Price Setting Behavior in Israel – An Empirical Analysis Using Microdata[1]

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Abstract

The paper studies pricing behavior in Israel, using a very large dataset containing more than 3 million observations drawn from the Israel Central Bureau of Statistics (CBS) database, covering all CPI components except housing and fruit and vegetables. The mean duration between price changes is about 6 to 9 months, depending on the method of computation. We find considerable heterogeneity in the frequency of price changes within and between sectors. We also find that the inflation environment, outlet characteristics and seasonality affect pricing behavior. Changes in VAT have some impact on duration but generally only affect the size of price changes of the most flexible prices. According to our analysis, the size of the average price change is 3.5%. Price reductions constitute about a third of price changes, and their average size, about 10%, is similar to that of price increases.

1. Introduction

The dynamics of price changes, and in particular the degree of rigidity in the pricing process, is an important factor in models explaining why monetary policy influences the real economy - particularly within the New Keynesian framework. A well known and wide-spread example for modeling price rigidity is the Calvo (1983) model, which assumes prices can change each period with a given fixed probability (p) that does not depend on the state of the economy or the time that elapsed since the previous price update. The size of this parameter p, and more generally the pricing behavior, which affects the dynamics of inflation – especially the reaction of prices to various shocks to the system – is therefore fundamental. This study offers an analysis of pricing behavior using microdata from the Consumer Price Index (CPI) database of Israel's Central Bureau of Statistics (CBS). The analysis will allow us to propose an estimate for the Calvo parameter as well.

[1] We wish to thank Alon Binyamini and the participants of the Bank of Israel Research Department seminar. We also wish to express our appreciation to Eyal Zafrani, Hagai Sugarman and their team from the Bank of Israel's IT Department for creating easy accessibility to the very large amount of data, as well as Shay Fried and Barkan Dolev for their research assistance.

Earlier studies based on microdata in Israel looked at the behavior of specific prices in a period with a relatively high rate of inflation and found a very short expected price duration. Lach and Tsiddon (1992, 1996) found that for data from the beginning of the 1980's (when the monthly (!) inflation was about 4-7%), prices changed every one–two months. Eden (2001) found that prices were updated every two–three months for similar microdata for the period of 1991 to 1992 (monthly inflation of about 1%). Baharad and Eden (2004) reported on different degrees of price stickiness for 1991–1992, depending on the computation method (an issue we will return to later in this paper); they argue that the standard computation leading to an average duration of about four months suffers from an aggregation bias, and therefore suggest an alternative computation yielding a duration of almost eight months.

Macro-based studies for Israeli data have estimated and made use of the Calvo parameter. In a DSGE model for the Israeli economy, Argov et al (2012) calibrated a quarterly Calvo-type probability for price adjustment to be 0.6, which corresponds to an average price duration of 2.5 quarters (about seven–eight months). This is somewhat shorter than is usually assumed in studies based on macro data for other countries, but is consistent with previous macro-based estimations by Ribon (2004) and Binyamini (2007).

There are a large number of papers studying pricing behavior in various countries. In the beginning of the previous decade, the ECB formed the "Inflation Persistence Network" (IPN) to study the issue in many EU countries and produced an extensive series of papers. The results of these papers were summarized by Alvarez et al (2006). The main findings were as follows:

- Firms in the euro area change their prices on average around once a year.
- Price adjustments are heterogeneous across sectors, with the highest flexibility in unprocessed food and energy and the lowest in services.
- Adjustments tend to be relatively large – about 8-10%, and price reductions are common.
- The frequency of price changes is affected by macroeconomic factors (such as the rate of inflation), by sectoral conditions, by time (seasonality) and by specific shocks (VAT).

Klenow and Malin (2011) reviewed the recent literature (mainly for Europe and the US) in their chapter in the *Handbook of Monetary Economics* and pointed out ten major findings. Their important findings, in addition to those of the IPN, were:

- The frequency of price changes in the US is higher than in Europe, mostly due to temporary price changes.

- Prices of durables change more frequently than those of non-durables. Prices of non-durables change more frequently than those of services.
- On the average, micro prices change more than is necessary to keep up with the aggregate inflation rate, and relative price changes are transitory; both of these findings suggest a dominance of temporary idiosyncratic shocks.

Table 1 in their work lists the results of a large number of papers that are based on CPI data[2]. The results are shown in terms of frequencies (inverse of the duration) and range from 0.11 for Germany, about 0.15-0.17 for many of the other European countries, and up to 0.37 for Brazil and 0.46 for Chile, apparently due to higher rates of inflation in these countries. Table A.1 in this paper presents a selective summary of results of studies using CPI data for several countries. In European countries, duration varies between six–seven months (Spain and the UK) and 15-20 months (Germany); in higher inflation countries the duration is much shorter. The duration estimate (or frequency of price changes) depends heavily on the data used, in particular on the level of aggregation of quoted prices and on the method in which the duration and frequency are computed. Therefore, the scope for comparison between studies is limited.

The aim of this paper is to study the dynamics of price changes, using microdata for the basic products and services that are included in the CPI in Israel.[3] The questions addressed relate to the frequency and size of price changes, and what factors – sector specific and macroeconomic – affect them.

Our main findings are that prices are moderately sticky in Israel, with an average duration of about six to nine months, depending on the method of computation. Duration and the size of price changes are affected by the inflation environment, and, in particular, inflation expectations. Prices that are more flexible (have a shorter duration) tend to react more moderately to changes in inflation with regard to the duration and the size of price changes. Changes in the value added tax (VAT) rate have some effect on duration, but have only a minor effect on the size of price changes, and only for the most flexible prices.

The paper is organized as follows: Following the introduction, Section 2 presents some computational issues. Section 3 describes the data, and Section 4 presents some basic statistics and analysis. The factors affecting the pricing behavior are analyzed in Section 5 and Section 6 concludes.

[2] Other papers are based on scanner data and on the Producer Price Index.
[3] The Fruit and Vegetables and the Housing sectors were omitted from our database and analysis. We refer to their effect on price behavior in section 4.a of this paper.

2. Computational Issues

a. Duration and frequency of changes: In this section we present terms and concepts associated with the analysis of pricing behavior. The basic term is the *duration* of a price – the number of months in which a single price remains unchanged. The corresponding term is the *frequency* of price changes – the number of price changes within a given time period.

Let $i=1,..N$ be the number of entries (goods) and T the number of periods they are observed. For simplicity, let us assume balanced data, with NT observations. The sum of durations for each entry is therefore T. Let b_i be the number of different prices for entry i, so that $1 \leq b_i \leq T$. $1/T \leq b_i/T \leq 1$ is the frequency of price changes, which is the fraction of periods with price changes for entry i. The reciprocal, $1 \leq T/b_i \leq$T is the average duration for entry i.

The average duration of the entries may be computed directly by averaging durations:

$$(1) \qquad dur\_entry = \frac{1}{N}\sum_i \left(\frac{T}{b_i}\right) = \frac{1}{N}\sum_i \left(\frac{b_i}{T}\right)^{-1}$$

Another alternative is to first average the frequency of price changes:

$$(2) \qquad ratio\_entry = \left(\frac{1}{N}\sum_i \frac{b_i}{T}\right)$$

and from this average the average duration may be derived:

$$(3) \qquad dur\_by\_ratio\_entry = \left(\frac{1}{N}\sum_i \frac{b_i}{T}\right)^{-1}$$

The use of the Harmonic Mean matches the link between duration and frequency of changes. It is the reciprocal of the arithmetic mean of the reciprocal of the original variable, or written simply as:

$$(4) \qquad H(x_1 ... x_n) = \left(\frac{1}{n}\sum_{i=1}^{n} x_i^{-1}\right)^{-1} = \frac{1}{\frac{1}{n}\left(\frac{1}{x_1} + ... + \frac{1}{x_n}\right)}$$

Dur_by_entry is the "harmonic mean" of (T/b_i). We know from Jensen's inequality that $E\left(\frac{1}{x}\right) \geq \frac{1}{E(x)}$, so for $x = b_i/T$, it is always true that

$$(5) \qquad dur\_entry \geq dur\_by\_ratio\_entry$$

In a model where everything is symmetric and the frequency (probability) of price changes is equal for all entries, as is usually assumed in the Calvo model, we have the simple geometric distribution with the probability for a price change θ, for example. Only in this case both definitions (*dur_entry* and *dur_by_ratio_entry*) will yield the same average duration, $1/\theta$. Baharad and Eden (2004) related to this aggregation issue and argued in favor of computing the average duration by averaging the durations, similar to our *dur_entry* computation. They showed that this computation may be biased in both directions, but it is consistent.

An alternative perspective is to observe the entire array of entries at each point of time *t*, and compute the proportion of prices that are changed at that date.

Let a_t be the number of price changes each period. The ratio of price changes each period is a_t/N. The average ratio over time is:

$$(6) \qquad ratio\_date = \tfrac{1}{T}\sum_{T}\frac{a_t}{N}$$

Because the total number of different prices is summed over periods and entries, $\sum_t a_t = \sum_i b_i$, it follows that in a balanced panel *ratio_date=ratio_entry*. Our analysis will refer to the three alternative methods of computation.

b. The hazard function: The history of a certain product's prices and price changes may be examined in the framework of survival analysis. A given price "survives" until a "failure" occurs and it is changed. The hazard function is the conditional failure rate, given that it has not yet occurred. If S(t) is the probability to survive at least until time *t*, and *f(t)* is the probability to fail at time *t*, then the hazard function is:

$$(7) \qquad h(t) = \frac{f(t)}{S(t)}$$

Proportional hazard models are standard parametric models that describe the factors that affect the hazard function. They may be expressed as a function of the time *t* that elapsed, multiplied by other factors, *x*:[4]

$$(8) \qquad h(t \mid x_j) = h_0(t)\exp(x_j\beta_x).$$

The most common specific distributions are:

[4] See Cleves et. al. (2010) for an extensive discussion of empirical survival analysis.

- The Weibull distribution for which :

(8.1) $h(t \mid x_j) = pt^{p-1}\exp(x_j\beta_x)$

That may be also expressed in an Accelerated Failure Time (AFT) metric, in terms of *ln(t)*:

(8.1a) $\ln(t_j) = x_j\beta_x + \ln(\tau) \quad \tau_j \sim Weibull(\beta_0, p) \quad F(\tau) = 1 - \exp\left[-\{\exp(-\beta_0)\tau\}^p\right]$

When p=1, the hazard is constant and the model reduces to a simple exponential model. If p>1, the hazard is monotonically increasing and for p<1 it is monotonically decreasing.

- The LogNormal distribution, represented in the AFT metric:

(8.2) $\tau_j \sim LogNormal(\beta_0, \sigma) \quad F(\tau) = \Phi\left(\frac{\ln\tau - \beta_0}{\sigma}\right)$

- The Log-logistic distribution:

(8.3) $\tau_j \sim LogLogistic(\beta_0, \gamma) \quad F(\tau) = 1 - \left[1 + \{\exp(-\beta_0)\tau\}^{1/\gamma}\right]^{-1}$

The Log-logistic distribution closely resembles the LogNormal distribution, and has a simpler mathematical expression of the hazard and survival functions.

We experimented with all three alternative distributions and found, based on the Akaike or the Bayesian information criteria (AIC and BIC) for goodness of fit, and on visual evaluation, that the fit according to the Weibull distribution is inferior to the other two alternatives, which were very much alike. We preferred the Log-logistic distribution due to better fit of the estimated duration for most (shorter) relevant durations. A detailed description of the estimation will be presented later.

3. The Data

a. General description

The data used in this study is a longitudinal monthly dataset, collected by the Israel Central Bureau of Statistics for the purpose of computing the Consumer Price Index (CPI). Prices for products are collected by surveyors from stores in about 100 municipalities throughout Israel. Prices for services are collected by phone, Internet, fax or other methods. The specific price quote of an entry in the Israeli CPI is our smallest "atom component". The data covers the period from January 1999 until June 2011 (150 months). Each individual price record corresponds to a precisely defined item

in a particular outlet in a given city at a given point of time, i.e., packed sliced white bread, by Angel's bakery, 450 gr., in a specific supermarket in Jerusalem.

These entries ("atoms") are aggregated into items (packed sliced white bread), which are aggregated into products (a loaf of bread). Groups of products make up the sub-subsectors (bread), and these are aggregated into subsectors (bread, cereals and baked products), and eventually into one of the ten major sectors (Food) of the CPI. Each of the entries may be related to the different levels of aggregation (Table 1).

Our data includes eight of the ten major sectors of the CPI. We excluded the Housing component, which measures new and existing rent contracts signed by different households. We also excluded the Fruit and Vegetables sector[5] which is characterized by significant seasonality and its prices are usually updated very frequently, more than once a month.

b. Weighting:

The weight of each of the sectors and smaller aggregates of the CPI in the sample data is significantly different from the weight of these components in the CPI (Table 1). In order to correctly represent the behavior of the CPI we had to weight our observations according to their weight in the CPI. The lowest aggregation for which we had weights is the product level. Therefore we weighted our observations starting from this level, assuming that all the entries in each product had the same weight. Relevant statistics were computed for each atom entry and averaged across entries which belong to the same product, without weighting, and then aggregated into higher levels, using the product weights. The average duration was computed first for each entry (excluding censored durations), averaged over entries and to higher aggregations, as required. This method of computation gives the appropriate weight for each price.[6]

[5] Fruit and Vegetables are a separate sector in the Israeli CPI and are not included in the Food sector.

[6] As Baharad and Eden (2004) show: Assume there are two products, each sampled for 100 periods. The price of one product is changed every period and the price of the other product is changed every two periods. A simple average over all durations will yield (100*1+50*2)/150=4/3 because shorter durations get more weight as they are observed more times. If we first compute average duration for each product separately we get (1+2)/2 = 1.5.

c. Prior data adjustments:

Prior to the analysis of the data, some adjustments were made. Some entries are sampled only once every few months.[7] We completed the data by assuming the price in between samplings did not change and was equal to the last observed price.[8] This of course, may upwardly bias the duration measurement, but for the products and services that are sampled less frequently, we may also assume that prices actually remained unchanged for most durations. Some prices were missing in arbitrary months within the sampling period. Following the same method, prices in between two sampled periods were filled in with a price identical to the price that existed one month before.

We kept only entries which were sampled for a period of at least 24 successive months in our data, in order to minimize the bias created by the censored observations. We were left with about 3.2 million observations for about 40,000 entries (Table 1). Diagram 1 illustrates a few examples of the original data we used. Some of the prices that were sampled tend to change very frequently (like coffee or home computers) and others stay unchanged for longer periods (like a ticket to the cinema or cigarettes).

For each observation, we computed the price change (which could also be zero) as a ratio of the base price[9]. If the change in price was zero, we added one to the number of months that elapsed since the last price change. If a change in the price of the atom entry occurred, it was indicated and the duration of the previously existing price was computed. If an observation was the last observation for the specific entry, the duration was computed, and the observation was marked as end-censored.

We did not have an explicit indication for sales in the data. We identified a sale price as a reduction in the price of the entry (by at least 5 Agorot – 0.05 NIS) that lasts only a single month.

Table 1 indicates that entries are observed for about 88 months, on average, before they cease to exist or cease to be sampled.[10] This is a relatively long period of about seven years, with a minimum of about 20 months and maximum of about 150 months. These relatively long trajectories reduce the concern of censored durations. The share of

[7] For example, household help is sampled once every three months.

[8] We completed up to six months of missing months, except for the Clothing and Footwear component, there we completed nine months of missing data. Most of the occurrences were of one or two missing months.

[9] Price increases of more than 100% and price reductions of more than 70% were omitted from the data.

[10] The trajectory of an atom entry includes "editor's changes" that indicate a change in the specific characterization of the product within the same entry classification. When computing the average duration and price changes we exclude these occurrences. (See the following sections for details).

censored durations, with zero price change on the last period observed, is about 13% of all durations. We refer to censored durations in our analysis.

d. Some additional issues

Campaigns: The data contains occurrences of special campaigns which were not implemented by changing the (recorded) posted price but through which the effective price was altered by special offers, such as an additional free unit of the product ("buy one, get one free") or increasing the size of each unit ("free extra 25%"). Our data includes indications for these campaigns.

Theoretically, it is not clear whether we want to include these types of price changes in our analysis because they may reflect seasonal or other marketing considerations and not macroeconomic considerations. Some studies make the distinction between "sale prices" and other "regular" changes in prices.[11] We chose not to refer to these events as "regular" price changes and we do not count them as such. Rather, for each entry and price duration we denote the average ratio of periods with product campaigns within the time span until the price was changed.

VAT: VAT (value added tax) is imposed on most products and services in Israel. Excluded are fresh fruit and vegetables (which are not included in our data), government services (such as education services) and goods and services purchased in Eilat. The prices which are recorded and used in this study belong to one of three categories. The first contains products upon which VAT is imposed and whose reported price includes VAT; the second category is products upon which VAT is imposed, but VAT is not included in the reported price (e.g., legal services). The third consists of exempted products, as described above. These three categories are identified in the data and are related to when the effect of VAT changes on price dynamics is estimated. According to Text Table 1, in most sectors, VAT is imposed and included in the price of almost all products and services. Exclusions are the Dwellings Maintenance sector, where municipal taxes are exempt, and education payments which also do not entail VAT. On average, about 78% of prices (weighted by product) in our database include VAT. Our database does not include Housing expenses and Fruit and Vegetables, which together comprise about 25% of the CPI and are exempt from VAT.[12] Therefore the weight of products and services carrying VAT in the total CPI is about 60%.

[11] Klenow and Malin (2011) refer to this distinction in Table 1 in their work.

[12] An additional 6% of CPI is generally products and services for which VAT is paid, and is also missing from our database (see following paragraph in this section).

Text Table 1: VAT characteristics – weighted by product

Sector		Price includes and is recorded with VAT	VAT is paid but not recorded in price	Exempt from VAT
1	Food	.99	.00	.01
4	Dwellings maintenance	.38	.33	.28
5	Furniture and household equipment	.99	.01	.00
6	Clothing and footwear	.99	.00	.01
7	Health	.97	.01	.02
8	Education, culture and entertainment	.65	.04	.31
9	Transport and communication	.89	.06	.04
10	Miscellaneous	.87	.08	.05
	TOTAL (in database)	.78	.09	.12

Prices denominated in foreign currency or in percentage rates: During the years of high inflation rates, some products and services, such as legal services or catering services, and, in particular, rents (which are not in our data), were denominated and reported in dollar terms. Some other services, such as vacations abroad, are still denominated in dollars. In our data, only 0.9% of prices (weighted by product) are denominated in dollars, and another 0.2% are denominated in percentage rate. These products and corresponding dates are identified in the data.

Changes of the specific product within the same entry (editor's change): When collecting the prices of the different products, the CBS marks whether there was a change in the characteristics of a product, within the same "atom" entry. For example, if the surveyor reported the price of strawberry yogurt instead of apricot yogurt – of the same firm and brand, this will be symbolized as a change, although the price may remain unchanged. Other examples are a different specific "children's cupboard" or "women's dress". We are able to detect these events in the data, and mark for an editor's change (where there was also a price change). We chose to keep the identification of a specific product according to the "atom" entry, and mark the editor's indication for a change with a dummy variable.

Text Table 2 shows the proportion price changes in each sector, which are accompanied by a change in the editor's symbol, and the average rate of price change for these occurrences relative to other occurrences.

Text Table 2: Editor's changes

Sector	% editor's change of product (accompanied by a price change)	Average rate of price change	
		Without editor's indication	With editor's indication
1. Food	5.3	0.024	0.111
4. Dwellings maintenance	9.9	0.028	0.146
5. Furniture and household equipment	18.9	0.005	0.122
6. Clothing and footwear	37.0	-0.043	0.236
7. Health	5.3	0.030	0.173
8. Education, culture and entertainment	10.3	0.193	0.146
9. Transport and communication	3.3	0.014	0.120
10. Miscellaneous	10.0	0.041	0.132

Two main findings can be seen from the table. The first is that sectors that are characterized by more heterogeneous and seasonal products, such as the Furniture and Household equipment sector or the Clothing and Footwear sector, are also characterized by a higher rate of editor's changes. The other finding is that on the occurrence of such a change the average price change is usually much larger, indicating a real change in the specification of the product recorded. In the following analysis, we will refer to these occurrences separately, and exclude them according to relevant considerations from the empirical examination.

Missing products: In addition to the two sectors that we chose to exclude from our analysis – the Fruit and Vegetables and the Housing sectors – there is another very small fraction of products and services missing from our dataset. These include the prices of vacations abroad, which are irrelevant, and some services such as postal services (only 0.02% of the CPI) or summer-camp (0.2%). We also excluded data for prices of cellular phones and Internet services from our analysis due to the difficulty of distinguishing between a price update of the same product and a change in the product itself. This is because there are very frequent price/product updates. The weight of cellular phones and Internet services items amounts to about 2.8% of the total CPI. All the excluded components in the sectors we analyzed amounted to about 6.5% of the total CPI.

4. Some Basic Statistics

a. Duration, frequency and the size of price changes[13]

Table 2 presents the main statistics for the duration and the frequency of price changes (average share of months with a price change out of total observed months of a certain product), by sectors and for aggregated CPI. The average frequency is computed separately for each entry, averaged over entries that belong to the same product and then averaged over products, in each sector, with the product weights. The *implied* duration is the inverse of the averaged change ratio. Alternatively, average duration is computed *directly* in a similar averaging method, using the average price duration in each of the entries. As shown in equation (3), average duration (*dur_entry*) will always be at least as large as the inverse of the change ratio (*1/ch_ratio_entry*). In addition, we present the harmonic mean, which is closer, by definition, to the implied computation of the duration[14]. While the mean duration for the CPI is about nine months, prices are changed on average about once every four months. The median duration is 7.5 months, and the implied median duration, according to the median frequency, is about five months.[15] The dispersion of durations and frequency of price changes, as seen in Diagrams 2 and 3, explains the considerable difference between the alternative measures.[16]

Looking at the different sectors, prices are updated relatively frequently in the Transport and Communication sector, due the impact of the monthly administered change in the price of gasoline for cars. The average and median duration in most other sectors is between 7-11 months. Implied duration is shorter. Prices in the Health and Miscellaneous sectors have relatively longer durations of over one year.

Diagram 2 illustrates the distribution of price durations for each sector and subsector. The data in the diagram represents entry averages, without weighting according to product weight in the CPI.[17] For most cases the distribution is skewed to the left so that the median is lower than the mean duration, as seen in Table 2.

Table 3 presents complementary statistics for the average size of price changes, when they occur. Averages were computed as described above for durations. The average size of a price change for all products is 3.5%, with price reductions of about 10%, which

[13] All duration analysis refers to data excluding observations for which there is an indication of an editor's change. (See Section C above).

[14] The size of the duration according to the harmonic mean and the implied duration for the sectors, which are presented in Table 2, are not identical due to (linear) weighted averaging over products.

[15] All, excluding censored durations.

[16] A similar difference between the direct and implied computation of duration was also found for Spain by Alvarez and Hernando (2004).

[17] Lowest and highest 5% of distributions were omitted in diagrams.

comprise, on the average, about a third of total price changes, and increases of 12% on average[18]. The average size of the price increases is substantial, and is in line with the findings of Lach and Tsiddon (2007), that show that although the size of price changes for some products may be small, the average size of price change (in their setting, within a store), is larger, and in line with the findings in Alvarez et al (2006). The size of average price changes varies between sectors, with an average reduction of 6% in the Clothing and Footwear sector, representing the downward trend in the relative price of this sector in recent years, and Health and Miscellaneous prices changing on average by more than 7%. Diagram 4 shows the unweighted distribution of the average size of price changes for the sectors and subsectors. For most sectors, the size of price reductions is less dispersed than that of price increases. Diagram 5a shows the duration and the size of price changes by sector. Diagrams 5b and 5c present (aggregated over products), the degree of symmetry between the average size of price increases and the average size of price decreases, and the degree of symmetry between the average frequency of price increases and the average frequency of price decreases.

Table 3 exhibits interesting information about attractive prices, which are defined to be prices that end with a "0" or "5" and those ending with a "9". It shows that about 15% of prices end with a "9" in the cents (Agorot) or Shekels digit. In the Food sector, about a quarter of prices end with a "9" in the cents digits, and in the Clothing and Footwear sector, in which prices are usually higher, the "9" appears in a quarter of the last shekel digit. Levy, et al. (2011) have shown for US data that prices ending with a "9" are the most frequent ending, and that the average price change for these prices is larger than for others.

Supplement: Implicit frequency and duration for total CPI

As described earlier, our data includes only eight of the ten major sectors of the CPI. It does not include the Housing sector, which is measured by sampling rental contracts, and is about 21% of total CPI; of which 17% are new and renewed contracts and 4% are existing contracts. It also does not include the Fruit and Vegetable sector which consists of fresh fruit and vegetables (2% of CPI) and dried, canned and frozen fruit and vegetables (1% of CPI). Using plausible assumptions about the behavior of these prices, we may evaluate the duration and frequency of price changes for *total* CPI. According to

[18] These rates of change do not include the effect of non-price campaigns on effective prices. These changes are taken into account by the CBS when computing the official published CPI.

external information from the CBS, we know that about 90% of rent contracts are signed for a period of one year.

For simplicity, we assumed all contracts are signed for one year, and applied different assumptions concerning the share of new contracts that actually update the rent price to be between 0.1 to 1.0. For fresh fruit and vegetables (F&V) we assumed prices are updated (at least) once a month; other (dried canned or frozen) fruit and vegetables are updated like goods in the food sector, about every 10 months. The implicit duration and frequencies for total CPI are shown in the following text table:

Text Table 3: Implicit duration and frequency of changes for aggregate CPI

Weight	750	217	23	10	1000
	Our data	Housing	Fresh F&V	Other F&V	**Implicit average**
10% of new contracts change price					
Mean frequency	0.25	0.03	1	0.18	**0.22**
Mean duration	9.3	11.4	1	9.8	**9.6**
100% of new contracts change price					
Mean frequency	0.25	0.26	1	0.18	**0.27**
Mean duration	9.3	9.2	1	9.8	**9.1**

The average frequency of price changes, including Housing and Fruit and Vegetables, is between 0.22 – 0.27, depending on the assumption concerning actual price updated in the Housing sector, as measured in the CPI. Average duration does not change much and is between 9.2 – 9.7 months for total CPI.

b. The monthly rate of price changes: An alternative computation for the ratio of price changes, which is presented in equation (6), is to look at the share of price changes each period (month). The ratio of prices (that are changed each month for each product separately) is computed and this ratio is averaged using the product weights, by which the average ratio for the CPI is obtained. Table 4 examines the rate of price changes each month across all entries. On average, about 18% of all prices change every month, of which about 11% are price increases and 7% are price reductions. A high rate of monthly price changes is evident in the Transport and Communication sector, while in all other sectors the rate is lower at about 4–7% (with a rate of price increases of about 10% in the Food and Dwellings Maintenance sectors).

Diagram 6a shows the computed ratio for each month, Diagram 6b shows separately the rate of ratio of reductions and increases, and Diagram 6c shows the change ratio for each sector separately. The average rate of monthly changes over the years for aggregate CPI

is about 0.20 with standard deviation of 0.04. The monthly volatility is noticeable, and most of it originates, as seen in Diagram 6b, from the Dwellings Maintenance sector, and, in particular, energy products, which are updated very frequently; additionally, it originates from the seasonal behavior of the Clothing and Footwear sector, and from the annual price updates of education prices (in the Education, Culture and Entertainment sector) by the government. According to the diagram the ratio of price changes lessened in the last year and a half, possibly due to a reduction in the ratio of changes in the Transport and Communication sector. The seasonality factor is most evident in Clothing and Footwear and much less in other sectors.

c. Correlations

The correlation between the price duration for an entry and the size of the price change and absolute price change was examined. This was done for the entries (without weighting), and alternatively for the data aggregated into 329 products using weights, as described above. The results are shown in Table 5. Generally, the measured correlation for the data aggregated by products was much higher than that measured for the separate entries, due to a large variance between the thousands of entries which was "averaged-out" at the product level. For both versions the sign of the correlation was as expected. For most sectors, a longer duration is correlated with larger price changes, when they occur. Diagram 5a shows the relationship between average duration and size of price change, for each of the products, by the eight sectors.

An additional analysis of the relationship between price changes in different sectors is the correlation between the ratio of monthly changes – total, reductions and price increases – between sectors. These are shown in panels (a) to (c) of Table 6. As we found in other tests and statistics, the Clothing and Footwear sector has a unique pattern of price changes due to the strong seasonality effect and it is not correlated with any of the other sectors. The monthly frequency of price changes in the Food sector is relatively highly correlated with all other sectors, as is the monthly price changing pattern in the Furniture and Household Equipment sector. A possible explanation is that the Food sector and the Furniture and Household Equipment sector both include a relatively high share of products (as opposed to services), and the market for these products is affected by the seasons of the year and by the timing of holidays. Additionally, the tables show a generally lower correlation between sectors for price reductions than that of price increases.

d. The effect of entry characteristics

Group attributes: The products in the CPI may be divided into different groups. We chose to divide the products into four different divisions, which were: services (or products); energy (or non-energy); durables (or others) and tradables (or others). For each of these divisions we checked whether there is a significant difference in the price duration and in the size of price changes using a simple t-test, for all products in the group, and by sectors, where applicable. The results are shown in tables 7a to 7d. The most evident difference in pricing behavior is for the energy products (Table 7c). We found that the price duration for these products is about three months, compared to 10.1 months for all other products. The size of price change is on average only 1.4%, compared to 2.6% in other products, but the difference is insignificant. We also found that price duration for services is higher – 15.9 months compared to 8.4 months in other products, with a small but significant difference in most sectors in the size of price change. No difference was found between the price duration of durables and other products – including or excluding services, but the size of price change is significantly smaller. This finding does not match the findings of Klenow and Malin (2004), who found that durables change prices more frequently than nondurables. The duration of prices of traded goods is significantly shorter than that of other goods and services (8.4 compared to 12.7 months), and is evident in the Dwellings Maintenance sector due to the effect of the energy products. The average size of price change for tradables is 0.5% compared to 6.4% for other products.[19]

Outlet attributes: For many of the collected entries, we have information about the kind of outlet in which they were sold. The outlet may be a specialty store, a grocery store, an open market, a chain store, a pharmacy, electronic commerce (via the Internet) or a convenience store. This division is not relevant for all sectors. For example, in Transport and Communication, this division does not apply for most entries. Table 8 shows the average duration and size of price changes by sectors and outlets. The most interesting evidence refers to the Food sector, where we may assume similarity between basic characteristics of products sold in outlets of different kinds. The average duration of prices in chain stores is about as half of that in grocery stores and the size of the average change is smaller than in all other outlets. This behavior is consistent with the assumption

[19] It is worth mentioning that the division between tradables and nontradables was based on theoretical considerations and did not take into account important factors such as import taxes or other barriers to imports.

that the cost of price changes is lower in chain stores due to the returns to scale and therefore in these stores price changes (even excluding special non-price promotions) are more frequent. It may also be consistent with higher monopolistic power of local grocery stores relative to chain stores.

Variation in duration and size of price change may also arise from heterogeneity in products sold in different types of outlets in the same sector. For example, products of the Furniture and Household Equipment sector that are sold in grocery stores are probably different than the products in the same sector that are sold via electronic commerce.

5. Factors affecting pricing behavior

In our analysis in this section, we will try to identify which factors affect pricing behavior - duration, size of price changes and monthly rate of price changes. This analysis can help us understand whether price updating is dependent on time and state, as models such as that of Dotsey, King and Wolman (1999) and Taylor (1999) suggest, or independent of time and state, as the simple Calvo model assumes.

In particular, we are interested in determining whether a change (assume an increase) in the rate of overall inflation reflects and induces a faster pace of price changes, i.e., shorter durations, or larger price changes. Is aggregate inflation relevant as it reflects general macroeconomic conditions or is the sectoral price behavior more important? Are price setters backward-looking, or do they give weight to expected inflation?

A reasonable hypothesis, in the presence of "menu costs", is that when inflation is higher price changes will be larger, but duration will not shorten significantly because of the costs associated with "changing the sticker", but not with printing a higher price on it. On the other hand, if menu costs in the computerized era are generally small, updating prices more frequently when inflation is higher may be preferable.

These questions are addressed by estimating the factors that affect the duration in the framework of hazard analysis, and the size of price changes, the probability of a price change and, alternatively, the factors that affect the rate of price changes each month.

a. What determines the price duration

For each entry, our data contains information about the number of periods between price changes (the duration) and the size of the change in price when it occurs (in percentages), specific attributes of the entry such as the outlet it is sold in, and information about the time, such as seasonal month dummies. We attached the corresponding macro variables by date to each observation. We looked at the aggregate rate of inflation, the measured

inflation for the sector, 12-months-ahead inflation expectations ("break-even inflation"), as measured from the capital markets, and the shekel-dollar exchange rate depreciation – for that point of time. In addition to the macro variables, we also included dummy variables indicating a reduction or increase in VAT (and identifying whether VAT is included in the reported price), a dummy variable for a sale price, which is a reduction in price which lasts only one period, and the proportion of months in which non-price promotions were applied since the previous price change. (See Section 3d). We also included dummy variables for an observation which represents a reduction in price (as opposed to an increase.) We added dummy variables for prices that are attractive (ending in 0, 5 or 9), monthly dummy variables and dummy variables for different types of outlets (i.e. chain store, specialty store).

We analyzed duration lengths and the factors affecting them, using the hazard function approach presented in Section 2b. As we are interested in the factors affecting the duration of each single price, without relating to its impact on the average duration or prices, we did not imply any weighting. We allowed heterogeneity between observations (termed as "frailty") and found, using a Chi-squared likelihood test, that it cannot be rejected.

Due to computation limitations, we estimated the hazard function separately for each of the eight CPI sectors. The results are presented in Tables 9a – 9d. They are shown in terms of the duration *t*, so that $ln(t)=x'\beta+\varepsilon$, and so are easily interpreted.

Our results show that the effect of the inflation environment on expected duration is negative and significant – i.e., the expected time until a price change is shortened when inflation is higher.

Expected duration is affected by inflation of prices in the sector in the past 12 months (Table 9b) to a larger extent than it is by total inflation (Table 9a), which is significant and negative only in some sectors. Thus, there is some evidence for the importance of a change in relative prices compared to the general inflation environment in determining the duration of prices in each sector. A larger effect is attained when inflation expectations (derived from the capital market) are included in the estimation. The implication of a coefficient of about -0.05 is that the expected *log(t)* is shortened by 5% for an annual inflation rate higher by one percentage point. Estimating the effect at the mean value of all other explanatory variables, this means a duration shorter by about 0.16 of a month (5 days). In fact, although annual inflation rates do move during the investigated period between a minimum of -2.7% to 7.5%, on the whole, this period is

characterized by a stable inflation environment, essentially perceived as price stability. So, it is plausible to assume that small (and temporary) changes in measured inflation do not significantly alter the behavior of price setters. The negative and significant coefficients are as expected, and their small magnitude is not unreasonable.

In Table 9d we present specifications including the variability (standard deviation) over time of total inflation and show that it has a significant negative effect on the length of expected duration. Larger uncertainty about inflation rate shortens expected duration.

The effect of changes in the dollar exchange rate is significant and negative with a small coefficient of -0.02 to -0.05. We know that in Israel the macroeconomic effect of the exchange rate existed in the past due to dollar denomination of prices in the Housing sector, which is not included in this analysis, and that its effect on the other components of the CPI is much smaller. This micro behavior matches these findings.

Discrete increases in the VAT rate are found to have a statistically significant negative effect in some sectors (when VAT is included in the reported price), meaning the expected duration shortens when the VAT rate is increased. In contrast, reductions in the VAT rate have a positive coefficient – lengthening expected duration, but are only occasionally significant. We note that during the sample period there were only four reductions and two increases in VAT rates. (See Diagram 6a).

A dummy variable for a “sale” is significant with a negative coefficient for all sectors and overall CPI. As a "sale" is defined to be a reduction in price that lasts only one month, this variable ought to be treated only in order to correct for these occurrences.

A dummy variable for price reductions (as opposed to increases) usually has a positive coefficient – implying that duration is longer before price reductions. Another interesting result is that attractive prices also tend to last longer. As already evident in the simple univariate analysis in Table 8, prices tend to have longer durations in grocery stores and are shorter in chain stores. Different sectors have different seasonal patterns, with monthly dummy variables significant in most specifications.

The shape of the hazard function, under the log-logistic distribution, is determined by the value of the γ parameter. It is about 0.5 for all specifications – implying a mostly decreasing hazard function. The estimated hazard functions for the separate sectors are shown in Figure 8. For most sectors, except the Health sector, and to some extent the Transport and Communication sector, the estimated hazard function is very close to the empirical hazard.

b. What determines the size of price changes?

The expected size of a price change, when it occurs, was estimated using an OLS regression, taking into account fixed effects of the 106 sub-subsectors. In addition to the explanatory variables that were included in the hazard function, the duration of the spell that ended with the price update was also included. We omitted the dummy variable for reduction in price from the estimation. Although the R^2 of the estimation is very much improved by its inclusion, it is in some sense endogenous. The results are presented in Tables 11a-11c.

The main findings are that past aggregate inflation, sectoral inflation or inflation expectations all have a significant positive effect for most sectors and in the aggregated estimation. The coefficient is about 0.2 to 0.4, meaning that a rise of 1 p.p. in inflation will result, on the average, in a 0.2% to 0.4% increase in the rate of average price changes (when they occur). The rate of depreciation in the exchange rate in the previous three months has an ambiguous and not always significant effect. The effect of changes in the VAT rate is generally insignificant, with some negative effect of reductions in VAT on the rate of price change. The size of the effect is generally smaller than 0.1. Contrary to expectation, a negative sign on duration was obtained – longer durations are associated with smaller price changes. This may represent the fact that there are longer durations before price reductions than before price increases.

c. Horizontal (cross-entry) analysis:

For each month in our data set, beginning in January 1999 and until June 2011, and for each product separately, we computed the share of prices that were changed in that month. The results of the panel estimation of the factors affecting the share of price changes by product and month are presented in Table 13. We found that an increase in the rate of inflation—actual or expected—increases the share of price changes each month and, in particular, price reductions decline and price increases increase. A dummy variable for periods of economic slowdown (September 2000 through June 2003 and September 2008 through the end of the sample – June 2011) has a negative effect in some of the specifications, with a very small magnitude. We do see a positive effect on the share of price reductions and a negative effect on the share of price increases during slowdown. VAT rate changes have a significant effect on the share of monthly price changes with a positive effect of the size of about 0.12 for VAT reduction and a double sized effect of about 0.25 for VAT increases. This effect is noticeable in Diagram 6a. The peaks in the graph all correspond (together with an additional peak in January 2008) to

VAT changes. Diagram 6b shows price declines and price increases separately. The two peaks evident in the share of price increases are associated with the two VAT rate increases in June 2002 and July 2009. The peaks in price reduction share in the months that VAT rates were reduced are less evident.

Comparing between the higher R^2 in the first specification that included dummy variables for products and the second specification with dummy variables only for the sectors, with lower R^2, provides an indication of the heterogeneity in the pricing patterns between the products, which is also seen in Diagram 6c.

6. Sticky and flexible prices

One of the outcomes of our micro analysis is the ability to map the products and sectors at different levels of disaggregation, according to the extent of flexibility in their pricing. The New Keynesian approach assumes price setters may update their prices only once every period and therefore have to take into account their expectations about future developments when doing so. The less flexible their ability to reprice, the larger the weight of expected developments, relative to present conditions, in their considerations. Therefore, we may expect to find higher correlation of price changes with expectations for less flexible sectors and a higher correlation with present conditions for sectors that are more flexible. (See Millard and O'Grady, 2012).

Based on the duration analysis, we divided the CPI sectors (excluding Housing and Fruit and Vegetables) into four quartiles, with the lowest including the most flexible prices (shortest durations) and the upper quartile with the 25% most sticky prices (longest durations). We performed this for the 106 sub-subsectors, because the CBS only publishes formal price indices from this level of aggregation. Having done so, we were able to compute the price indices and rates of change for these four sub indices according to the degree of flexibility.[20]

As expected, and as seen in Diagram 1, the most flexible part of the CPI is the most volatile, in particular between 2008 and 2011. However, more interesting is the fact that towards the end of the period the four sub-indices converge to similar rates of change (over 12 months).

[20] For some of the published prices that are set annually (such as payments for public education or municipal taxes), the CBS smoothes annual price changes over the year, so although according to our measurements these prices belong to the sticky group of prices, the published price used for this analysis is seemingly very flexible.

Diagram 1: 12-months inflation rate by quartile of flexibility

While the standard deviation of monthly price changes is, as expected, much smaller for the most sticky quartile (0.007), compared with the most flexible quartile (0.011), the average size of monthly price changes is similar – 0.2% for the most flexible quartile and the most sticky quartile, compared with 0.1% for the middle quartiles, and 0.15% for total CPI (excluding Housing and Fruit and Vegetables). So we cannot conclude that on average sticky prices rise more or less than flexible prices.

We estimated the hazard function and the factors affecting the size of price changes, as has been done for the sectors. Results are presented in Tables 10 and 12. It is interesting to note that both the hazard function and the size of price changes of the more flexible prices (1st quartile) react more moderately to changes in the inflation environment than other quartiles. Because price updates are very frequent, the impact of changes in the inflationary environment on behavior is smaller, or at least harder to detect. Increases in the rate of VAT have a significant positive effect on the size of price changes only in the most flexible quartile, where it is possible to react in the short run to VAT changes. On the contrary, expected duration in the most flexible quartile is not affected, but in other quartiles an increase in VAT is expected to shorten duration.

7. Concluding Remarks

The paper studies the basic characteristics of pricing behavior in Israel, using a very large dataset containing more than 3 million observations drawn from the Israel Central Bureau of Statistics database, covering all CPI components except the Housing and Fruit and Vegetables sectors. The analysis offers, among other results, an evaluation of the degree of rigidity in price setting, estimated by the duration of prices, or its reciprocal – the frequency of price changes. The main conclusions may be summarized as follows:

1. Consumer prices are moderately sticky. The average price duration is about six to nine months, depending on the method of computation. The average frequency of price changes is about 0.25.

2. The average size of price change is 3.5%. Price reductions comprise about a third of price changes. The average size of a price reduction is considerable, at about 10%; the average size of price increases is 12%.

3. There is a positive correlation between the duration and the size of a price change.

4. There is considerable heterogeneity in the frequency of price changes (or durations) within and between sectors. The frequency of changes also depends on time in the year (seasonality).

5. The duration of energy prices is short – only about three months. The price duration of services and nontradables is significantly longer than that of other products. We did not find a significant difference between the price duration of durables and non-durables.

6. The duration of food prices in chain stores is about half the duration in grocery stores.

7. The inflationary environment affects both the duration of prices (negatively) and the size of price changes (positively), with a larger effect of inflation expectations relative to that of total actual inflation. Higher inflation time-variability shortens expected duration.

8. Changes in the rate of VAT were found to negatively affect the expected price duration in a hazard analysis, but have a significant effect on the size of price changes only for the most flexible prices.

9. The duration of flexible prices and their rate of change respond to changes in the inflation environment more than the duration and rate of change of stickier prices. Flexible prices react to VAT changes with the rate of price change but not with their duration.

10. Each month about 18% of prices change. Lower inflation and moderate economic activity tend to reduce the monthly rate of price changes. Increases (reductions) in the VAT rate tend to have a positive effect on the monthly rate of price increases (reductions).

Table 1: Basic Statistics

Sector* [weight of data in CPI]		No. of obs. (weight in data) **	Mean Trajectory (weighted by products)***	No. of entries	No. of items	No. of pro-ducts	No. of sub-sub sectors	No. of sub-sectors
1 [14.0]	Food	1,004,144 (30.9)	88.7	11,351	293	99	33	9
4 [10.1]	Dwellings maintenance	294,850 (9.1)	96.4	3,592	88	24	10	5
5 [4.5]	Furniture and household equipment	340,467 (10.5)	72.4	4,499	117	45	14	4
6 [3.1]	Clothing and footwear	565,663 (17.4)	77.5	7,516	151	59	18	2
7 [4.0]	Health	190,079 (5.9)	85.6	2,113	101	16	5	3
8 [12.2]	Education, culture and entertainment	348,930 (10.8)	103.4	4,751	203	49	15	2
9 [16.3]	Transport and communication	140,420 (4.3)	78.8	1,664	73	21	8	2
10 [4.6]	Miscellaneous	360,870 (11.1)	83.2	4,975	125	25	7	4
[68.6]	**TOTAL ***	**3,243,411**	**87.8**	**40,461**	**1,151**	**338**	**110**	**31**

* We exclude Sector 2 which is Fruit and Vegetables and Sector 3 which is Housing Services (rent). The weight relates to the items included in our dataset. Total weight of these sectors in the CPI is 74.5%, compared to 68.6% of our data.

** The relative share of observations in each sector is in parentheses. The relative share of entries is very similar.

*** Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d).

Table 2: Price change ratio and duration (weighted by product) *

			Frequency **			Implied median duration	Implied mean duration	Duration **		
		Weight of data in CPI (average 1998-2011)	median	A. mean	H. mean			median	A. mean	H. mean
1	Food	139.7	.20	.20	.18	5.0	5.0	7.2	8.2	6.5
4	Dwellings maintenance	100.7	.13	.18	.12	7.7	5.6	13.1	10.7	6.7
5	Furniture and household equipment	44.5	.20	.21	.20	5.0	4.8	9.0	8.7	8.1
6	Clothing and footwear	31.1	.26	.26	.23	3.8	3.8	6.3	7.4	6.2
7	Health	39.7	.13	.21	.12	7.7	4.8	12.4	14.0	5.7
8	Education, culture and entertainment	111.1	.12	.16	.12	8.3	6.3	11.7	10.8	9.1
9	Transport and communication	163.0	.28	.42	.20	3.6	2.4	3.9	6.4	3.5
10	Miscellaneous	45.5	.15	.16	.11	6.7	6.3	10.9	14.4	10.4
	TOTAL* **	**675.1**	**.21**	**.25**	**.15**	**4.8**	**4.0**	**7.5**	**9.3**	**5.8**

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.
** A=Arithmetic, H=Harmonic (see Section 2)
*** Excluding Fruit and Vegetables and Housing.

Table 3: Price and price change attributes (weighted by product)*

		Size of price change	Size of negative price change	Size of positive price change	Share of price reduc-tions	Share of attractive prices			
						"5" and "0" in cents	"9" in cents	"5" and "0" in Shekels	"9" in Shekels
1	Food	.040	-.093	.105	.31	.70	.23	.09	.02
4	Dwellings maintenance	.044	-.070	.083	.28	.65	.09	.25	.00
5	Furniture and household equipment	.010	-.129	.135	.46	.88	.11	.63	.10
6	Clothing and footwear	-.060	-.219	.297	.64	.86	.13	.41	.23
7	Health	.075	-.142	.158	.28	.78	.07	.39	.04
8	Education, culture and entertainment	.029	-.096	.108	.33	.97	.02	.47	.05
9	Transport and communication	.034	-.099	.085	.33	.79	.04	.37	.05
10	Miscellaneous	.077	-.145	.182	.29	.82	.16	.42	.06
	TOTAL*	**.035**	**-.106**	**.116**	**.34**	**.79**	**.10**	**.34**	**.05**

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.

Table 4: Rate of prices changed each month (weighted by product)

Sector		Rate of prices changed	Rate of price reductions	Rate of price increases
1	Food	.171	.066	.105
4	Dwellings maintenance	.143	.050	.093
5	Furniture and household equipment	.121	.059	.062
6	Clothing and footwear	.124	.069	.054
7	Health	.115	.048	.067
8	Education, culture and entertainment	.110	.044	.066
9	Transport and communication	.342	.139	.203
10	Miscellaneous	.097	.034	.063
	TOTAL*	**.177**	**.071**	**.106**

* Excluding Fruit and Vegetables and Housing.

Table 5: Correlation between duration, size of price change and size of absolute price change*

		Aggregated by entry			Aggregated by product (weighted)		
Sector	Correlation between:	No. of obs.	Duration, size of price change	Duration, absolute size of price change	No. of obs.	Duration, size of price change	Duration, absolute size of price change
1	Food	10,907	.37	.11	99	.75	-.02
4	Dwellings maintenance	3,126	.30	.06	24	.82	.52
5	Furniture and household equipment	3,977	.03	.03	45	.33	.13
6	Clothing and footwear	6,428	.25	-.08	59	.90	-.30
7	Health	1,901	.34	.23	16	.59	-.12
8	Education, culture and entertainment	3,916	.15	-.02	49	.47	.04
9	Transport and communication	1,542	.24	.26	21	.79	.47
10	Miscellaneous	4,357	.12	-.05	25	.31	.44
	TOTAL**	**36,154**	**.21**	**.02**	**338**	**.53**	**.17**

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.
** Excluding Fruit and Vegetables and Housing.

Table 6: The correlation between monthly rate of price changes (weighted by product)

a. All price changes

Sector*	1	4	5	6	7	8	9
4	.12						
5	.58	.08					
6	-.07	-.02	-.05				
7	.38	.05	.29	-.14			
8	.14	.02	.14	-.12	.09		
9	.41	.33	.36	.05	.39	.05	
10	.35	.15	.43	-.02	.23	.03	.26

* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

b. Price reductions

Sector*	1	4	5	6	7	8	9
4	-.10						
5	.35	-.04					
6	-.03	-.02	.14				
7	.41	-.08	.26	.04			
8	.15	-.08	.07	-.05	.13		
9	.21	-.03	.16	.07	.25	.12	
10	.65	-.03	.31	.11	.43	.26	.25

* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

c. Price increases

Sector*	1	4	5	6	7	8	9
4	.12						
5	.55	.15					
6	-.05	-.18	-.07				
7	.37	.13	.32	-.13			
8	.14	.07	.03	-.15	.12		
9	.31	.12	.36	.03	.27	.05	
10	.26	.18	.52	-.10	.25	.00	.27

* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 7: Duration and size of price changes, by group attributes*

a. Tradables

			Duration			Size		
	Sector	Obs	Tradables	Other	P-value	Tradables	Other	P-value
1	Food	99	7.3	7.7	.53	.03	.04	.08
4	Dwellings maintenance	24	5.9	16.1	.00	.03	.08	.01
5	Furniture and household equipment	45	8.8	10.2	--	.01	.08	--
6	Clothing and footwear	59	8.7	30.9	.00	-.05	.12	.02
7	Health	16	9.2	17.5	.02	.06	.09	.20
8	Education, culture and entertainment	48	10.7	13.3	.11	.01	.06	.00
9	Transport and communication	21	5.9	13.8	.02	.02	.07	.01
10	Miscellaneous	25	10.7	23.9	.01	.02	.15	.14
	TOTAL**	**337**	**8.4**	**12.7**	**.00**	**.005**	**.064**	**.00**

** Excluding Fruit & Vegetables and Housing.

b. Services

			Duration			Size		
	Sector	Obs	Services	Other	P-value	Services	Other	P-value
1	Food	99	14.4	7.3	.32	.07	.04	.55
4	Dwellings maintenance	24	16.1	5.9	.00	.08	.03	.01
5	Furniture and household equipment	44	--	--	--	--	.01	--
6	Clothing and footwear	59	30.9	8.7	.00	.12	-.05	.02
7	Health	16	17.5	9.2	.02	.09	.06	.20
8	Education, culture and entertainment	48	13.4	11.1	.16	.06	.02	.01
9	Transport and communication	21	12.6	6.2	.03	.07	.01	.00
10	Miscellaneous	25	23.9	10.7	.01	.15	.02	.14
	TOTAL**	**337**	**15.9**	**8.4**	**.00**	**.08**	**.01**	**.00**

** Excluding Fruit & Vegetables and Housing.

c. Energy

		Duration			Size		
	Obs	Energy	Other	P-value	Energy	Other	P-value
TOTAL	**337**	**2.9**	**10.1**	**.00**	**.014**	**.026**	**.15**

d. Durables

		Frequency			Size		
	Obs	Durables	Other	P-value	Durables	Other	P-value
TOTAL	**337**	**9.1**	**10.2**	**.08**	**.008**	**.030**	**.00**
TOTAL –excluding services	**264**	**9.1**	**8.2**	**.11**	**.008**	**.013**	**.50**

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.

Table 8: Duration and size of price change, by sector and outlet type*

Sector **		Specialty stores	Grocery stores	Open markets	Chain stores	Pharma -cies	Electronic commerce	Convenience stores	Unknown/ other	Share of unknown /other
Tot.	Duration	9.0	10.1	4.3	5.5	5.2	5.8	8.1	12.5	23.4%
	% change	-.021	.044	.023	.012	.053	.035	.045	.053	
1	Duration	7.2	10.0	4.3	5.2	6.0	8.4	7.0	13.0	11.8%
	% change	.032	.047	.023	.025	.055	.035	.039	.065	
4	Duration	17.1	9.7	--	4.8	5.2	4.7	--	15.5	17.5%
	% change	.082	.035		.034	.042	.048		.088	
5	Duration	10.8	13.5	--	5.1	--	--	--	8.7	12.5%
	% change	-.01	.061		.010				.025	
6	Duration	8.0	--	--	5.6	--	--	--	23.0	3.9%
	% change	-.063			-.054				.077	
7	Duration	8.6	--	--	7.1	6.6	15.8	--	20.5	37.8%
	% change	.025			.037	.025	.020		.112	
8	Duration	11.8	--	--	9.1	--	4.3	--	10.7	76.1%
	% change	-.009			.008		.040		.034	
9	Duration	--	--	--	--	--	--	--	8.4	98.5%
	% change								.037	
10	Duration	11.4	11.7	--	6.3	4.2	5.0	11.3	17.0	15.5%
	% change	.039	.044		.044	.077	.030	.061	.069	

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.

** 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 9a: Hazard function estimation[#,+] with total inflation[*], Log-logistic distribution

Sector **	**1**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Obs. (non-censored)	170126 (160768)	41035 (37860)	38165 (34075)	43666 (36641)	19520 (17527)	40208 (35856)	37503 (36059)	46039 (41666)
12m. **total** inflation, lagged	-.016	(-.002)	(.002)	(-.003)	-.020	.011	.019	.018
Change in $ exchange (3m mov. ave. , lagged)	-.014	-.026	-.054	-.023	-.045	-.046	-.011	-.046
VAT: reduction, included in price	(0.044)	(.048)	.155	(.011)	.569	(.045)	.192	.167
VAT: increase, included in price	.262	-.151	-.659	-.254	(-.070)	-.148	-.095	-.458
VAT: reduction, not included in price	7.32	(-.688)	(-4.08)	--	(2.459)	1.027	(.091)	(.620)
VAT: increase, not included in price	--	(.100)	(-1.39)		(2.519)	1.831	(-.016)	(-2.31)
Dummy for sale	-1.32	-1.32	-1.42	-1.35	-1.31	-1.30	-.480	-1.32
Dummy for reduction	.234	.240	.134	-.560	-.072	-.160	.089	.297
Proportion of non-price promotions	(-.038)	.359	.549	-.150	-.664	.262	.125	.100
Dummy for 5, 0 ending in cents	-.193	.199	(.111)	(.041)	.418	.108	.257	.212
Dummy for 9 ending in cents	-.074	.265	(.021)	(-.039)	-.152	(-.010)	.172	.085
Dummy for 5, 0 ending in Shekels	.113	.659	-.073	.042	.803	-.319	.579	.235
Dummy for 9 ending in Shekels	.187	(.008)	-.036	-.094	.235	-.156	.429	.119
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.270	.884	.336	-.362	(-.005)	.563	1.323	-.392
Dummy for grocery stores	.300	.645	.678	--	--	--	--	-.151
Dummy for chain stores	-.266	.093	-.243	-.590	-.052	.070	.373	-.801
Dummy for pharmacies	-.325	(-.009)	(.265)	--	--	--	--	-.967
Dummy for electronic commerce	-.119	(-.041)	-.174	--	.401	-.487	--	-.930
Constant	1.485	.779	1.417	2.429	1.417	1.852	.169	1.732
Log-logistic γ	.530	.555	.546	.509	.595	.593	.410	.567
Log likelihood (in thousands)	-224.51	-55.35	-50.31	-53.39	-26.98	-55.97	-43.08	-62.24
AIC (in thousands)	449.0	110.8	100.68	106.8	54.02	112.0	86.22	124.51
BIC (in thousands)	449.4	111.0	100.95	107.1	54.25	112.2	86.46	124.78

Coefficients shown are the b's in *log(t) = xb*, derived from a hazard function with a log-logistic distribution.
+ All coefficients are significant (in 5%), except for those in parenthesis.
* Observations that record a change in the specific brand of the product (editor's change), are omitted.
** 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 9b: Hazard function estimation[#,+] with sectoral inflation[*], Log-logistic distribution

Sector **	**1**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Obs. (non-censored)	170126 (160768)	41035 (37860)	38165 (34075)	43666 (36641)	19520 (17527)	40208 (35856)	37503 (36059)	46039 (41666)
12m. **sectoral** inflation, lagged	-.014	-.010	-.036	0.012	-.078	-.025	.010	-.017
Change in $ exchange (3m mov. ave. , lagged)	-.016	-.027	-.057	-.014	-.032	-.045	-.006	-.045
VAT: reduction, included in price	.055	(.015)	(.006)	(.076)	.587	(-.038)	.139	.155
VAT: increase, included in price	.098	-.175	-.677	-.200	(.033)	(-.076)	(.001)	-.314
VAT: reduction, not included in price	7.09	-.695	(-4.11)	--	(2.47)	.956	(.039)	(.268)
VAT: increase, not included in price	--	(.065)	(-1.44)		(2.44)	(1.89)	(.076)	(-2.14)
Dummy for sale	-1.33	-1.32	-1.41	-1.35	-1.30	-1.30	-.478	-1.32
Dummy for reduction	.235	.239	.127	-.555	-.080	-.168	.086	.292
Proportion of non-price promotions	(-.034)	.355	.547	-.162	-.712	.257	.121	.109
Dummy for 5, 0 ending in cents	-.192	.210	(.111)	(.046)	.450	.107	.256	.207
Dummy for 9 ending in cents	-.066	.266	(.001)	(-.041)	-.117	(-.019)	.174	.076
Dummy for 5, 0 ending in Shekels	.113	.650	-.085	.040	.835	-.329	.580	.237
Dummy for 9 ending in Shekels	.185	(.003)	-.052	-.094	.220	-.159	.431	.111
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.269	.881	.343	-.361	(.011)	.563	1.341	-.393
Dummy for grocery stores	.300	.636	.672	--	--	--	--	-.156
Dummy for chain stores	-.270	.090	-.244	-.592	-.097	.069	.388	-.807
Dummy for pharmacies	-.334	(-.011)	(.270)	--	--	--	--	-.971
Dummy for electronic commerce	-.122	(-.052)	-.173	--	.366	-.497	--	-.936
Constant	1.499	.810	1.390	2.456	1.517	1.918	.190	1.831
Log-logistic γ	.530	.555	.543	.509	.592	.593	.410	.567
Log likelihood (in thousands)	-224.47	-55.33	-50.07	-53.34	-26.86	-55.93	-43.12	-62.22
AIC (in thousands)	449.0	110.7	100.2	106.7	53.78	111.9	86.30	124.51
BIC (in thousands)	449.3	111.0	100.5	107.0	54.00	112.2	86.54	124.78

Coefficients shown are the b's in *log(t) = xb*, derived from a hazard function with a Log-logistic distribution.
+ All coefficients are significant (in 5%), except for those in parenthesis.
* Observations that record a change in the specific brand of the product (editor's change), are omitted.
** 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 9c: Hazard function estimation[#,+] with inflation expectations[*], Log-logistic distribution

Sector **	**1**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Obs. (non-censored)	170126 (160768)	41035 (37860)	38165 (34075)	43666 (36641)	19520 (17527)	40208 (35856)	37503 (36059)	46039 (41666)
12m. **inflation expectations**, lagged	-.026	-.028	-.044	-.056	-.050	-.018	(-.002)	-.032
Change in $ exchange (3m mov. ave. , lagged)	-.017	-.030	-.059	-.031	-.057	-.048	-.010	-.050
VAT: reduction, included in price	.064	(.031)	.109	(-.018)	.568	(.000)	.137	.133
VAT: increase, included in price	.232	-.129	-.579	-.209	(-.065)	(-.080)	(-.001)	-.368
VAT: reduction, not included in price	7.32	(-.680)	(-3.95)	--	(2.43)	(.999)	(.015)	(.36)
VAT: increase, not included in price	--	(.134)	(-1.35)	--	(2.50)	(1.91)	(.100)	(-2.13)
Dummy for sale	-1.33	-1.32	-1.42	-1.34	-1.33	-1.30	-.474	-1.32
Dummy for reduction	.235	.238	.131	-.561	-.067	-.165	.084	.292
Proportion of non-price promotions	(-.036)	.358	.546	-.146	-.663	.259	.120	.115
Dummy for 5, 0 ending in cents	-.189	.203	(.114)	(.047)	.425	.106	.256	.211
Dummy for 9 ending in cents	-.073	.261	(.012)	(-.037)	-.144	(-.014)	.169	.082
Dummy for 5, 0 ending in Shekels	.112	.657	-.078	.040	.804	-.325	.583	.239
Dummy for 9 ending in Shekels	.185	(.004)	-.043	-.095	.231	-.158	.438	.114
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.269	.885	.331	-.358	(-.002)	.562	1.342	-.395
Dummy for grocery stores	.300	.647	.680	--	--	--	--	-.154
Dummy for chain stores	-.264	.099	-.248	-.588	-.055	.070	.382	-.808
Dummy for pharmacies	-.328	(-.006)	(.283)	--	--	--	--	-.972
Dummy for electronic commerce	-.123	(-.036)	-.188	--	.394	-.494	--	-.937
Constant	1.486	.814	1.493	2.489	1.435	1.912	.213	1.825
Log-logistic γ	.531	.555	.546	.508	.595	.593	.411	.567
Log likelihood (in thousands)	-224.56	-55.33	-50.27	-53.30	-26.98	-55.97	-43.16	-62.23
AIC (in thousands)	449.2	110.7	100.6	106.6	54.02	112.0	86.37	124.53
BIC (in thousands)	449.5	111.0	100.9	106.9	54.24	112.2	86.61	124.80

Coefficients shown are the b's in *log(t) = xb*, derived from a hazard function with a Log-logistic distribution.
+ All coefficients are significant (in 5%), except for those in parenthesis.
* Observations that record a change in the specific brand of the product (editor's change), are omitted.
** 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 9d: Hazard function estimation[#,+] with inflation deviation[*], Log-logistic distribution

Sector **	**1**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Obs. (non-censored)	170126 (160768)	41035 (37860)	38165 (34075)	43666 (36641)	19520 (17527)	40208 (35856)	37503 (36059)	46039 (41666)
12m. inflation standard deviation	-1.30	-1.48	-1.17	-.478	-2.57	-1.45	.325	-1.58
Change in $ exchange (3m mov. ave. , lagged)	-.007	-.017	-.045	-.019	-.023	-.037	-.008	-.028
VAT: reduction, included in price	(-.01)	(-.051)	(.017)	(-.014)	.397	(-.108)	.113	.097
VAT: increase, included in price	.424	.102	-.427	-.170	.271	.169	(.056)	(-.069)
VAT: reduction, not included in price	--	-.760	(-4.04)	--	(2.44)	(.914)	-.018)	(.087)
VAT: increase, not included in price	--	(.343)	(-1.17)	--	(2.91)	2.14	(.157)	(-1.91)
Dummy for sale	-1.32	-1.32	-1.41	-1.35	-1.30	-1.30	-.471	-1.32
Dummy for reduction	.239	.246	.134	-.557	-.059	-.151	.084	.298
Proportion of non-price promotions	(-.049)	.364	.543	-.148	-.665	.249	.120	.095
Dummy for 5, 0 ending in cents	-.187	.202	(.075)	(.041)	.400	.088	.254	.213
Dummy for 9 ending in cents	-.076	.258	(-.025)	(-.043)	-.160	(-.018)	.166	.084
Dummy for 5, 0 ending in Shekels	.113	.644	-.082	.042	.776	-.323	.584	.227
Dummy for 9 ending in Shekels	.185	(.008)	-.043	-.095	.237	-.159	.440	.105
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.271	.880	.327	-.363	(.002)	.557	1.312	-.395
Dummy for grocery stores	.300	.629	.645	--	--	--	--	-.164
Dummy for chain stores	-.261	.091	-.245	-.591	-.055	.076	.374	-.803
Dummy for pharmacies	-.313	(.002)	(.268)	--	--	--	--	-.968
Dummy for electronic commerce	-.114	(-.042)	-.166	--	.390	-.463	--	-.930
Constant	2.064	1.487	2.029	2.653	2.614	2.585	.365	2.524
Log-logistic γ	.535	.553	.545	.509	.590	.592	.411	.565
Log likelihood (in thousands)	-226.5	-55.12	-50.16	-53.36	-26.75	-55.79	-43.13	-62.00
AIC (in thousands)	453.0	110.3	100.4	106.8	53.6	111.6	86.33	124.07
BIC (in thousands)	453.3	110.6	100.7	107.0	53.8	111.9	86.57	124.34

Coefficients shown are the b's in *log(t) = xb*, derived from a hazard function with a Log-logistic distribution.
+ All coefficients are significant (in 5%), except for those in parenthesis.
* Observations that record a change in the specific brand of the product (editor's change), are omitted.
** 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 10: Hazard function estimation[#,+] by quartile of flexibility[*], Log-logistic distribution

Quartile **	**1**		**2**		**3**		**4**	
Obs. (non-censored)	64,370 (62,596)		213,126 (198,488)		133,870 (119,092)		24,896 (20,276)	
12m. **total inflation**, lagged	.008		-.005		-.011		-.009	
12m. **inflation expectations**, lagged		-.017		-.021		-.052		-.074
Change in $ exchange (3m mov. ave. , lagged)	-.007	-.009	-.024	-.028	-.024	-.031	-.069	-.081
VAT: reduction, included in price	.227	.191	.234	.229	.098	.081	.235	.210
VAT: increase, included in price	(-.052)	(.009)	.157	.164	-.307	-.293	-.608	-.544
VAT: reduction, not included in price	(-.080)	(-.123)	(.030)	(.040)	(.065)	(.037)	(.070)	(.075)
VAT: increase, not included in price	(.095)	(.172)	(-.136)	(-.132)	-2.80	-2.77	(.294)	(.375)
Dummy for sale	-.796	-.796	-1.30	-1.30	-1.48	-1.48	-1.57	-1.58
Dummy for reduction	.376	.375	.234	.233	-.088	-.091	-.591	-.596
Proportion of non-price promotions	.167	.162	.089	.091	(-.018)	(-.021)	-.376	-.378
Dummy for 5, 0 ending in cents	.264	.265	-.020	-.020	.028	.029	.628	.649
Dummy for 9 ending in cents	.265	.262	.030	.030	-.065	-.071	.437	.445
Dummy for 5, 0 ending in Shekels	.291	.292	.023	.023	.102	.100	.197	.191
Dummy for 9 ending in Shekels	.233	.239	.055	.054	(-.011)	(-.016)	(-.051)	(-.054)
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	.114	.114	.391	.391	.107	.107	.065	.066
Dummy for grocery stores	--	--	.508	.508	.047	.046	--	--
Dummy for chain stores	.149	.154	(.008)	(.009)	-.347	-.348	-.577	-.580
Dummy for pharmacies	--	--	-.063	-.063	-.546	-.549	--	--
Dummy for electronic commerce	.231	.234	.079	.078	-.390	-.398	-.337	-.354
Constant	.107	.147	1.028	1.048	1.899	1.957	1.928	2.000
Log-logistic γ	.381	.382	.511	.510	.599	.598	.706	.704
Log likelihood (in thousands)	-68.60	-68.60	-272.4	-272.4	-185.5	-185.3	-36.0	-36.0
AIC (in thousands)	137.25	137.25	544.9	544.8	371.0	370.7	72.1	72.1
BIC (in thousands)	137.52	137.52	545.2	545.1	371.3	371.0	72.4	72.3

Coefficients shown are the b's in *log(t) = xb*, derived from a hazard function with a Log-logistic distribution.
+ All coefficients are significant (in 5%), except for those in parenthesis.
* Observations that record a change in the specific brand of the product (editor's change), are omitted.
** 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 11a: Estimation of the size of price change, with total inflation[+,*]

Sector **	**Total**	**1**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Obs.	400,452	160,768	37,860	34,075	36,641	17,527	35,856	36,059	41,666
12m. **total inflation**, lagged	.19	.13	.33	.18	.41	.34	.17	(.04)	.29
Change in $ exchange (3m mov. ave., lagged)	-.15	-.35	(-.11)	(-.10)	-.32	(.00)	(-.01)	.11	(.080)
VAT: reduction, included in price	-.016	-.021	.033	(.003)	.043	-.070	-.039	(-.010)	-.047
VAT: increase, included in price	(.001)	(-.002)	(-.003)	.075	(-.010)	(-.014)	(-.019)	-.021	(-.020)
VAT: reduction, not included in price	-.062	.273	(.047)	(-.163)	--	(-.369)	(-.079)	-.046	(-.273)
VAT: increase, not included in price	(-.029)	--	(.027)	(-.131)	--	(-.492)	(.096)	(-.010)	(-1.52)
Duration (*100)	-.088	-.106	-.155	-.237	-.036	.040	-.078	.116	-.374
Dummy for sale	-.174	-.157	-.185	-.144	-.175	-.194	-.200	-.103	-.270
Proportion of non-price promotions	.017	(.001)	.022	-.019	(-.010)	.072	-.021	-.007	.095
Dummy for 5, 0 ending in cents	.011	.017	.027	(.023)	(.020)	.014	.033	(-.003)	.044
Dummy for 9 ending in cents	.018	.013	.038	(.023)	(.021)	.047	.034	(-.001)	.067
Dummy for 5, 0 ending in Shekels	-.020	-.012	-.105	-.007	-.031	.023	-.008	-.009	-.038
Dummy for 9 ending in Shekels	-.006	-.010	-.069	(-.004)	.015	-.064	-.013	-.011	-.052
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for sub-subsector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.007	(-.002)	-.048	(-.008)	-.082	-.066	-.013	(.010)	(.007)
Dummy for grocery stores	-.005	(.003)	-.096	(.020)	--	--	--	--	(.009)
Dummy for chain stores	-.011	(-.002)	-.102	(-.004)	-.088	-.071	(.001)	-.033	(-.004)
Dummy for pharmacies	.009	.008	-.087	(.028)	--	-.069	--	--	(.016)
Dummy for electronic commerce	(.001)	.007	-.083	(.001)	--	-.065	(.003)	--	.029
Constant	.061	.041	.118	(.017)	.175	.067	(-.012)	.038	.038
Adjusted R^2	.114	.124	.112	.090	.182	.104	.196	.132	.110

+ All coefficients are significant (in 5%), except for those in parenthesis.

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.

** 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 11b: Estimation of the size of price change, with sectoral inflation[+,*]

Sector **	**Total**	**1**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Obs.	400,452	160,768	37,860	34,075	36,641	17,527	35,856	36,059	41,666
12m. **sectoal inflation**, lagged	.19	.11	.06	.14	.24	.37	.24	(-.03)	(.11)
Change in $ exchange (3m mov. ave., lagged)	-.15	-.33	(-.08)	(-.07)	(-.12)	(-.00)	(-.00)	.10	(.101)
VAT: reduction, included in price	-.016	-.022	.028	(.001)	.041	-.076	-.039	(-.011)	-.051
VAT: increase, included in price	(.001)	.011	(.011)	.085	(.023)	(-.009)	(-.013)	-.020	(-.013)
VAT: reduction, not included in price	-.062	(.291)	(.043)	(-.152)	--	(-.373)	(-.077)	-.048	(-.295)
VAT: increase, not included in price	(-.029)	--	(.039)	(-.119)	--	(-.486)	(.101)	(-.007)	(-1.51)
Duration (*100)	-.088	-.105	-.156	-.232	-.042	.044	-.076	.117	-.372
Dummy for sale	-.174	-.157	-.185	-.144	-.175	-.193	-.200	-.103	-.270
Proportion of non-price promotions	.017	(.000)	.023	-.019	(-.010)	.074	-.021	-.007	.096
Dummy for 5, 0 ending in cents	.011	.017	.027	(.022)	(.020)	.012	.033	(-.003)	.044
Dummy for 9 ending in cents	.018	.012	.037	(.022)	(.021)	.045	.035	(-.001)	.067
Dummy for 5, 0 ending in Shekels	-.020	-.012	-.104	-.007	-.031	.022	-.007	-.009	-.037
Dummy for 9 ending in Shekels	-.006	-.010	-.068	(.004)	.015	-.063	-.013	-.011	-.052
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for sub-subsector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.007	(-.002)	-.047	(-.009)	-.082	-.068	-.014	(.011)	(.006)
Dummy for grocery stores	-.005	(.003)	-.095	(.019)	--	--	--	--	(.008)
Dummy for chain stores	-.011	(-.002)	-.101	(-.005)	-.089	-.069	(.002)	-.033	(-.005)
Dummy for pharmacies	.009	(.009)	-.086	(.027)	--	-.070	--	--	(.015)
Dummy for electronic commerce	(.001)	.007	-.081	(.000)	--	-.064	(.003)	--	.028
Constant	.061	.040	.122	(.024)	.191	.069	.019	.040	.042
Adjusted R^2	.114	.124	.110	.090	.182	.104	.196	.132	.110

+ All coefficients are significant (in 5%), except for those in parenthesis.

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.

** 1=food, 4=Dwelling maintenance, 5=Furniture and household equipment, 6=Clothing and Footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 11c: Estimation of the size of price change, with inflation expectations[+,*]

Sector **	**Total**	**1**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Obs.	400,452	160,768	37,860	34,075	36,641	17,527	35,856	36,059	41,666
12m. **inflation expectations**, lagged	.40	.22	.52	.36	1.39	(-.12)	.33	(.04)	.68
Change in $ exchange (3m mov. ave., lagged)	-.09	-.32	(-.00)	(-.04)	(-.11)	(.00)	(.00)	.11	.22
VAT: reduction, included in price	-.018	-.022	.030	(-.001)	.039	-.078	-.041	(-.011)	-.046
VAT: increase, included in price	(.005)	(.002)	(.004)	.078	(-.006)	(.001)	(-.015)	-.020	(-.013)
VAT: reduction, not included in price	-.067	.273	(.042)	(-.162)	--	(-.372)	(-.081)	-.047	(-.294)
VAT: increase, not included in price	(-.026)	--	(.029)	(-.125)	--	(-.484)	(.097)	(-.008)	(-1.53)
Duration (*100)	-.088	-.107	-.155	-.234	(-.031)	.034	-.077	.117	-.371
Dummy for sale	-.174	-.158	-.185	-.144	-.174	-.193	-.200	-.103	-.270
Proportion of non-price promotions	.017	(.000)	.023	-.019	(-.011)	.071	-.021	-.007	.095
Dummy for 5, 0 ending in cents	.011	.017	.027	(.022)	(.018)	.013	.032	(-.003)	.043
Dummy for 9 ending in cents	.018	.013	.038	(.022)	(.020)	.046	.034	(-.001)	.066
Dummy for 5, 0 ending in Shekels	-.020	-.012	-.105	-.007	-.030	.024	-.008	-.009	-.038
Dummy for 9 ending in Shekels	-.006	-.010	-.068	(-.004)	.015	-.064	-.013	-.011	-.051
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for sub-subsector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.007	(-.002)	-.049	(-.008)	-.084	-.068	-.013	(.010)	(.006)
Dummy for grocery stores	-.005	(.003)	-.096	(.020)	--	--	--	--	(.009)
Dummy for chain stores	-.011	(-.002)	-.102	(-.005)	-.090	-.072	(.002)	-.033	(-.004)
Dummy for pharmacies	.009	(.008)	-.087	(.026)	--	-.071	--	--	.016
Dummy for electronic commerce	(.002)	.007	-.082	(.002)	--	-.067	(.003)	--	.029
Constant	.058	.026	.106	(.015)	(.034)	.080	(-.013)	.039	.032
Adjusted R^2	.114	.124	.110	.089	.182	.103	.196	.131	.110

+ All coefficients are significant (in 5%), except for those in parenthesis.

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.

** 1=food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and Footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Table 12: Estimation of the size of price change, by quartiles of flexibility[+,*]

Quartile **	**1**		**2**		**3**		**4**	
Obs. (non-censored)	62,596		198,488		119,092		20,276	
12m. **total inflation**, lagged	.03		.20		.24		.19	
12m. **inflation expectations**		-.08		.42		.58		.63
Change in $ exchange (3m mov. ave., lagged)	-.15	-.16	-.10	(-.03)	-.19	-.11	-.25	(-.15)
VAT: reduction, included in price	-.026	-.028	(.000)	-.015	(-.004)	(-.005)	(-.016)	(-.018)
VAT: increase, included in price	.045	.047	(.058)	(.003)	(.002)	(.005)	(-.011)	(-.011)
VAT: reduction, not included in price	-.047	-.049	(-.106)	(.057)	(-.009)	(-.006)	(-.064)	(-.066)
VAT: increase, not included in price	(.008)	(.011)	-.003	(-.105)	(-.032)	(-.031)	(.160)	(.157)
Duration (*100)	-.12	-.13	-.28	-.28	-.04	-.04	.09	.09
Dummy for sale	-.12	-.12	-.20	-.20	-.17	-.17	-.18	-.18
Proportion of non-price promotions	-.007	-.007	.062	.062	.013	.013	-.017	-.017
Dummy for 5, 0 ending in cents	.004	.004	.022	.021	.018	.018	(-.014)	(-.015)
Dummy for 9 ending in cents	-.007	-.007	.031	.031	.022	.022	(-.016)	(-.017)
Dummy for 5, 0 ending in Shekels	-.004	-.004	-.030	-.029	-.019	-.019	(-.005)	(-.005)
Dummy for 9 ending in Shekels	-.008	-.008	-.011	-.011	(-.004)	(-.004)	(-.008)	(-.008)
Monthly dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for sub-subsector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy for specialty stores	-.003	-.003	(.001)	(.000)	-.007	-.008	-.017	-.018
Dummy for grocery stores	--	--	(-.003)	(-.003)	(-.002)	(-.002)	--	--
Dummy for chain stores	.004	.005	-.011	-.012	-.012	-.012	(-.002)	(-.003)
Dummy for pharmacies	--	--	.009	.009	(-.005)	(-.005)	--	--
Dummy for electronic commerce	.019	.019	(.002)	(.002)	(.000)	(.001)	(.017)	(.018)
Constant	.037	.040	.047	.021	.023	.020	.058	.055
Adjusted R^2	.14	.14	.13	.13	.09	.09	.14	.14

+ All coefficients are significant (in 5%), except for those in parenthesis.

* Excluding observations with editor's indication for a change in specific characteristics of products (see Section 3d), and excluding censored durations.

** In the first quartile are included 25% of weighted sub-subsectors with the shortest durations. Quartile 4 includes the 25% longest weighted durations.

Table 13a: Estimation (weighted by product) of the rate of price changes at a certain month*

	(1)	(2)	(3)	(4)	(5)
	All changes			Price reductions	Price increases
Annual inflation	.24	.19		-.09	.33
Inflation expectations			.50		
Dummy for slowdown periods, lagged 2m. average *	(-.001)	-.004	(.005)	.002	-.003
VAT reduction, included in price, 2 months average	.124	.130	.124	.128	(-.004)
VAT increase, included in price, 2 months average	.253	.273	.253	.014	.240
VAT reduction, not included in price, 2 months average	.099	.288	.098	(.00)	.098
VAT increase, not included in price, 2 months average	-.275	-.165	-.280	-.109	-.166
Dummy for sale	.295	.919	.299	.972	-.677
Proportion of non-price promotions	(-.020)	-.025	(-.009)	(-.016)	(-.003)
Proportion of editor's change of product	.370	.380	.372	.089	.281
Proportion of prices set in dollars	.330	.145	.330	-.040	.370
Proportion of prices set in %	-.171	-.209	-.167	(.002)	-.174
Dummy for months	Yes	Yes	Yes	Yes	Yes
Dummy for products	Yes		Yes	Yes	Yes
Dummy for sector		Yes			
Intercept	.136	.120	.130	.045	.091
No. of observations	46,359	46,359	46,359	46,359	46,359
Adjusted R^2	.55	.30	. 55	.64	.38

* Dummy for slowdown in activity =1 for Sep. 2000 – June 2003 and for Sep. 2008 – June 2009.

Table 13b: Estimation (weighted by product) of the rate of monthly price *changes*, by sector+

Sector *	Obs.	Annual inflation	Dummy for slowdown periods, lagged 2m. average **	VAT reduction, included in price, 2 months average	VAT increase, included in price, 2 months average	VAT reduction, not included in price, 2 months average	VAT increase, not included in price, 2 months average	*Adj.* R^2
1	14,290	.48	-.013	.122	.250	(.977)	(.130)	.54
4	3,336	(.04)	.020	(.057)	.287	.179	(-.348)	.29
5	6,370	.10	(.00)	.050	.122	(-.365)	-1.61	.50
6	7,971	.19	-.009	-.018	.025	--	--	.76
7	2,029	.31	(.002)	.337	.257	(-1.39)	(-1.66)	.59
8	6.745	(.12)	(.000)	(.042)	.148	(-.129)	(-.734)	.43
9	2,203	(.22)	-.019	.218	.425	(-.031)	(-.032)	.72
10	3,415	(.08)	.030	.112	.216	(-.000)	(-.005)	.33

+ All coefficients are significant (in 5%), except for those in parenthesis. Regressions include all variables shown in column (1) of Table 10a.

* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.
** Dummy for slowdown in activity =1 for Sep. 2000 – June 2003 and for Sep. 2008 – June 2009.

Table 13c: Estimation (weighted by product) of the rate of monthly price *reductions*, by sector+

Sector *	Obs.	Annual inflation	Dummy for slowdown periods, lagged 2m. average **	VAT reduction, included in price, 2 months average	VAT increase, included in price, 2 months average	VAT reduction, not included in price, 2 months average	VAT increase, not included in price, 2 months average	*Adj.* R^2
1	14,290	.48	.003	.109	(-.009)	(-1.26)	(.013)	.68
4	3,336	-.37	(.006)	(.027)	.079	(-.001)	-.132	.27
5	6,370	(-.04)	(-.002)	.038	-.039	(-.466)	(.053)	.51
6	7,971	(.02)	(-.000)	-.014	(.011)	--	--	.63
7	2,029	(.02)	(.006)	.380	(-.043)	-1.85	(.316)	.71
8	6.745	-.09	(.004)	.038	(.007)	(-.018)	(-.115)	.43
9	2,203	(-.12)	(-.005)	.297	(.029)	(-.013)	(-.018)	.67
10	3,415	(-.02)	(.001)	.073	(.003)	(-.013)	(.035)	.63

+ All coefficients are significant (in 5%), except for those in parenthesis. Regressions include all variables shown in column (1) of Table 10a.

* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.
** Dummy for slowdown in activity =1 for Sep. 2000 – June 2003 and for Sep. 2008 – June 2009.

Table 13d: Estimation (weighted by product) of the rate of monthly price *increases*, by sector+

Sector *	Obs.	Annual inflation	Dummy for slowdown periods, lagged 2m. average **	VAT reduction, included in price, 2 months average	VAT increase, included in price, 2 months average	VAT reduction, not included in price, 2 months average	VAT increase, not included in price, 2 months average	*Adj.* R^2
1	14,290	.44	-.016	(.013)	.259	(2.23)	(.117)	.27
4	3,336	.41	(.014)	(.030)	.203	.180	-.216	.19
5	6,370	.14	(.002)	(.012)	.163	(.101)	-1.67	.23
6	7,971	.17	-.008	(-.004)	.014	--	--	.73
7	2,029	.29	(-.004)	(-.043)	.300	(.462)	(-1.97)	.40
8	6.745	.21	(-.004)	(.003)	.142	(-.111)	-.618	.26
9	2,203	.35	(-.013)	(-.079)	.397	(-.018)	(-.013)	.56
10	3,415	.10	.029	.039	.213	(.012)	(-.040)	.19

+ All coefficients are significant (in 5%), except for those in parenthesis. Regressions include all variables shown in column (1) of Table 10a.

* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

** Dummy for slowdown in activity =1 for Sep. 2000 – June 2003 and for Sep. 2008 – June 2009.

Diagram 1: Some examples of price trajectories

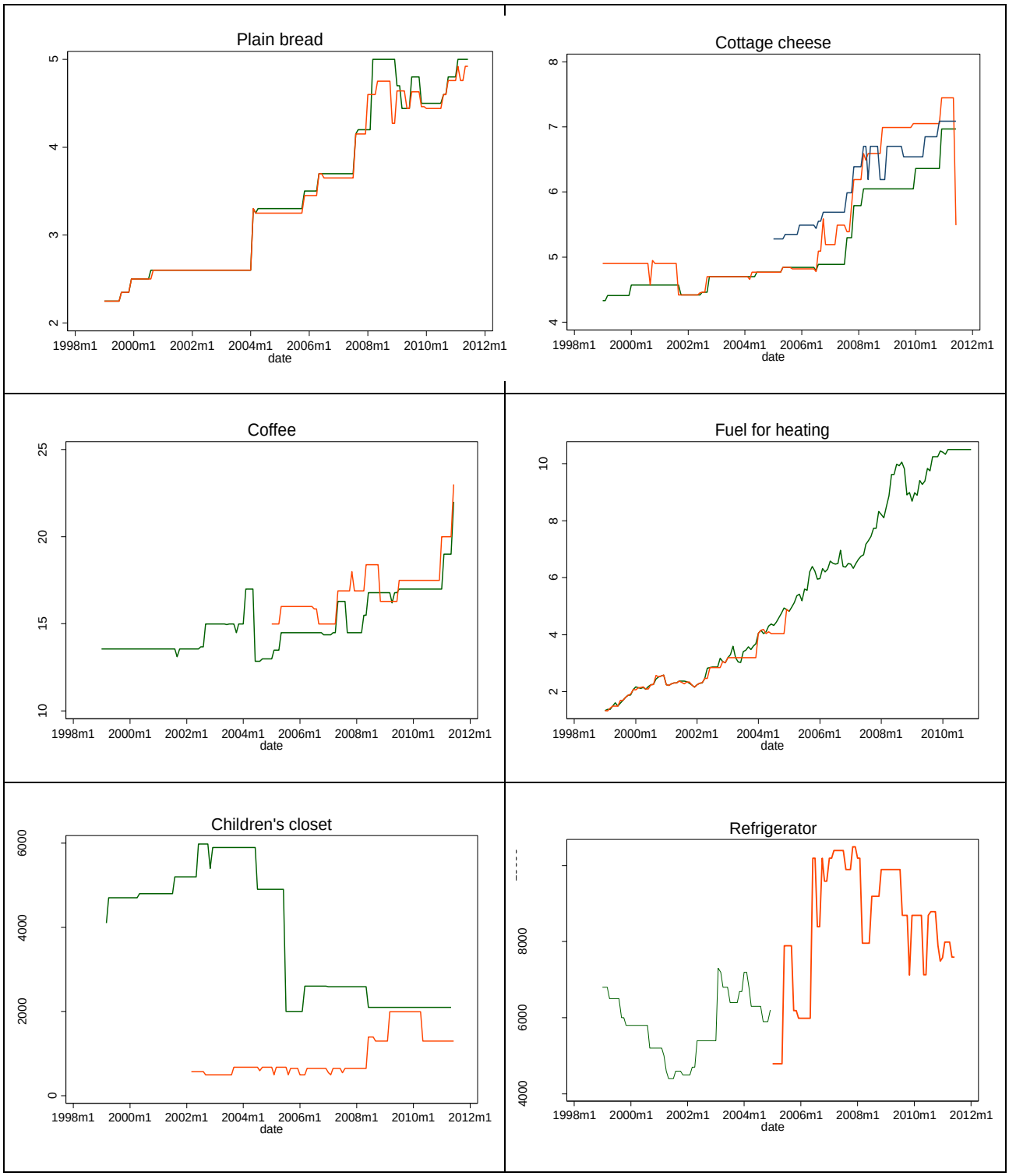

Diagram 1, cont':

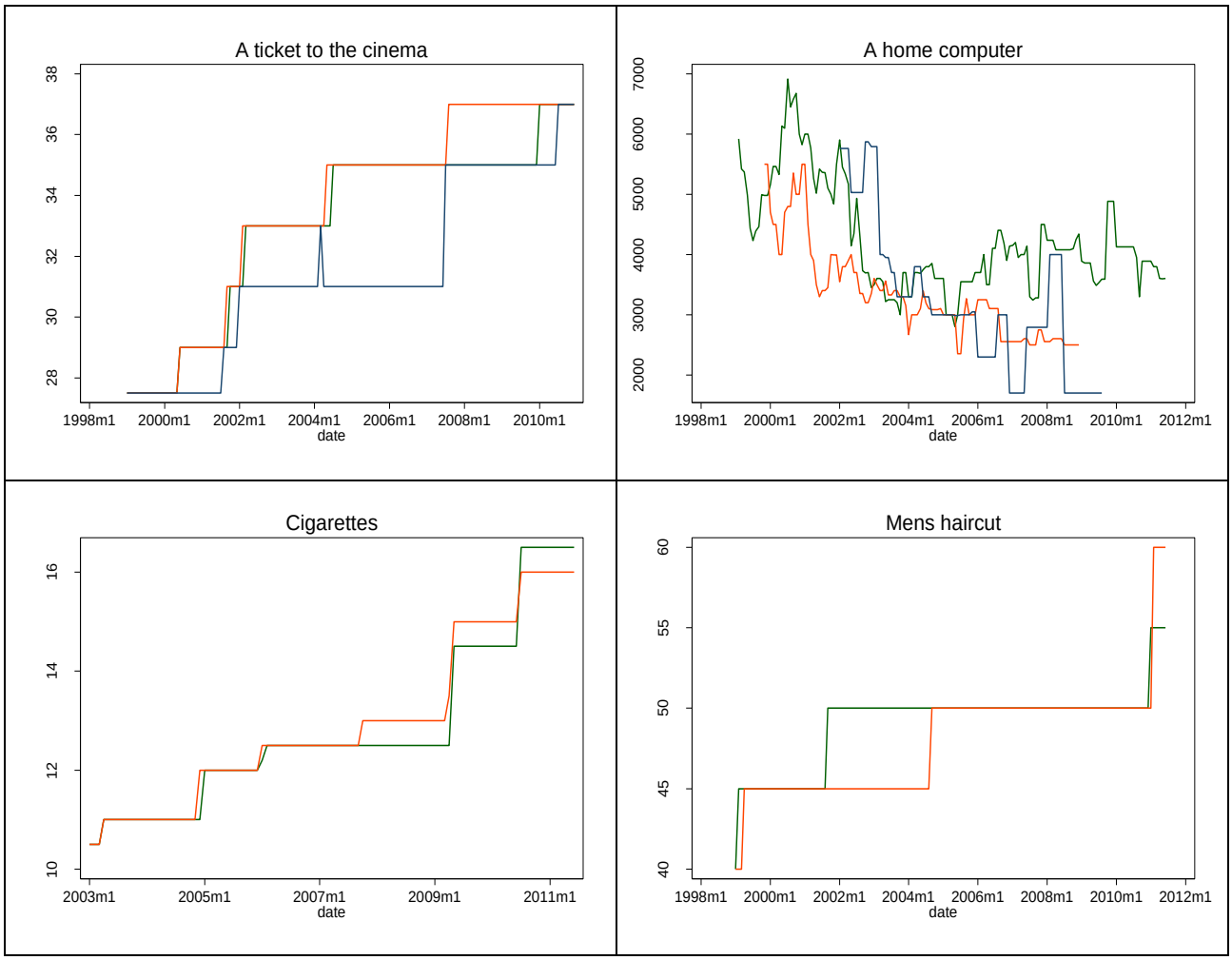

Diagram 2: Duration by sector and subsector, excluding censored durations and upper 5% (unweighted)

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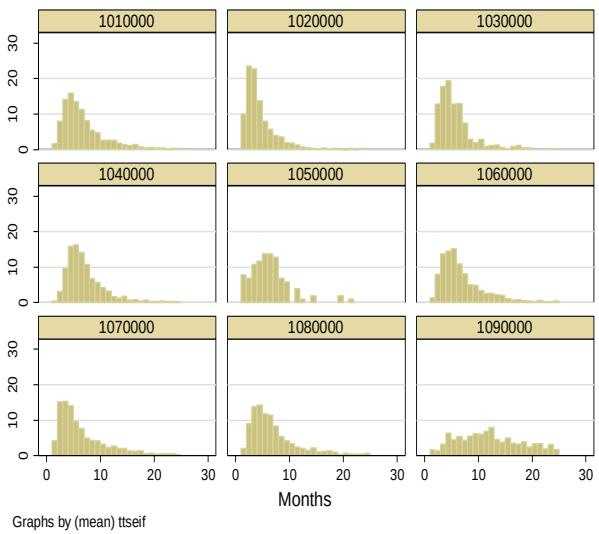
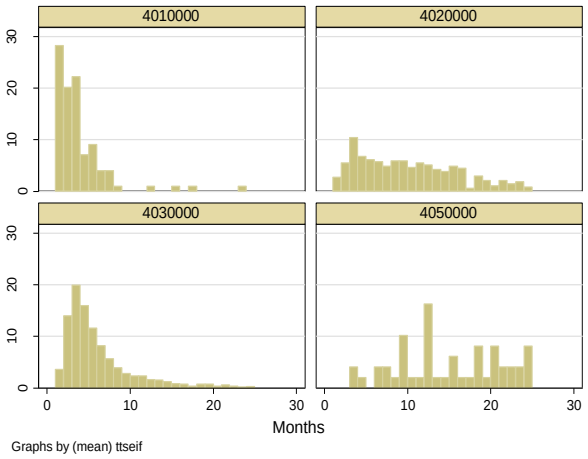
<tr><td> 
</td><td> 

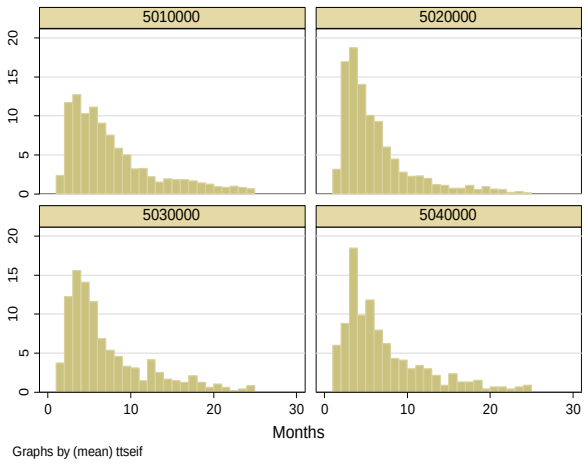
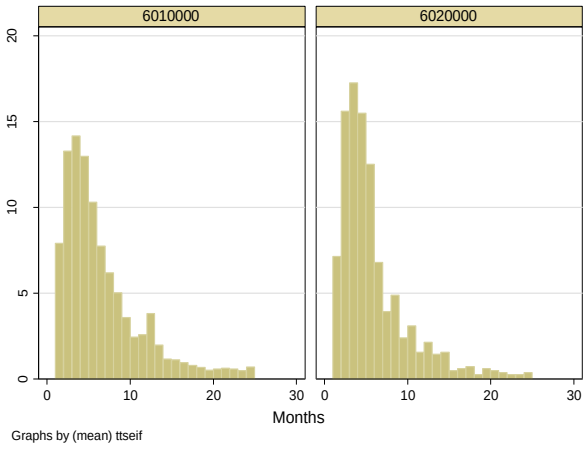
* Excluding the municipal taxes subsector, with duration of 12 months.</td></tr>
<tr><th>Furniture and household equipment</th><th>Clothing and footwear</th></tr>
<tr><td> 
</td><td> 
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Diagram 2, cont.

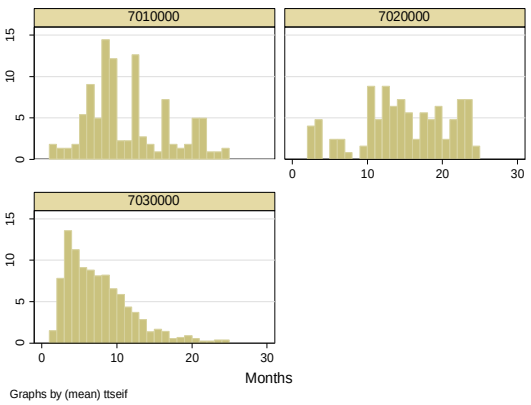
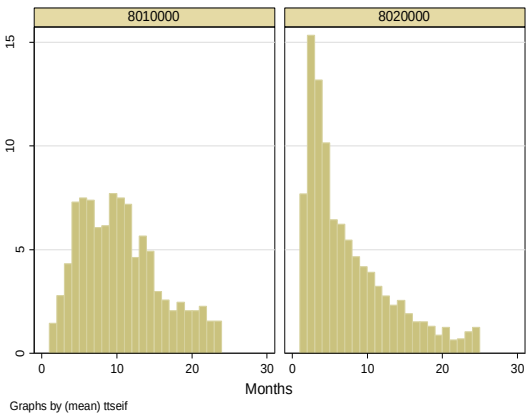
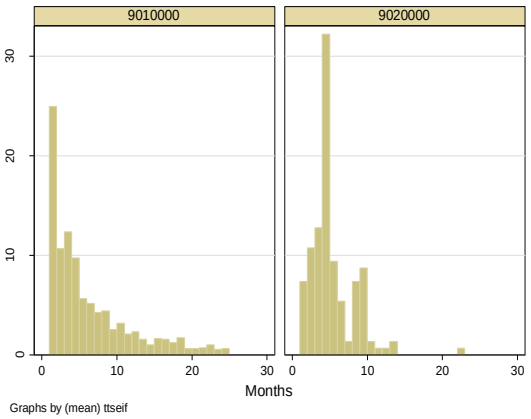
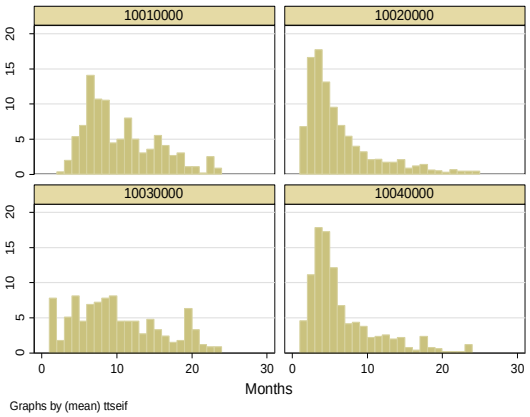
Health	Education, culture and entertainment
	
Transport and communication	**Miscellaneous**
	

Diagram 3: The frequency of price changes, by sector and subsector, excluding censored durations and lower and upper 5% (unweighted)

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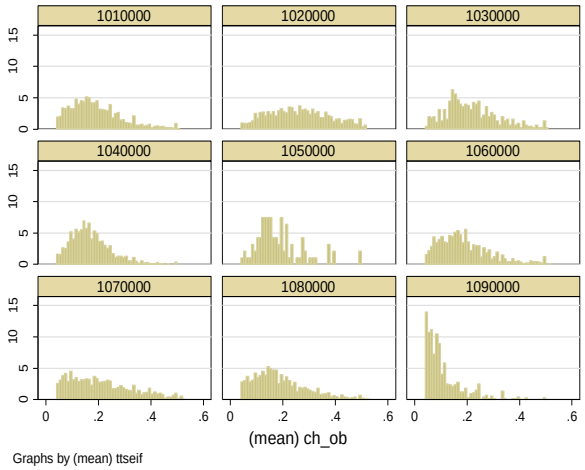
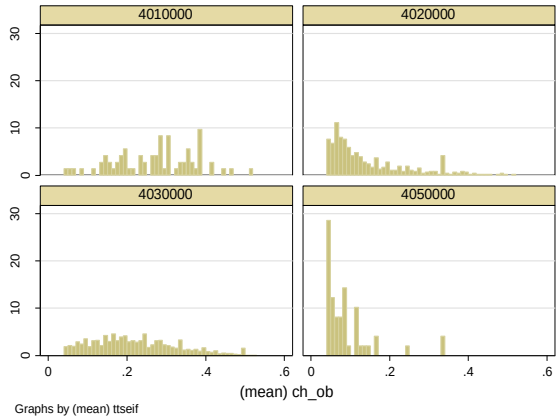
<tr><td> 
</td><td> 

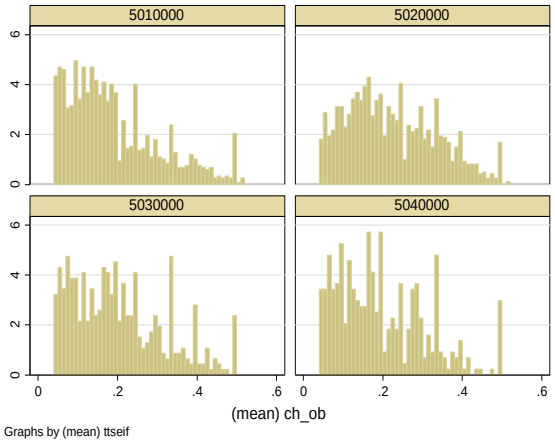
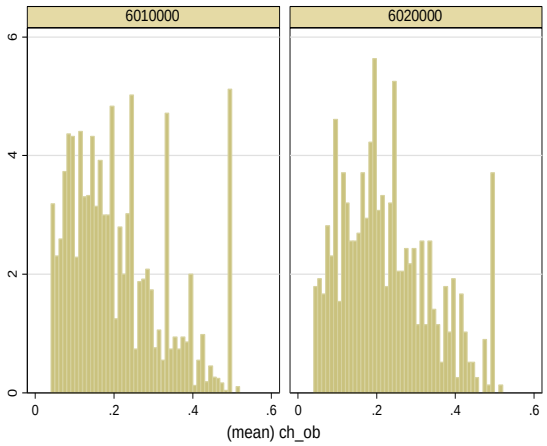
* Excluding the municipal taxes subsector, with frequency of 1/12.</td></tr>
<tr><th>Furniture and household equipment</th><th>Clothing and footwear</th></tr>
<tr><td> 
</td><td> 
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Diagram 3, cont.

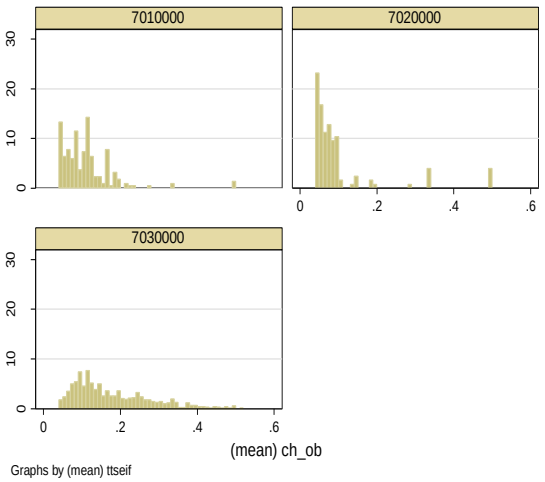
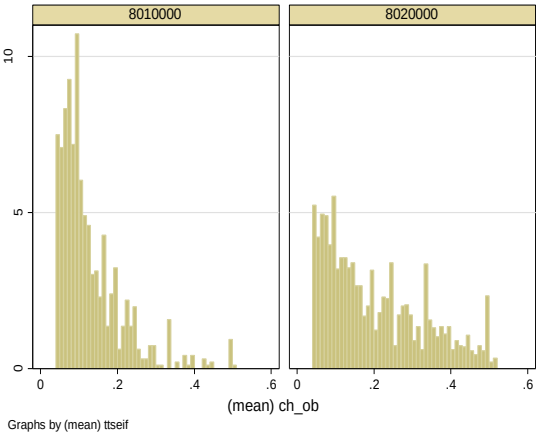
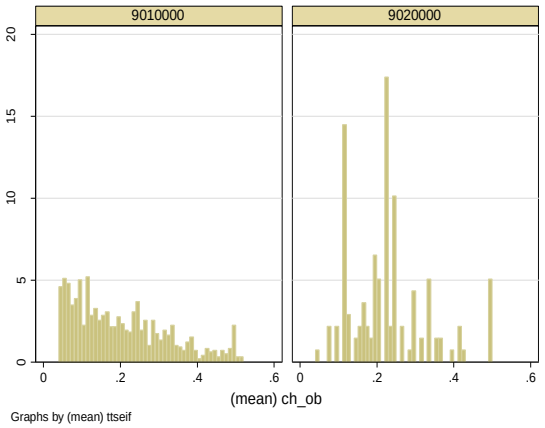
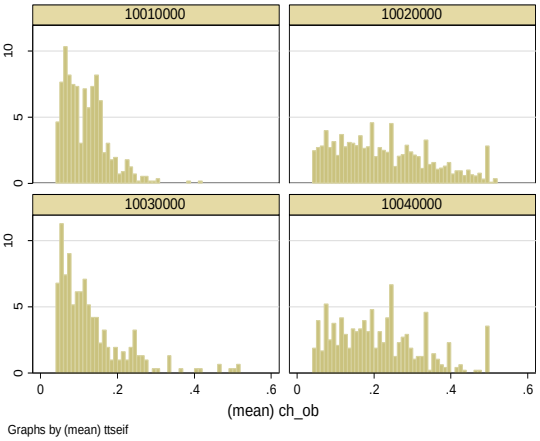
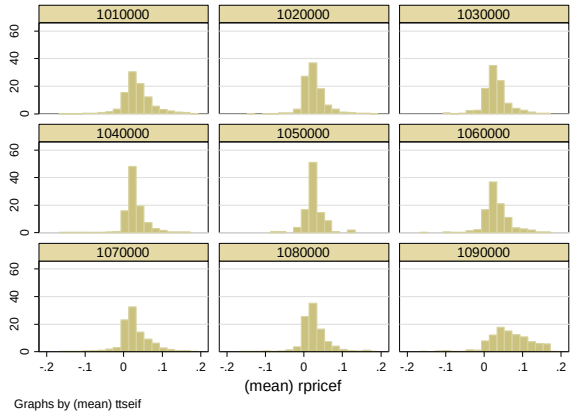
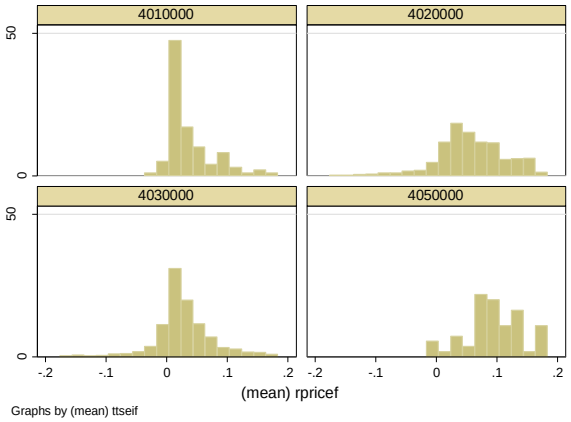
Health	Education, culture and entertainment
	
Transport and communication	**Miscellaneous**
	

Diagram 4: Size of price change, by sector and subsector, excluding censored durations and lower and upper 5% (unweighted)

Food

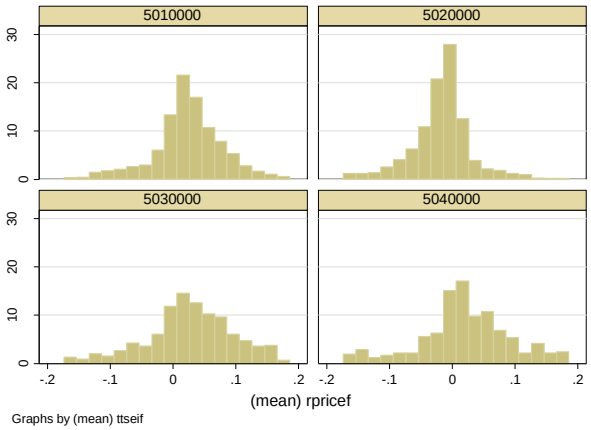


Dwellings maintenance



* Excluding the municipal taxes subsector.

Furniture and household equipment



Clothing and footwear

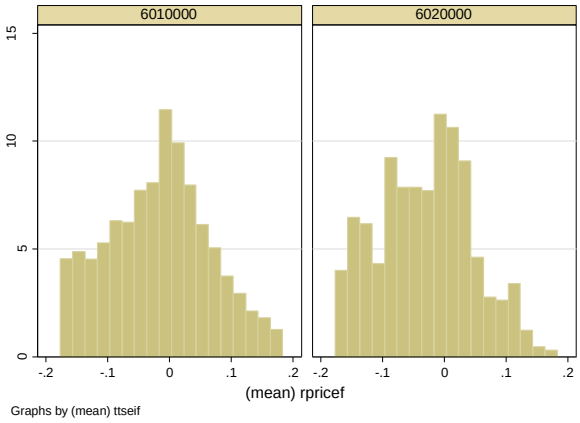


Diagram 4, cont.

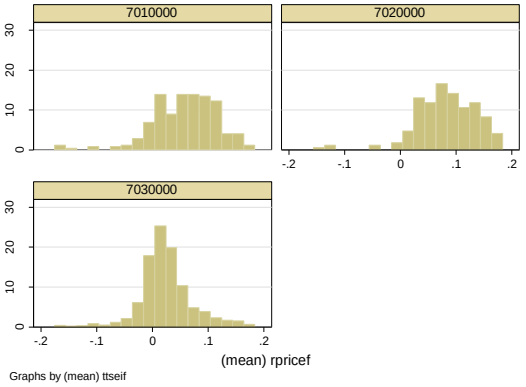
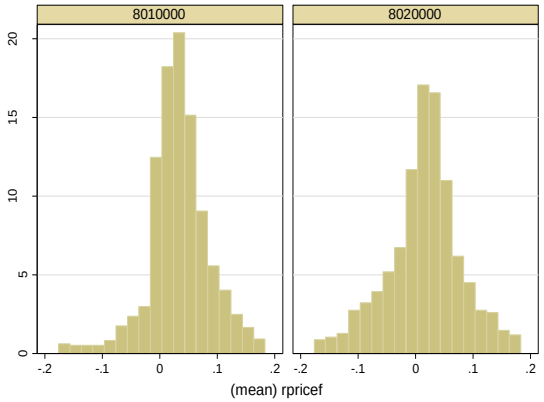
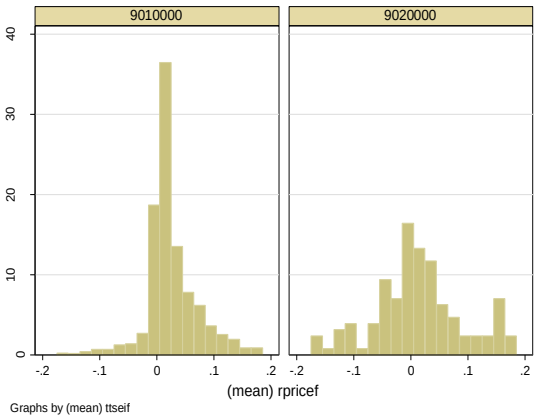
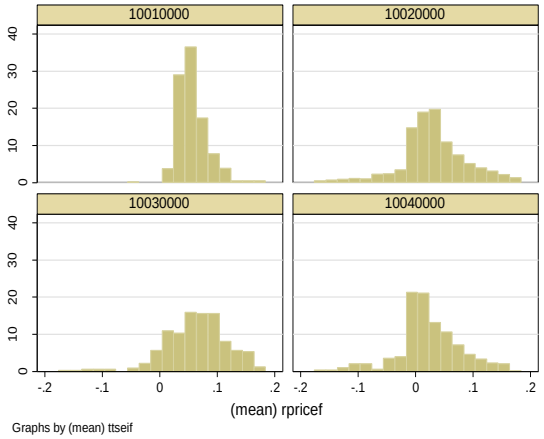
Health	Education, culture and entertainment
	
Transport and communication	**Miscellaneous**
	

Diagram 5a: Duration and size of price changes, by sector, excluding censored durations

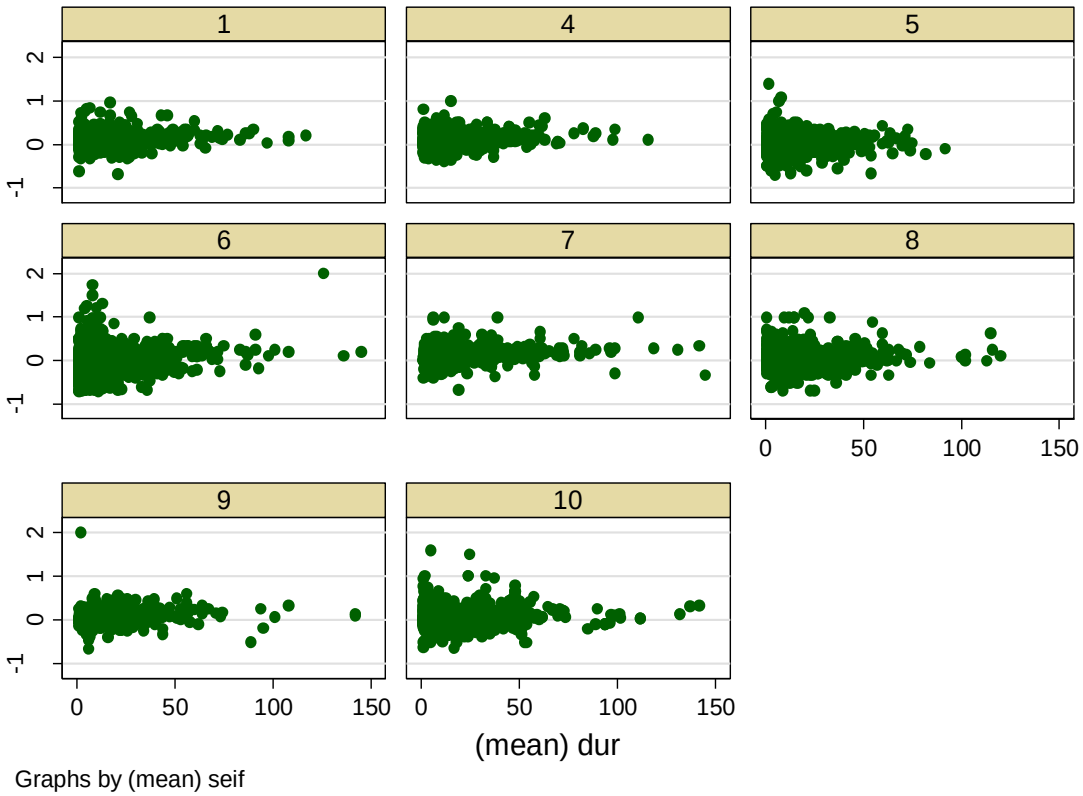


Diagram 5b: Degree of symmetry between the average frequency of price increases and the average frequency of price decreases, by product

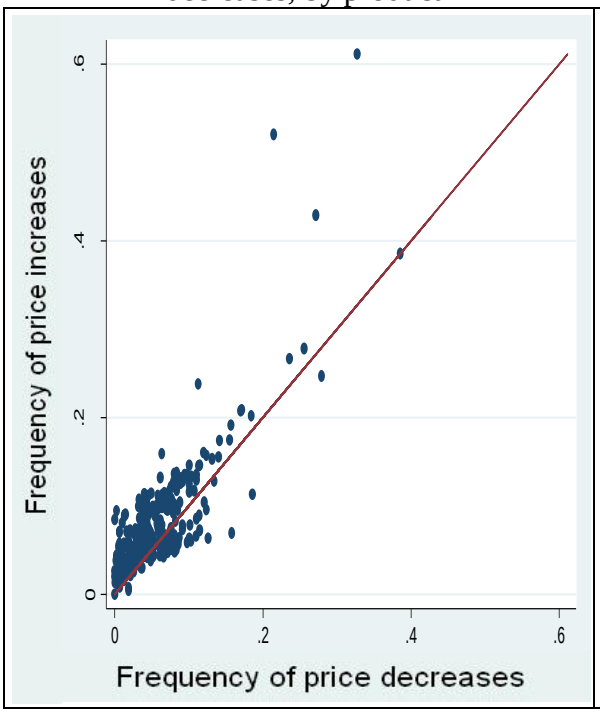


Diagram 5c: Degree of symmetry between the average size of price increases and the average size of price decreases, by product

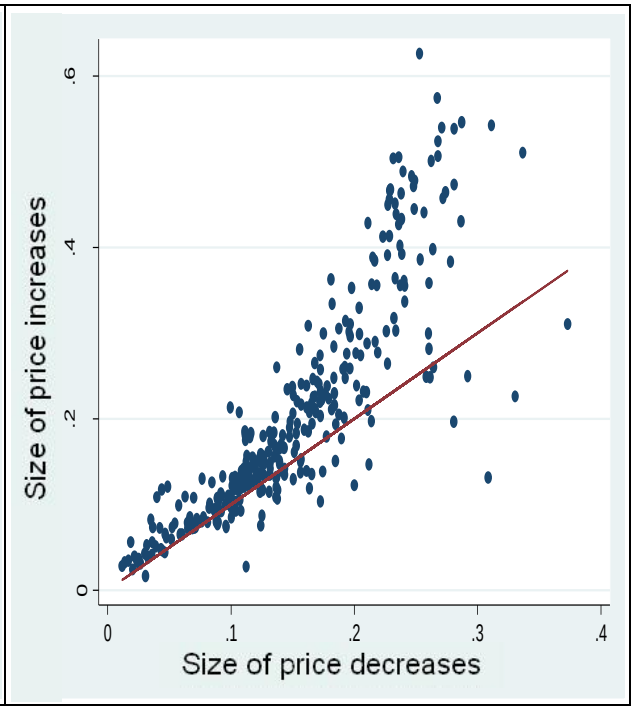


Diagram 6a: Monthly proportion of price changes (weighted by product)

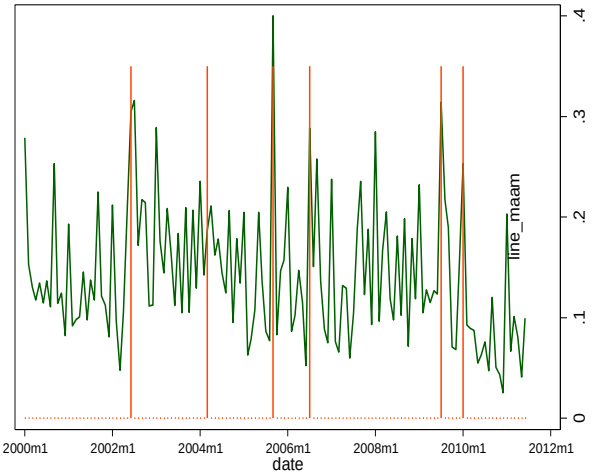
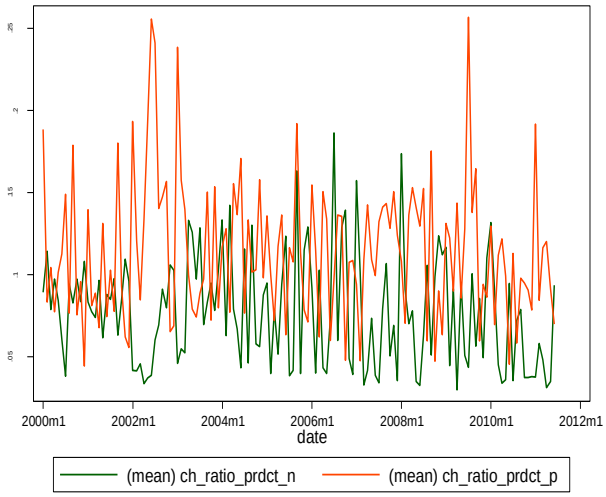
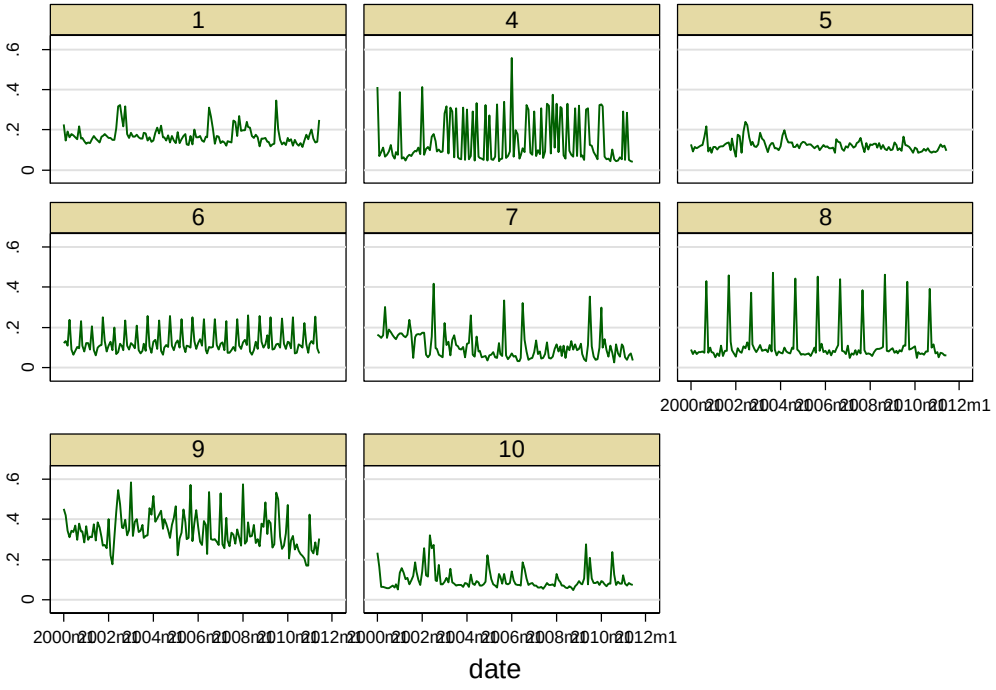


Diagram 6b: Monthly proportion of price increases and declines (weighted by product)



Red lines mark VAT reductions (3/2004, 9/2005, 7/2006, 1/2010) and increases (6/2002, 7/2009).

Diagram 6c: Monthly proportion of price changes, by sectors (weighted by product)



* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Diagram 7a: Monthly size of price changes (weighted by product)

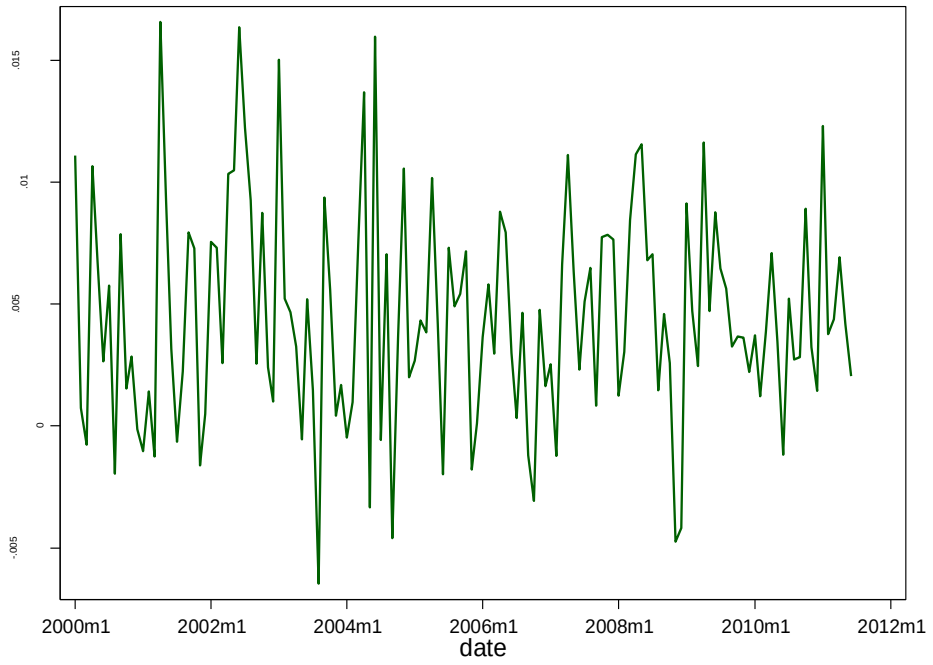
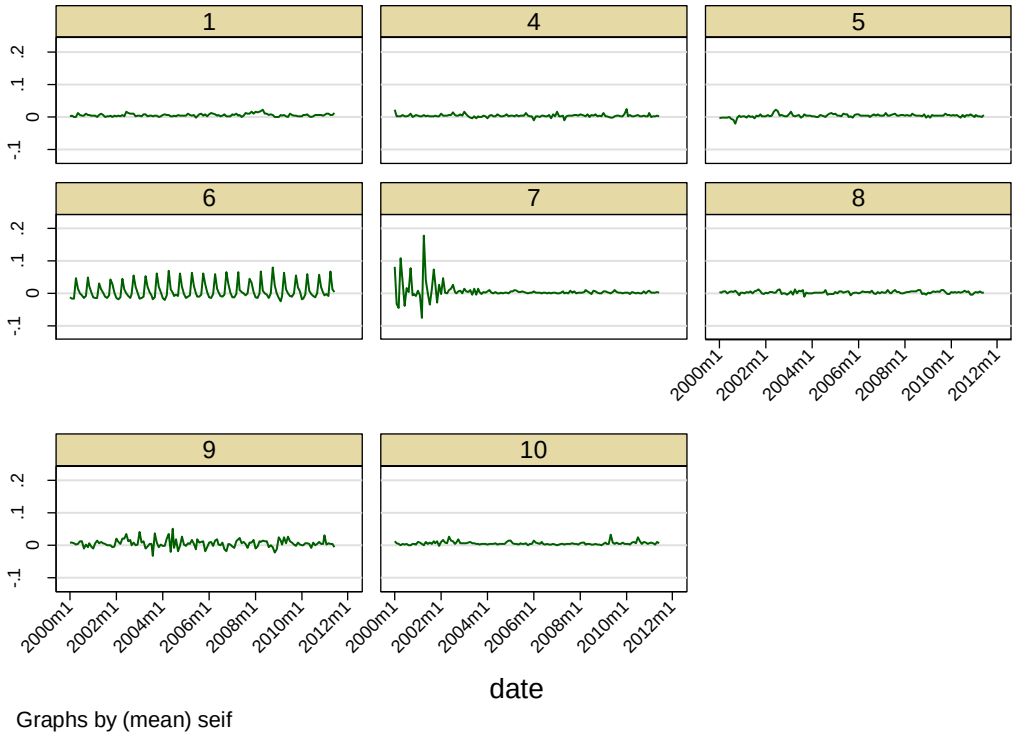
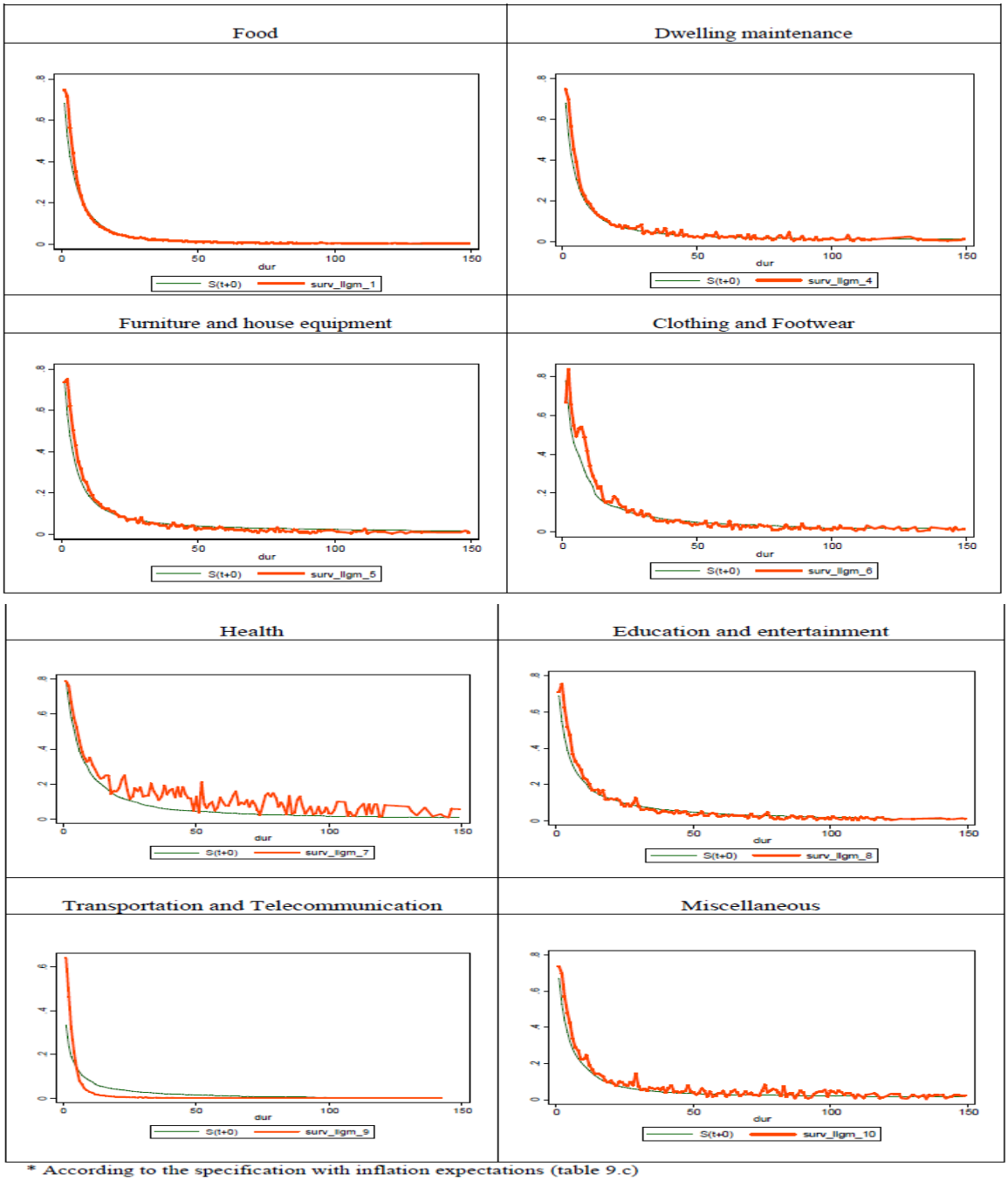


Diagram 7b: Monthly size of price changes, by sectors (weighted by product)



* 1=Food, 4=Dwellings maintenance, 5=Furniture and household equipment, 6=Clothing and footwear, 7=Health, 8=Education, culture and entertainment, 9=Transport and communication, 10=Miscellaneous.

Diagram 8: Empirical (green) and estimated survival function (orange), by sector*



* According to the specification with inflation expectations (table 9.c)

Diagram 9: Empirical (green) and estimated survival function (orange), by flexibility*

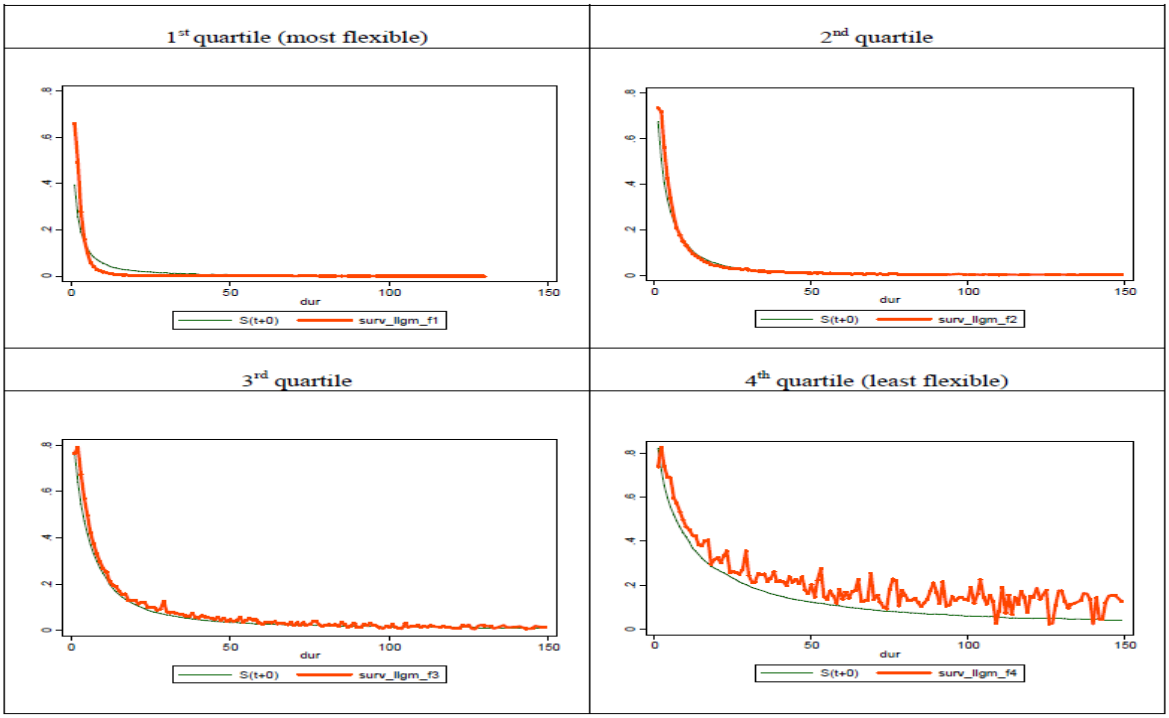


Table A.1: Selected results for other countries, using CPI data

Country	**Paper**	**Sample period**	**Data**	**Duration**
Austria	Baumgartner et. al (2004)	1996.1-12.2003	85% of CPI	11-14 mo.
Brazil	Gouvea (2007)	1996.3-2006.4	9 mil. 75% of CPI	2.7-3.8 mo.
Finland	Vilmunen and Lakkonon (2004)	1997.1-2003.12	50,000 items	6-9 mo.
France	Baudry et al. (2004)	1994.1-2003.2	750,000 obs.	8 mo.
Germany	Hoffman and Kurz-Kim (2004)	1998-2003	350,000 obs., 52 products	15-20 mo.
Italy	Veronese et al. (2005)	1996.1-2003.12	750,000 obs. ,550 products	10 mo.
Luxemburg	Lunnemann et al. (2005)	1999.1-2004.12	230 products	12 mo.
Spain	Alvarez L. J. and I. Hernando (2004)	1993.1 – 2001.12	1.1 mil 70% of CPI	6-7 mo.
Switzerland	Kaufmann (2008)	1993q3-2005q4	CPI	4-6 qrt.
Turkey	Ozmen and Orhun (2011)	2006.10-2011.1	6000 products, 75% of CPI	7.4 weeks
UK	Zhou (2010)	1996-2008	60% of CPI	5.5 mo.
US	Nakamura and Steinsson(2008)	1988-2005	70% of CPI	7-9 mo.

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