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Abstract

In this paper, we review the price setting survey of Estonian firms and compare our findings with the results of similar research in the euro area summarized by Fabiani et al. (2005). Generally, the price setting patterns that emerge from our survey are quite similar to those in the euro zone. There is some evidence, however, that price setting may be somewhat more flexible in Estonia. The findings that suggest more price flexibility in Estonia are as follows: the incidence of time-dependent pricing is lower, the share of firms that are price takers is larger, price changes are more frequent, and, finally, the speed of price adjustments to shocks is higher.

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Non-technical summary

We present a broad overview of a price setting survey of Estonian firms and compare our findings with the results of similar research that has been carried out in a number of euro area countries in the framework of the Inflation Persistence Network (IPN), a joint research project of the European System of Central Banks. Our focus is on those IPN survey findings that Fabiani et al. (2005) present as stylized facts of price setting behavior and price stickiness in the euro area. We believe such a comparison is of interest because virtually all of the survey-based inference on price setting and stickiness to date is based on research in developed economies. Also, ours seems to be the first survey-based investigation of price setting behavior in a new member state, future candidate of the euro club.

To ensure comparability of results, we designed the questionnaire drawing heavily on the IPN national surveys. In addition to collecting information on some general characteristics of the firm and its market, the questionnaire inquired about the price setting method used, the nature of price reviews and price adjustments, the main determinants of price changes and the factors contributing to slow and/or incomplete price adjustment (price stickiness). The survey was implemented by the Estonian Institute of Economic Research (EKI) via the Internet in September 2005. The final sample consists of 208 firms and covers the goods, trade and services sectors.

Generally, the price setting patterns that emerge from our survey are quite similar to those in euro area countries, although there are several noteworthy differences suggesting that price setting may be more flexible in Estonia. With regard to the pricing method, for example, the share of firms using markup pricing is very similar in Estonia (53 percent) to that in the euro area (54 percent). However, the share of firms setting prices in accordance with competitors' price is considerably higher in Estonia (46 percent) than in the eurozone (27 percent). In addition, the results indicate that the level of perceived competition is notably higher in our sample.

To better understand price setting, a number of questions inquired about the nature of price reviewing, in particular, the circumstances under which price reviews are made, the scope of information used in the process, and the frequency of price reviews. We found that 27 percent of firms review prices on a regular basis, compared to 34 percent of firms practicing time-dependent pricing in the euro area. The remaining firms reassess prices either mostly in response to shocks and thus behave as state-dependent price setters or combine both approaches simultaneously. Everything else equal, time-dependent pricing is likely to result in more sluggish price adjustments than state-dependent pricing because under the former, price adjustments and shocks are less syn-

chronized. The somewhat lower share of time-dependent pricing suggests that prices are potentially more flexible in the Estonian economy.

We also inquired whether firms set prices mainly on the basis of information referring to the past or whether their pricing decisions are largely influenced by predictions of future economic conditions. We found that about 60 percent of firms make pricing decisions predominantly on the basis of past and present information, whereas the remaining 40 percent decide about prices in the present/future context. The predominance of backward-looking firms in our sample contrasts with the corresponding finding for the eurozone, where the proportions of backward- and forward-looking firms are 40 and 60 percent, respectively. Everything else the same, the relatively high share of firms setting prices in a backward-looking manner implies more sluggish price adjustment.

The frequency of price reviews in Estonia appears to be very similar to that in the euro area, at least in the case of full-sample results. Typically, about a quarter of firms review prices every month or more often, whereas about 60 percent of firms do that at most three times a year. Interestingly, the Estonian median of 2 price reviews per year is basically a midpoint in the range of medians across euro area countries.

The frequency of price changes is lower than that of price reviews. For example, the share of firms that review prices quarterly or more often amounts to 40 percent, but the share of firms that change prices that often is only 20 percent. The same tendency is also captured by the median frequencies of price reviews and price changes that are two times and one time a year, respectively. On the other hand, if the frequencies of price reviews are similar in Estonia and the euro area, price changes are more frequent in Estonia. For example, the share of firms that change prices at least once a year is 86 percent in Estonia but only 73 percent in the eurozone.

The median frequency of only one price change a year is suggestive of price stickiness. As an alternative way to learn about the degree of price rigidity, we asked firms to indicate the amount of time it would take them to change prices in response to demand or cost shocks. The results show that firms would respond considerably quicker in Estonia than in euro area countries. More than 50 percent of firms in our sample would adjust prices in one month. In contrast, in the majority of euro area countries for which similar results are available, the share of firms that would respond so promptly is considerably, sometimes as much as two times smaller.

A separate section of the questionnaire asked firms to assess the importance of several potential reasons (eight in total) for delayed and/or incomplete price adjustment that have been proposed as explanations for price stickiness

in the theoretical literature. The results reveal that both in Estonia and the euro area, the four most appreciated explanations are implicit and explicit contracts, cost-based pricing and coordination failure, the only difference being that cost-based pricing ranks third in the eurozone but tops the list in Estonia. This hypothesis stipulates that price changes are delayed because firms wait until their costs change and only then adjust prices accordingly. The next two explanations suggest that price stickiness is largely due to customers' preference for stable nominal prices, which leads to either explicit agreements or the implicit understanding that prices should not be changed. The fourth most popular explanation — coordination failure — argues that price rigidity is due to strategic considerations: firms are reluctant to initiate price changes because they are not sure that their competitors will follow suit. In addition, we find some differences between the most relevant reasons for upward and downward price stickiness.

Finally, we have asked firms to assess the empirical importance of changes in costs, demand and competitors' price on the basis of how relevant these factors are in prompting firms to change prices. In this regard, we find support for the IPN result that firms adjust prices in response to shocks asymmetrically. On the one hand, cost shocks are more important for resulting in price increases than price decreases. On the other, demand shocks are more important for price reductions than price increases.

Contents

1. Introduction

In this paper, we provide a broad overview of the price setting survey of Estonian firms and compare our findings with the results of analogous research for the eurozone summarized by Fabiani et al. (2005). In 2003 and 2004, nine central banks of the European System of Central Banks carried out price setting surveys in the framework of the Inflation persistence network (IPN), a joint research project on inflation persistence in the euro area and its member countries.[1] Although the national surveys were prepared largely in a decentralized way, the degree of coordination among the researchers was sufficient to make the surveys comparable in terms of a number of common issues investigated. On this basis, Fabiani et al. (2005) derived twelve stylized facts that generalize the key characteristics of price setting behavior and price stickiness in the euro area. In the present paper, we use these stylized facts as a set of landmarks for introducing the most important results from the survey of price setting by firms in Estonia. Among other things, we are particularly interested in whether our findings are in line with the aforementioned stylized facts. Since basically all survey-based inference on price setting and price stickiness to date is based on research in more developed and mature economies than Estonia, we deem the comparison to be of interest. At the same time, given the wealth of empirical evidence provided by the IPN on price setting in the euro area, this seems to be the first survey-based investigation of price setting behavior in a new member state, a future candidate of the euro club.

The methodology of studying price setting by a means of business interviews has been popularized by Blinder (1991) and Blinder et al. (1998) who applied it for analyzing price setting in the US. The potential of this approach has prompted similar studies in other countries, e.g. the UK (Hall et al., 2000), Sweden (Apel et al., 2005), Canada (Amirault et al., 2004) and, most recently, the nine euro area countries covered by the IPN. Since we were particularly interested in making our survey comparable to the latter, we designed the survey drawing heavily on the questionnaires used by the IPN participant countries.[2] In principle, the breadth and nature of the collected information are sufficient for a country-specific study of price setting similar to those undertaken by the IPN. However, given that the primary objective of the present paper is to compare our results with the stylized facts drawn by Fabiani et al. (2005), we will consider only the most general characteristics of the data. Our equivalent of a

[1] The nine countries were Austria, Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Portugal and Spain.

[2] See Fabiani et al. (2005) and country-specific studies: Austria (Kwapil et al., 2005), Belgium (Aucremanne and Druant, 2005), France (Loupias and Ricart, 2004), Italy (Fabiani et al., 2004), Luxembourg (Lünnemann and Mathä, 2005), the Netherlands (Hoeberichts and Stokman, 2005), Portugal (Martins, 2005), and Spain (Álvarez and Hernando, 2005).

more detailed study of the price setting behavior of Estonian firms will appear in a follow-up paper.

The survey of price setting in Estonia was conducted via the Internet by the Estonian Institute of Economic Research (EKI) in September 2005. Our contract with the Institute foresaw that the Institute would deliver at least 200 responses and that the sample would cover the goods sector, the trade sector and the services sector in approximately equal proportions. Since the response rate was low, the Institute had to send the questionnaire out to more than 1,000 firms. To increase the response rate, basically all firms were contacted by telephone at least once; in a number of cases it was done more than once. The final sample consists of 208 responses.

The paper is organized as follows. Section 2 overviews the introductory part of the questionnaire, which was designed to provide some general information about the firm and its market. Sections 3 and 4 investigate the characteristics of the two stages of the price setting process, price reviews and price changes, respectively. The relative importance of various explanations for price stickiness is examined in Section 5. Section 6, in turn, ranks a number of price determinants according to their relevance in causing price increases and declines. Section 7 summarizes the main points of the paper and provides some conclusions. In addition, the paper includes two appendices. Appendix 1 lists the stylized facts of price setting behavior in the euro area discussed by Fabiani et al. (2005). Appendix 2 contains a replica of our survey questionnaire.

2. General information about the firm and its market

We start by discussing the first two sections of our questionnaire which inquired about the basic characteristics of firms and their markets, respectively.[3] Among other things, the first set of questions provides information about the distribution of sample firms by sector and size, and thus tells us about the representativeness of our sample of the Estonian economy. The second set focuses on characterizing the market structure that firms operate in, since that is likely to have important implications for their pricing strategies.

As mentioned in the introduction, our sample was designed to cover three sectors of the economy — industry, trade and services — in approximately equal proportions. We decided to exclude the construction sector on the grounds

[3]Specifically, we refer to sections "General information" and "Market structure" of the questionnaire, see Appendix 2.

that it would be especially difficult for construction firms to define their main product and/or fit the way they set or change their prices into the stylized framework that the questionnaire offered.[4] The sectoral composition of our sample and, for comparison, the sectoral coverage of the IPN surveys are described in Table 1. In terms of its absolute size, our sample of 208 firms is the smallest, but that is not the case if we compare the number of surveyed firms by sector.[5] As acknowledged by Fabiani et al. (2005), the majority of IPN surveys were clearly biased toward industry (manufacturing), but since this particular bias is far less prominent in our sample, the difference in sectoral coverage should certainly be kept in mind when comparing our and IPN results.[6]

Table 1: Sectoral coverage, percent (number of firms in brackets)

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(1)]	**EE**
Industry	38 [753]	100 [1228]	45 [833]	100 [1662]	65 [215]	18 [41]	18 [219]	76 [661]	85 [999]	62 [6611]	35 [73]
Trade	24 [478]		25 [467]		14 [46]	21 [48]	22 [271]			12 [1310]	32 [67]
Services	18 [364]		30 [557]		20 [68]	38 [89]	60 [756]	24 [212]	15 [174]	21 [2220]	33 [68]
Construction	20 [384]				1 [4]	23 [54]				4 [442]	
Total	100 [1979]	100 [1228]	100 [1857]	100 [1662]	100 [333]	100 [232]	100 [1246]	100 [873]	100 [1173]	100 [10583]	100 [208]

Notes: (1) Percentages for the euro area are computed on the basis of the absolute figures reported in square brackets, which are the sum of the firms in each category over the nine countries.

If we look at the sectoral distribution of samples by country, ours is quite similar to the Spanish one but differs very much from the German and French surveys, which cover only manufacturing. For this reason, it might seem that the comparison of our findings with those of individual IPN countries should be done at the sectoral rather than the aggregate level. However, for basically all the major characteristics of price setting and price stickiness considered in their paper, Fabiani et al. (2005) report the corresponding GDP-weighted average measures that they interpret as describing the typical pricing behav-

[4]The same argument applies in the case of providers of financial services, which were not covered by our survey either.

[5]For example, the number of trade firms in our sample is larger than in the samples of Italy and Luxembourg; the number of service firms is the same in our and the Italian sample.

[6]According to the Estonian Business Registry data for 2002, manufacturing firms constituted 14.2, services firms (excluding electricity, water and gas supply) 35.0 and trade firms 31.3 percent of all firms. Hence, in terms of the *number* of firms by sector, our sample overstates the significance of manufacturing but not as much as some national IPN surveys.

ior in the euro area as a whole. Since we are certainly interested in reflecting this aspect of their message in our comparison, we proceed as follows. In the series of tables below, we present our results for Estonia next to the corresponding characteristics of price setting for the the euro area as a whole and its constituent countries as reported by Fabiani et al. (2005). When considering aggregate measures, we focus mostly on the comparison of the figures for Estonia and the euro area and pay less attention to the pairwise comparison of the Estonian indicators vis-à-vis those of individual euro area countries. At the cost of completely ignoring the small versus large economy dimension in such comparisons, we let the aggregation of the intra euro area figures alleviate the issue of different sectoral coverage in IPN samples and average-out other country-specific influences. On the other hand, whenever the data are available, we present and discuss the characteristics of price setting and price rigidity at the sectoral level. Since the problem of disparity in sectoral coverage basically disappears in such cases, the pairwise cross-country comparison of various indicators becomes more appropriate.

Next, we compare the composition of our and IPN samples in terms of firm size. In addition to being an important criterion for cross-checking the representativeness of a given sample, the distribution of firms by their size may have some influence on the calculated average characteristics of pricing behavior.[7] In Table 2, the size of firms is measured by the number of employees, and for comparison purposes, the distribution of this variable is presented in terms of three size intervals: from one to 49, from 50 to 199, and, finally, 200 or more employees. Although Table 2 indicates that we have relatively fewer respondents in the category of firms with 200 or more employees compared to the synthetic sample of the euro area, in general our sample is quite similar to the majority of samples investigated by the IPN. In sum, we feel we can conclude that there are no significant comparability problems in terms of this

[7]For example, in Spain and Luxembourg, large firms tend to give more importance to expectations about future conditions when assessing their prices than smaller firms (Fabiani et al., 2005). In addition, Álvarez and Hernando (2005) note that large Spanish firms conduct price reviews more often than smaller firms.

dimension.[8]

Table 2: Firm size, based on the number of employees, percent

	BE	DE	ES	FR	IT	LU	NL[(1)]	AT	PT	**EA**[(2)]	**EE**
1–49	75	29	43	18	–	41	81	53	38	**47**	**53**
50–199	17	35	23	43	39	47	19	28	37	**29**	**36**
≥ 200	8	36	34	39	61	12		19	25	**24**	**11**

Notes: (1) In the Netherlands, the size classes are defined as follows: 1–49; ≥ 50. (2) Percentages for the euro area are computed on the basis of absolute figures, which are the sum of the firms in each category over the nine countries.

One important decision that had to be made when designing the survey was choosing the definition of the *main product*, the product that firms had to focus on in their responses. The individual surveys of the IPN varied somewhat in this respect, since some defined the main product as the one generating the biggest turnover in total sales, while others concentrated on the dominant product in domestic sales (Fabiani et al., 2005). Given that ultimately we were interested in gaining more understanding about inflation in Estonia, we decided to concentrate on price setting in the domestic market and defined the main product with reference to sales in Estonia.[9] To avoid confusion, we also declined asking firms about the distribution of their sales of the main product between the national and foreign markets. For this reason, we are not able to measure the degree of "openness" in the sales of firms in our sample and compare this characteristic of Estonian firms with the corresponding results reported by Fabiani et al. (2005), although we nevertheless present their findings in the top panel of Table 3.

On the other hand, we inquired about a number of other important char-

[8]This is not to say that the sample distribution of firms by size adequately characterizes the population of all firms in Estonia. Masso et al. (2004) describe the distribution of all Estonian firms by the number of employees using the Estonian Business Registry data from 1995 to 2001. According to their Table A1 (and after adjusting the figures provided in it for the firms with zero or not reported number of employees), we find that the first size category — from 1 to 49 employees — accounts for 93.5 percent of all firms. The population share of the second size category cannot be calculated from this table exactly, but we can infer that firms with 50–249 employees account for 5.8 percent in the population of all firms. Clearly, our sample is significantly biased toward larger firms, but since the same seems to be true for most of the IPN samples (perhaps with the exception of Belgium and the Netherlands), the bias should not matter very much for our comparison exercise as such.

[9]In the questionnaire, we suggested (but did not insist) that the main product would be the one generating the highest turnover in the Estonian market. We also suggested that the good should correspond to something that is considered to be one category in the decision making of the firm with regard to pricing.

Table 3: Market structure, percent[1]

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[2]	**EE**[7]
Main market for the main product (in industry)[3]**:**											
- domestic	55	78	82	64	73	63	72	69	67	**72**	**–**
- foreign	45	22	18	36	27	37	28	31	33	**28**	**–**
Main customer:											
- other firms	56	89	62	66	73	–	–	84	84	**75**	**61**
- consumers	40	7	36	30	25	–	–	9	12	**21**	**39**
- public sector	4	4	2	4	2	–	–	7	4	**3**	**–**
Firm-customer relationships[4]**:**											
- long-term	78	57	86	54	98	84	–	81	84	**70**	**67**[6]
- occasional	22	43	14	46	2	16	–	19	16	**30**	**33**
Perceived competition[5]**:**											
- very low	18	19	26	19	10	17	5	20	8	**17**	**2**
- low	22	23	19	17	25	17	25	18	21	**21**	**12**
- high	30	34	24	38	37	34	49	30	38	**35**	**43**
- very high	30	24	30	25	29	32	22	32	32	**26**	**34**

Notes: (1) Re-scaled figures excluding non-responses. (2) Weighted averages (GDP weights). (3) Only the information under item 1 of the table refers to the industrial sector; the other three samples refer to the whole sample in each national survey. (4) In the case of Belgium, France and Italy, this refers to relationships with other firms. (5) Measured by the importance a firm gives to competitors' prices when considering reducing its own price. (6) Firms in trade excluded. (7) In the case of Estonia, the firms were directly asked about the degree of perceived competition.

acteristics of the markets firms operate in, for which our results can be compared with those documented in the IPN surveys, namely, the distribution of customers by customer type (firms, consumers or the public sector), the distribution of customers by the type of firm-customer relationship (occasional and regular customers), and the degree of perceived competition in the main market. As Table 3 shows, about 60 percent of the demand faced by our sample firms is attributed to firms; the remaining 40 percent — to consumers. Hence, even though according to this measure, our survey describes predominantly producer prices, the bias toward producer prices is not as strong as in the case of the IPN surveys, in which firms accounted for 75 percent of the customer base on average. Note also, that the weight of producer prices in some national IPN surveys, e.g. 89 percent in Germany and 84 percent in Austria and Portugal, exceeded this average considerably. Since there can be some important differences between producer and consumer price setting, the fact that our sample is not as skewed toward producer prices as some IPN surveys is worth keeping in mind when comparing our results with individual IPN surveys, although the issue seems to be less relevant if the synthetic IPN sample for the euro area as a whole is used as a benchmark.[10]

According to Table 3, IPN and our surveys are quite similar in terms of the reported nature of firm-customer relationships. Specifically, the share of regular customers is approximately 70 percent in the synthetic sample of the euro area as well as our sample.[11] It is important to note, however, that we did not ask trade firms to answer this question. We did so after being warned[12] that these firms would interpret it as asking about the number of customers holding the so-called "client cards." Since such an interpretation of the question was indicative of a very specific understanding of the issue, we decided to drop this question from the questionnaire designed for trade firms.[13] This exception notwithstanding, the responses reveal that in our sample of firms, as much as

[10]The effect of the customer type on price setting behavior is not always clear. Consider the frequency of price changes, for example. On the basis of the micro prices underlying the CPI and PPI indexes in Portugal, Dias et al. (2004) conclude that consumer prices are changed more frequently than producer prices. However, using analogous micro price data for Spain, Álvarez et al. (2005a) conclude just the opposite. Interestingly, there is no stylized fact comparing the frequency of price adjustment between consumer and producer prices in Álvarez et al. (2005b), the paper summarizing the new micro evidence on price stickiness obtained by the IPN. Instead, the paper emphasizes the presence of (a certain pattern of) heterogeneous flexibility *within* consumer and producer prices but not *between* them.

[11]As in IPN surveys, our questionnaire did not provide a precise definition of a regular customer, allowing firms to decide this on their own. In contrast, Hall et al. (2000) defined long-term customers as those dealing with the firm for at least five years.

[12]By the analysts of EKI involved in organizing the survey.

[13]To our knowledge, such customer cards are issued mostly by big retail chains. In that case, the narrow interpretation of the question would have biased our results.

67 percent of customers are perceived to be regular and only 33 percent of them are considered to be occasional.

Finally, the bottom panel of Table 3 provides information on the strength of competition in the main market. To make the comparison of our results with those of the IPN possible, we also measure the degree of competition indirectly, by looking at the importance that firms assign to competitors' prices when setting their own price. In particular, we asked the respondents to evaluate the following statement: "The market is very competitive; therefore, we set our price in accordance with the market price level."[14] The set of possible qualitative answers included "irrelevant", "of little importance", "important" and "very important", which we map into the assessment of the degree of competition as "very low", "low", "high" and "very high", respectively. It turns out that the main market has very low or low degree of competition in the case of only 14 percent of firms, while the remaining firms split equally between those that operate in the markets with high and very high competitive pressure. If compared with similar measures reported by the IPN for the euro area, our findings strongly suggest that competition is more widespread in Estonia. This result is the first in a set of other indications revealed by the survey that price setting is on average more flexible in Estonia than in the euro area.[15]

3. Price reviews

Having reviewed the main characteristics of sample firms and their markets, we turn to the analysis of questions focusing on firms' pricing behavior. Conceptually, price setting can be thought of as a two-stage process. Firstly, necessary information is collected and processed in order to determine the optimal price. This is the so-called price review stage of price setting. The second phase involves making a decision whether to set the actual price at the newly determined optimal price level or not. Since the latter decision can be negative because the actual price may turn out to be equal to the optimal one or because of some other reason that prevents price adjustment, having information only about actual price changes, i.e. only about the realized outcomes of the second stage of the price setting process, may be insufficient to identify the behavioral patterns necessary to understand price setting adequately. In such a situation,

[14] See Q14, Appendix 2.

[15] We also inquired about the degree of *perceived* competition directly, requesting the firms to choose one of the four descriptions of competition in their main market: "very low", "low", "average", "high", and "very high". Only 4 percent of firms indicated that competition is very low or low; 65 percent of them described it as average and high, and 30 percent as very high. These assessments are more subjective, but they reinforce the results based on the interpretation of responses about the importance of competitors' price.

the survey methodology comes in particularly handy as it enables one to address the two different stages of price setting separately (Blinder et al., 1998). In this section, we focus on price reviewing and address such issues as the circumstances under which price reviews are made, the frequency of price reviewing and the scope of information that is used in the process. In addition, we look into whether firms determine their prices according to the mark-up rule, as the pricing theory of imperfect competition would generally predict, or align them with the price level dictated by the market, as would be the case under perfect competition. Issues surrounding price changes will be discussed in the next section.

Similarly to the case of nominal price rigidity in general, we have limited understanding of the reasons that make firms review prices relatively infrequently. Ball and Mankiw (1994) suggested that frequent price reviewing may be undesirable because gathering information is costly. When trying to provide support for their sticky information model, Mankiw and Reis (2002) argued that infrequent re-optimization could be due to costs of acquiring information, "the cost of thinking" or some reasons related to bounded rationality.[16] Given the nature of the hypothesized impediments to more frequent price reviewing, they are difficult to investigate by the survey like ours. Hence, although we will return to the information costs hypothesis in Section 5, when we discuss the results of the surveyed firms' evaluation of different explanations for price stickiness, we do not attempt to infer about the reasons for "information stickiness" beyond this. Instead, we follow the earlier literature and seek a number of descriptive characteristics of the price reviewing process.

Whatever the reason(s) for discontinuous price revisions, it is useful to know whether firms undertake price reviews mostly in response to certain sufficiently significant shocks or reassess prices on a regular basis. In the literature, these modes of behavior are referred to as state-dependent and time-dependent pricing, respectively, acknowledging that in the real world, firms may practice both approaches simultaneously.[17] For example, firms may use the time-dependent approach to approximate the state-dependent behavior in relatively tranquil times but switch to the state-dependent pricing when some important factor changes significantly.[18]

[16] In their model, all firms change prices in every period but they undertake re-optimization on the basis of updated information infrequently (at randomly distributed intervals). Hence, price reviewing has a somewhat different interpretation in Mankiw and Reis (2002) than in this paper.

[17] See Taylor (1999) for a survey of models of sticky prices in macroeconomics.

[18] To justify this idea, Fabiani et al. (2005) refer to Sheshinski and Weiss (1977), who consider a model featuring costly price adjustment and show that in a constant inflation environment, the resulting optimal price adjustment policy for a monopolistic firm has a (s, S) form. The model is deterministic, however, so the behavior implied by the (s, S) rule under

The questionnaire asked firms if their practice of price reviewing is mostly time-dependent, state-dependent or a mixture of both. Table 4 provides information about the share of firms that described their price reviewing as time-dependent. As before, the table allows us to compare our survey results with those reported by the IPN. For the whole sample, 27 percent of Estonian firms say that they review prices regularly. This share does not appear to be very different from those found by the IPN in other European countries, even though it is somewhat lower than the (GDP weighted) average share of 34 percent calculated for the euro area as a whole. It is sometimes said that time-dependent price reviewing is likely to introduce more sluggishness in the process of price adjustments than state-dependent pricing, since the timing of action is not synchronized with the occurrence of a shock (Apel et al., 2005). In fact, money can be neutral in some models with state-dependent pricing.[19] From this point of view, the finding that the incidence of firms with time-dependent price reviewing is on average lower in our sample than in IPN surveys suggests that there is a case for less nominal rigidity in Estonia than in the euro area.

In general, it is unclear whether there are differences in the incidence of time-dependent price reviewing across sectors. Five IPN surveys could provide information on the sectoral distribution of price review strategies, but the results were quite mixed (see Table 4). In our sample, the share of firms reviewing prices on a regular basis is higher in trade than in the goods sector and in services compared to trade. A similar pattern can be observed in three out of five IPN countries with sectoral results: Belgium, Spain and the Netherlands. Perhaps because this result was not very general, the IPN research team appears to have emphasized a slightly weaker form of it, the more commonly observed tendency for the share of time-dependent price reviewers to be higher in services than in the goods sector (Fabiani et al., 2005). This tendency is more noticeable in the case of Estonia as well: the share of firms reviewing prices on a regular basis is 35 percent in services but only 20 percent in the goods sector. Following the same reasoning as before, we may take this as an indication that price adjustment is likely to be more sluggish in services than in the goods sector.

At the risk of creating an obvious attractor among the possible answers with regard to the timing of price reviews, we included an option specifying that the practice of price reviewing has both time- and (perhaps only occasionally) state-dependent features. The availability of the option encompassing both pricing strategies certainly increased the flexibility of the question to match the complexity of pricing behavior in the real world. At the same

constant inflation implies regular adjustment of prices.

[19] A famous example is Caplin and Spulber (1987). See Taylor (1999) for a more general discussion.

Table 4: Firms following mainly time-dependent rules, percent[(1)]

	Total	Sector		
		goods	trade	services
BE	26	22	29	24
FR	39	39		
DE	26	26		
ES	33	29	32	40
IT	40	40	35	45
LU	18	23	16	14
NL	36	26	34	40
AT	41	37		44
PT	35	32		63
EA[(2)]	**34**	**32**		
EE	**27**	**20**	**25**	**35**

Notes: (1) Re-scaled figures excluding non-responses. (2) Weighted averages (GDP weights).

time, the presence of such an option must have strengthened the potential of this question to segregate those firms that follow purely time-dependent price reviewing. Indeed, the 27 percent of firms that opted for describing themselves as time-dependent price reviewers did so in spite of the fact that the mixed-policy option was present among possible answers.

Information about the share of firms that characterize their price reviewing as both time- and state-dependent is provided in Table 5. On average, half of Estonian firms belong to this category, and although this result seems to be very similar to the average share of 46 percent reported by Fabiani et al. (2005) for the euro area, the Estonian figure is relatively high if we consider only those countries that had broader survey samples (and thus could report the responses by sector). Furthermore, we find that the mixed price-review policy is the most popular in the trade sector, where as many as 62 percent of firms engage in both time- and state-dependent price reviewing. The mixed option is the least popular among the services firms (38 percent); as a matter of fact, each price review policy is selected by approximately the same number of firms in this sector.

Thus, in accordance with Stylized fact 1 proposed by Fabiani et al. (2005)[20], we find that both time- and state-dependent pricing strategies are used by Estonian firms, and that the state-dependent pricing behavior or some elements

[20]For convenience, the list of stylized facts is provided in Appendix 1 of this paper.

Table 5: Firms following both time- and state-dependent rules, percent[(1)]

	Total	Sector		
		goods	trade	services
BE	40	42	36	48
FR	55	55		
DE	55	55		
ES	28	25	24	34
IT	46	45	62	26
LU	32	27	39	32
NL	18	19	21	16
AT	32	36		29
PT	19	23		17
EA[(2)]	**46**	**46**		
EE	**50**	**50**	**62**	**38**

Notes: (1) Re-scaled figures excluding non-responses. (2) Weighted averages (GDP weights).

of it is characteristic to about two-thirds of all firms. The share of firms using mainly time-dependent pricing is somewhat lower in Estonia (27 percent) than in the euro area (34 percent), suggesting that in the presence of shocks, prices can be slightly more flexible in Estonia. Finally, we also confirm the observation that time-dependent pricing is less common in the goods sector than in the services sector, indicating that prices are likely to respond to shocks more quickly in the former than in the latter.

When constructing a question about the information that firms use to determine the price of their main product, we decided to focus on the issue that we deemed to be particularly important in this context, namely, whether firms' behavior is shaped by the information referring mainly to the present and the past or the present and the future. Hence, unlike the Austrian questionnaire, our survey did not include an option allowing for an encompassing answer "Past, present, and future information."[21] Moreover, in order to distinguish between the past and future perspectives on pricing more clearly, we decided to exclude the "rule of thumb" alternative as well, since it largely describes backward-looking decision making.

[21] In our opinion, the issue of whether firms use mainly historical data or predictions about future economic conditions when setting their prices is somewhat more specific and easier to address than trying to inquire whether firms behave optimally or sub-optimally on the basis of how broad, *à la* "Past, present, future", or narrow – say, only "Present, future" – their information set is.

Table 6: Information used in pricing decisions, percent

	BE	ES	IT	LU	AT	PT	**EA**[(1)]	**EE**
Rule of thumb	37	33	n.a.	30	n.a.	25		
Past/present context	29	39	32	26	37	33	**34**	**59**
Present/future context	34	28	68	44	12	42	**48**	**41**
Past, present and future	n.a	n.a	n.a.	n.a.	51	n.a.		

Notes: (1) Weighted averages (GDP weights).

According to Table 6, about 60 percent of Estonian firms make pricing decisions predominantly on the basis of past and present information, whereas the remaining 40 percent of them decide about prices in the present/future context. The predominance of backward-looking firms in our sample clearly contrasts with the corresponding results reported by Fabiani et al. (2005), who conclude that in the euro area as a whole, the proportion of firms practicing mostly backward-looking pricing to those making pricing decisions in the present/future context is about the reverse of what we have found in our sample. However, it is easy to notice that there is a substantial degree of variation in the results across individual countries of the euro area (see Table 6). For example, the share of firms making pricing decisions in the present/future context was found to be relatively low in Belgium (34 percent) and Luxembourg (43 percent).

To shed more light on these results, Table 7 compares the proportions of firms that make their pricing decisions using either mostly "backward-looking" or "forward-looking" information sets in the goods, trade and services sectors separately. In the case of the goods sector, our results appear to be quite in line with the findings for the eurozone: the share of firms making pricing decisions in the present/future context is 50 percent in the euro area and 53 percent in Estonia.[22] The outcome that there are more firms setting prices on the basis of mostly past information in the whole sample of Estonian firms is therefore determined by the responses of firms in the trade and particularly the services sector: the share of such firms is 60 and 68 percent in the trade sector and services, respectively. This differs from the corresponding summary figures for the euro area, where the average shares of firms setting

[22]Again, there are considerable differences in the shares of forward-looking price setters among euro area countries, say, Spain (29 percent) and Italy (69 percent). All in all, however, the Estonian goods sector does not appear to be more backward-looking in its price setting than the goods sectors of most other euro area countries, as was the impression comparing the aggregate results.

prices on the basis of past and present information in the trade and services sector are only 38 and 29 percent, respectively. Interestingly, our findings are not as different if we compare them with the results of some individual country surveys and treat the "Rule of thumb" option in the case of the latter as a form of backward-looking behavior in pricing. Then, at least in the services sector, the ratio of firms setting prices using the present/past and present/future context is approximately 2:1 not only in Estonia but also in Belgium, Spain, Luxembourg, and Portugal.[23] In general, however, the tendency for Estonian trade and services firms to limit the information set they use when determining prices to mainly historical data is one of a very few survey results that can be interpreted as pointing toward relatively less flexible pricing behavior in Estonia.

Table 7: Information used in pricing decisions by sector, percent

	BE	ES	IT	LU	AT	PT	**EA**(1)	**EE**
Goods								
Rule of thumb	29	29		28		20		
Past/present context	27	42	31	18	33	32	**34**	**47**
Present/future context	45	29	69	54	13	48	**50**	**53**
Past, present and future					55			
Trade								
Rule of thumb	35	33		21				
Past/present context	35	49	33	28			**38**	**60**
Present/future context	30	18	67	51			**47**	**40**
Past, present and future								
Services:								
Rule of thumb	46	37		40		42		
Past/present context	23	30	29	25	35	21	**29**	**68**
Present/future context	31	33	71	35	15	38	**55**	**32**
Past, present and future					53			

Notes: (1) Weighted averages (GDP weights).

The importance of the finding that relatively more Estonian firms set prices on the basis of historical information is likely to depend on the frequency of price reviews. For example, backward-looking price setting should mat-

[23]The share of forward-looking firms is clearly higher in Italy and Austria. The result that about 70 percent of Italian firms are forward looking appears to stand out even among the IPN surveys. In the case of Austria, the comparison of results is complicated by the fact that the Austrian questionnaire included an encompassing option "Past, present and future."

ter more for inflation persistence if prices are reviewed (and changed) infrequently. Another reason for investigating the frequency of price reviews is that it should help identify whether nominal rigidities are mostly associated with the price review or the price change phase of the price setting process.

Table 8 describes the frequency of price reviews in the whole sample of Estonian firms and compares it with the corresponding results reported by the IPN for euro area countries (Fabiani et al., 2005). The table shows the distribution of firms over the following ranges of price review frequencies: twelve or more price reviews, between four and eleven price reviews and three or fewer price reviews per year. In addition, the last row of the table reports the median number of price reviews per year. At the aggregate level, the price review frequency in Estonia turns out to be very similar to that in the euro area as a whole: the share of firms reviewing prices on a monthly basis or more often is 24 percent in Estonia compared to 27 percent in the eurozone, the share of firms reviewing prices between 4 and 11 times a year is 16 percent in both, and, finally, the share of firms that review prices at most three times a year is 61 percent in Estonia and 57 percent in the monetary union. Although there are some exceptions, a similar pattern of frequency distribution can be observed in the majority of euro area countries, so the synthetic summary measure for the eurozone appears to be quite representative. Given that our results also match the pattern, we can conclude that typically about a quarter of firms review prices on a monthly basis or more often, and about 60 percent of firms do that at most three times a year. Interestingly, the Estonian median of 2 price reviews per year is basically a midpoint in the range of medians reported by Fabiani et al. (2005).

Table 8: Frequency of price reviews per year, percent[(1)]

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(2)]	**EE**
≥ 12	4	30	7	31	28	26	37	29	5	**26**	**24**
4–11	8	17	7	22	14	20	19	25	26	**17**	**16**
≤ 3	88	53	86	47	57	54	44	46	69	**57**	**61**
Median	1	3	1	4	1	4	4	4	2		**2**

Notes: (1) Re-scaled figures excluding non-responses. (2) Weighted averages (GDP weights).

A similar comparison of the frequency of price reviews in Estonia and the euro area by sectors reveals some differences in the case of the goods and trade sectors (Table 9). In the goods sector, Estonian firms review prices less frequently. For example, the share of firms reviewing prices at least quarterly is 42 percent in the euro area but only 26 percent in Estonia. The median

number of price reviews in this sector in Estonia is one, whereas three out of seven IPN countries for which this measure is reported by Fabiani et al. (2005) have the median equal to four.

Table 9: Frequency of price reviews per year by sector, percent[(1)]

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(2)]	**EE**
Goods											
≥ 12	7	30	5	31	30	11	39	35	20	**26**	**13**
4–11	12	19	6	22	15	21	19	29	15	**16**	**13**
≤ 3	81	51	90	47	55	68	42	37	65	**58**	**74**
Median	1		1	4		2	4	4	2		**1**
Trade											
≥ 12	2		17		32	44	56			**29**	**40**
4–11	4		12		19	11	16			**15**	**23**
≤ 3	94		72		49	44	28			**56**	**37**
Median	1		1			4	12				**4**
Services:											
≥ 12	3		2		20	13	24	24	9	**15**	**16**
4–11	5		5		11	21	21	22	6	**11**	**11**
≤ 3	92		92		70	67	55	53	85	**74**	**74**
Median	1		1			2	1	2	2		**2**

Notes: (1) Re-scaled figures excluding non-responses. (2) Weighted averages (GDP weights).

In contrast, trade firms review prices more frequently in Estonia than in the euro area. The share of firms reviewing prices on average at least quarterly is 63 percent in Estonia compared to only 44 percent in the eurozone. The fact that prices are reviewed more frequently in the trade sector than in the goods sector is also reflected by a higher median frequency, which is four reviews per year.

Finally, relatively infrequent price reviewing is reported by the firms in the services sector, and here the IPN and our surveys provide very similar results. In particular, only 26 percent of firms in both Estonia and the euro area review prices at least four times a year, while the remaining 74 percent of firms do that less frequently. The finding that price reviewing in the services sector is relatively infrequent was documented by most of the IPN country studies and was presented as one of the stylized facts of pricing behavior of firms in the euro area. According to our results, however, the frequency of price reviewing in the services sector is not much different from that in the goods sector in Estonia. If anything, the median price reviewing frequency of 2 in services is

even higher than the median frequency in the goods sector. In this context, it seems to be more appropriate to stress the fact that it is the trade sector that stands out as reviewing prices more often, perhaps because of the very nature of this business.

This completes our broad overview of the main characteristics of the price review process among Estonian firms. Next, we look into the practices that firms follow when they set and change their prices.

4. Price changes

The main reason we address reviewing and changing prices separately is that a price review must always accompany a price change but not necessarily result in one. The frequency of price reviews and actual price changes can therefore be quite different. Characterizing the frequency of price changes and comparing it with the frequency of price reviews is one of the issues we investigate in this section. Before that, however, we look into the way firms determine the prices they want to set; for example, we inquire whether they practice mark-up pricing or mostly follow competitors' prices and essentially take prices as given by the market. This information should shed some light on how important imperfect competition is in the economy. To cross-check the results and see if they are consistent, we also look at whether mark-up pricing is more likely when the degree of perceived competition is lower. The last question we investigate before turning to discuss the frequency of price changes is the incidence of price discrimination in pricing. This is yet another, somewhat indirect way of learning about firms' market power and the mode of competition in the market.

As can be seen from Table 10, the share of firms that have chosen to describe their pricing as a mark-up rule is 53 percent, which is remarkably close to the euro area average of 54 percent. On the other hand, the share of firms that set prices in accordance with competitors' price is 46 percent in Estonia but only 27 in the eurozone. The remaining 20 percent of firms in the IPN surveys have found none of the above two options to be satisfactorily close to their pricing practice and chose the "Other" option as an answer. Interestingly, only 2 percent of all firms in our sample have followed suit. This leads us to the conclusion that the incidence of mark-up pricing in Estonia is essentially the same as in the euro area, but the share of price taking firms is considerably higher. Note that the latter finding agrees with the earlier observation that the perceived level of competition is also higher in Estonia than on average in the EMU.

The analysis of responses by sectors (see Table 11) reveals that the goods

Table 10: Price setting rules, percent[1]

	BE	DE[2]			ES	FR	IT	NL[2]			PT[3]	**EA**[4]		**EE**[5]
		all	con	var				all	con	var		unwa	wa	
Mark-up	46	73	4	69	52	40	42	56	27	30	65	**54**	**54**	**53**
Competitors' price	36	17			27	38	32	22			13	**26**	**27**	**46**
Other	18	10			21	22	26	21			22	**20**	**18**	**2**

Notes: (1) Re-scaled figures excluding non-responses. (2) Germany and the Netherlands distinguished between constant (con) and variable (var) markups; "all" includes both. (3) In the case of Portugal, the issue was not addressed directly; the information reported in the table has been estimated on the basis of the answers to other questions. (4) Reports unweighted (uwa) and weighted (wa) averages. (5) In the case of Estonia, firms were asked to assess the relevance of different price setting rules – the results in the table refer to the most relevant rule chosen.

sector tops the list in terms of the share of firms setting prices according to the markup rule (58 percent), followed by the trade sector (53 percent) and services (43 percent). Given that very few firms chose "Other" as their preferred response, basically all the remaining firms — 38 percent in the goods sector, 47 percent in trade and 57 percent in services — characterize themselves as largely price takers. As a result, an interesting pattern emerges if one contrasts the two sectors for which the above results differ the most: the ratio of firms setting prices as markups to those following competitors' price is 60:40 in the goods sector but approximately 40:60 in the services sector. The 60:40 characterization of the goods market is qualitatively similar to the full-sample result: mark-up pricing is not only widespread but also arguably the dominant price setting practice in the market. The 40:60 outcome for the services sector, on the other hand, indicates that the relative importance of the two price setting practices is quite different in a very considerable part of the economy. Finally, the comparison of our sectoral results with those reported by the IPN for the euro area confirms the pattern we observed when investigating the aggregate figures: the incidence of mark-up pricing is very similar even at the sectoral level, but the share of price-taking firms is considerably higher in Estonia.

One of the shortcomings of survey methodology is that it places limits on how precise a questionnaire can be in using certain theoretical concepts, even though they may have very specific meaning to economists. In other words, it is often the case that survey questions are compromises between theory, scientific rigor and the language that is understandable to ordinary market participants. This limitation notwithstanding, we still expect that the responses we collect will enable us to discriminate between alternative theories and perhaps even validate or reject some of them. For that to be the case, various consistency checks can be applied to infer whether survey evidence is infor-

Table 11: Price setting rules by sector, percent[1]

	BE	DE	ES	FR	IT	NL	PT[2]	**EA**[3]	**EE**
Weight,%	3.7	29.8	9.8	21.6	17.8	6.3	1.8		
Markup									
goods	49	73	55	40	48	63	67	**56**	**58**
trade	41		50		16	71		**37**	**53**
services	49		50		43	45	48	**46**	**43**
Competitors' price									
goods	40	17	24	38	33	19	13	**27**	**38**
trade	33		26		35	21		**30**	**47**
services	39		31		18	24	8	**24**	**57**
Other:									
goods	11	10	22	22	19	18	19	**17**	**4**
trade	26		23		49	8		**33**	**0**
services	12		20		40	31	44	**31**	**0**

Notes: (1) Re-scaled figures excluding non-responses. (2) In the case of Portugal, the issue was not addressed directly; the information reported in the table has been estimated on the basis of the answers to other questions.

mative and reliable enough, so that it can be used to discriminate between different theories. For example, the credibility of survey results would certainly be questionable if they happened to imply that firms with a lot of market power act as price takers or that price discrimination is common among firms operating in a market that is close to being perfectly competitive.

In this context, we may want to check whether some of our findings concerning price setting rules and the mode of competition are mutually consistent. For example, we already discussed the results of asking firms to evaluate the degree of competition in their main market (Table 3) and assess the importance of competitors' prices for their own price setting (Table 10). Since both questions can be seen as inquiring about how close (far) the functioning of a given market is to (from) the paradigm of perfectly competitive market, we follow Fabiani et al. (2005) and cross-check the answers by looking into whether the incidence of mark-up pricing is lower when the market is perceived to be very competitive. Figure 4. demonstrates that we indeed observe a negative association between the degree of perceived competition and the share of firms practicing mark-up pricing, but the relationship is not very strong. In particular, the incidence of mark-up pricing in the markets with low and high perceived competition is about 65 and 50 percent, respectively. Hence, although the difference in averages points to the right direction, the effect is

quite marginal. Note, however, that our results are again very similar to those reported by the IPN.

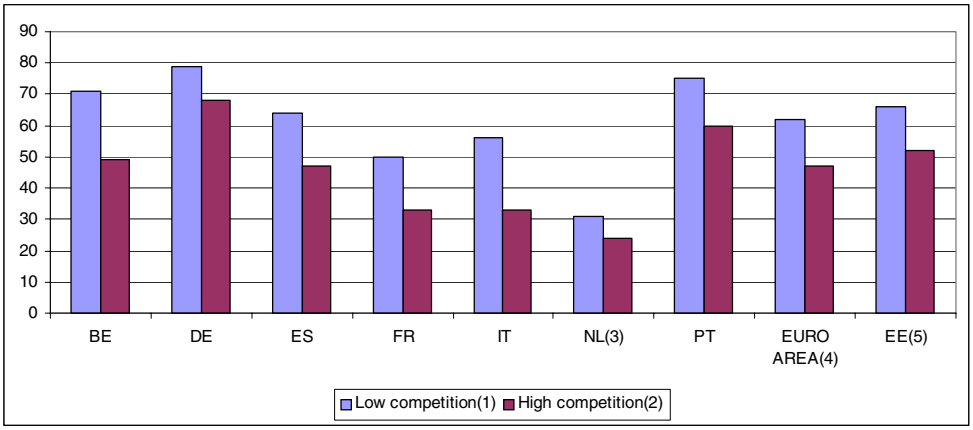

Figure 1: Markup rule and perceived competition, percent

Notes: (1) Mean share for a "very low" and "low" degree of perceived competition. (2) Mean share for a "very high" and "high" degree of perceived competition. (3) For the Netherlands, the percentage of firms adopting a fixed mark-up is considered. (4) Weighted average (GDP weights). (5) In the case of Estonia, the firms which considered the perceived competition "medium" were classified as belonging to the low competition group.

On the basis of these findings we conclude that our survey provides support for Stylized facts 4 and 5 put forward by Fabiani et al. (2005). In line with the former, we find that markup-pricing is a predominant price setting practice in Estonia as well. We also confirm that this pricing method is used more frequently in the markets where the level of perceived competition is low. On the other hand, the incidence of prices being shaped mainly by competitors' prices is higher in our sample (45 percent) than in any other euro area country for which such data are provided by the IPN. Hence, we do find support for Stylized fact 5 in principle but note that the high proportion of price taking firms in Estonia exceeds the corresponding average for the euro area (30 percent) referred to in Fabiani et al. (2005). This higher incidence of price taking behavior suggests that everything else being equal, there is a smaller case for nominal rigidity in Estonia.[24]

Following Fabiani et al. (2005), we have also tried to infer about the prevailing modes of competition in the economy by investigating how common it is for firms to possess enough market power to differentiate prices. In particular, we asked firms whether they practice price discrimination — quantity discounts and even case-by-case price setting — or sell their goods at the same

[24]For example, Small and Yates (1999) find that stronger competition increases the responsiveness of prices to demand shocks. They do not confirm the same in the case of cost changes, however.

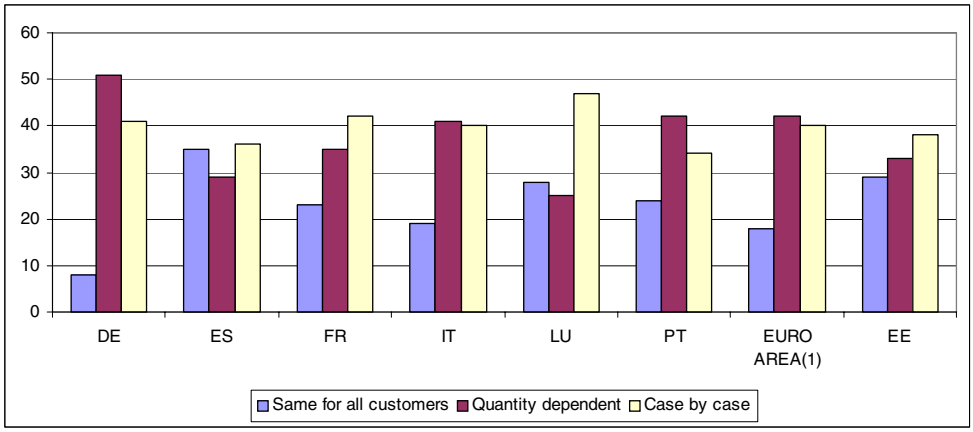

Figure 2: Price discrimination, percent

Notes: (1) Weighted average (GDP weights).

price to all customers. Figure 4. shows that about 30 percent of firms set the same price to all customers, slightly more than that practice quantity discounts, and almost 40 of all firms set prices on a case-by-case basis. Perhaps the easiest way to compare these findings with the results reported by the IPN is to focus on the shares of those firms that do not practice price discrimination. The 30 percent share of such firms in Estonia appears to be relatively high in the context of the IPN surveys; since only Spain and Luxembourg report similar shares of non-discriminating firms, our figure is noticeably higher than the 20 percent share corresponding to the euro area average. Obviously, the reverse side of that is a lower incidence of price discrimination in Estonia relative to that in the eurozone. As for the relative significance of quantity discounts versus price setting on the case-by-case basis, both practices are more-or-less equally common among the majority of eurozone countries and Estonia. It is remarkable, however, that so many firms say they set prices on a case-by-case basis.

All in all, the evidence on price discrimination provided by our survey is very much in line with the Stylized fact 6 offered by Fabiani et al. (2005) on the basis of IPN surveys. Price discrimination is a common practice in Estonia as well, although here the share of firms practicing price discrimination (70 percent) is slightly lower than that in the eurozone on average (almost 80 percent). Note that this difference can be interpreted as implying that in Estonia, firms are somewhat more constrained by competitive market forces than in most euro area countries.

Finally, we switch our attention from the analysis of price setting practices and their relationship with the degree of competition in the market to the

investigation of price changes. Since the nature of price changes has direct implications for the formation of inflation at the aggregate level, we investigate this topic more extensively and address it from several perspectives. Firstly, we look at the frequency of price changes and compare it with the frequency of price reviews, the issue that was discussed in greater detail in Section 3. In remaining Sections 5 and 6, we will investigate, respectively, the factors that make prices sticky and the relative importance of different factors that induce price adjustments.

Table 12: Frequency of price changes per year, percent[(1)]

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(2)]	**EE**
≥ 4	8	21	14	9	11	27	11	11	12	**14**	**18**
2–3	18	21	15	24	19	27	19	15	14	**20**	**25**
1	55	14	57	46	50	31	60	51	51	**39**	**43**
< 1	18	44	14	21	20	15	10	24	24	**27**	**14**
Median	1	1	1	1	1	2	1	1	1		**1**

Notes: (1) Re-scaled figures excluding non-responses. (2) Weighted averages (GDP weights).

The frequency distribution of price changes per year is described in Table 12. The table reports the incidence of firms changing prices four or more times a year, two or three times a year, once a year and, finally, less than once a year. The table also shows the median number of price changes and provides all this information in the context of the corresponding statistics from the IPN, which are also reported.

The first thing to notice about the frequency distributions in all euro area countries but Germany and Luxembourg is that they have their modes at one price change per year. One price change a year is also the median frequency in all countries but Luxembourg. As shown in the last column of Table 12, the results for Estonia are no exception: the frequency distribution of price changes has both its mode and median at one price change per annum. In fact, even the share of firms that change prices once a year, which according to our survey amounts to 43 percent, is very similar to the respective share for the euro area, which is 39 percent.

However, a closer look at the table reveals that relative to the frequency distributions in euro area countries, the distribution of price changes in Estonia is skewed toward more frequent price changes. For example, only Germany and Luxembourg have more density mass in the case of the highest frequency group of at least four price changes than Estonia. As a result, its 18 percent

share of firms belonging to this category exceeds the corresponding average share in the euro area, which is only 14 percent. In the case of the second highest frequency group, Estonia leads the list. Two or three price changes per year are reported by 25 percent of all firms, and that exceeds the respective average share in the eurozone by 5 percentage points. Finally, the easiest way to see that the frequency of price changes is higher in Estonia than in the euro area is to compare the densities in the lower tails of the distributions. The share of firms changing prices less often than once a year is 26 percent in the euro area but only 14 percent in Estonia.

We can now compare the frequencies of price reviews and price changes and see whether it is indeed the case that the latter are not as frequent as the former, indicating that nominal rigidity is more likely to be associated with the second stage of the price setting process than the first one. Instead of comparing the corresponding distributions, we follow Fabiani et al. (2005) and carry out the comparison by focusing on the incidence of up to three price reviews/changes per year, as presented in Table 13. This particular frequency divides the sample into those firms that on average review/change prices at least quarterly and those that do it less frequently.

Table 13: Comparison of price reviews and price changes per year, percent[(1)]

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(2)]	**EE**
Reviews ≤ 3	88	53	86	47	57	54	44	46	72	**57**	**61**
Changes ≤ 3	91	79	88	91	89	73	89	90	88	**86**	**82**

Notes: (1) Re-scaled figures excluding non-responses. (2) Weighted averages (GDP weights).

According to Table 13, 61 percent of firms in our survey review prices at most three times a year, but the share of firms that change prices at this frequency is clearly higher and amounts to 82 percent. This evidence is very much in line with the IPN findings for the euro area, where the corresponding shares are 60 and 86 percent in the case of price reviews and changes, respectively.

To summarize, we find that the frequency of price changes is somewhat higher in Estonia than in euro area countries. That is especially evident if we consider the incidence of firms that change prices less often than once a year. The share of such firms in the euro area is 26 percent but only 14 percent in Estonia. In addition, we find clear support for Stylized fact 9 in Fabiani et al. (2005) that price changes are less frequent than price reviews (see Appendix 1). Given that the incidence of price reviews is not binding for

the frequency of price changes on average, the latter are relatively infrequent either because some price reviews show that price changes are unnecessary or because there are additional reasons that make firms unwilling to change prices. In the following section, we investigate which of a number of such explanations for price stickiness that economists have proposed seem to be the most relevant for the firms in our sample.

5. Price stickiness

There exist many theories that aim to explain nominal price rigidity. However, as noted by Blinder (1991) and Blinder et al. (1998), assessing the empirical validity and relevance of different theories in this research area has proved to be particularly difficult. Partly because some theories are observationally equivalent, partly because the explanations are often based on the behavior of certain variables that we cannot observe and measure. As an alternative, Blinder (1991) proposed using business surveys as a means to investigate price stickiness and even to inquire about the empirical relevance of respective economic theories. Following that work and the surveys undertaken by the IPN, we also included into the questionnaire a set of questions asking firms to evaluate the relevance of a number of proposed explanations for what makes them refrain from or postpone price changes. In particular, we inquired about nine out of ten different reasons for nominal rigidity investigated by the IPN. The fact that different studies have implemented these inquiries using very similar questions and evaluation scales makes comparing our results and previous findings relatively easy. The second set of results we discuss in this section includes a summary of firms' responses to our inquiry about how much time it takes for firms to react to shocks by changing prices. As pointed out by Blinder et al. (1998), this question represents the most direct way of learning about the existence and degree of price stickiness in the economy. In this context, it is particularly interesting to compare our results with those in Fabiani et al. (2005).

The first column of Table 14 provides a list of explanations of price stickiness we asked firms to evaluate. The first two, referred to as implicit and explicit contracts, focus on the firm-client relationship and hypothesize that prices are not changed either because firms think that their customers prefer stable prices and thus expect that firms will guarantee price stability implicitly or because there are legally binding contracts or other explicit agreements that specify prices for some period of time, respectively. The explanation under the "cost-based pricing" entry stipulates that firms delay price changes because they wait until their costs change and only then adjust prices accordingly. The

hypothesis that firms do not alter prices because they are not sure that their competitors will follow suit is named co-ordination failure in Table 14. The idea that prices signal quality, and therefore firms refrain from lowering prices because they think that customers will perceive that as an indication of the product quality being degraded is listed as "Judging quality by price." Note that this explanation is applicable only for explaining downward price rigidity. The next explanation suggests that firms keep prices constant because they change the effective price of their product by adjusting other, less transparent characteristics of the product such as delivery terms and conditions. We also inquired if the firms think that certain specific costs associated with changing prices represent the reason for adjusting prices relatively infrequently. Although our previous findings already established that price reviews are more frequent than price changes, we nevertheless asked firms to consider the hypothesis that prices are changed infrequently because of information costs associated with recalculating the optimal price. Finally, we inquired about the importance of attractive pricing (pricing thresholds) for nominal price stickiness.

To ensure the comparability of our results with those of previous surveys, we asked the firms to evaluate the relevance of the above explanations according to a 4-point scale that was often used in other studies: 1 – not important, 2 – of minor importance, 3 – important, 4 – very important. Table 14 provides the ranking of the explanations on the basis of the average scores that they received according to this 1–4 scale. Importantly, to capture possible asymmetries, we asked the firms to evaluate the hypotheses in the case of price increases and decreases separately. This enables us to report separate rankings for price increases and decreases, shown in columns EE(p↑) and EE(p↓), respectively, as well as the overall ranking based on pooled evaluations in Table 14.

It is quite evident from Table 14 that businesses tend to favor more-or-less the same explanations for price stickiness in spite of the fact that surveys are carried out in different countries and using somewhat different questionnaires. For example, the same four theories top the list according to the evidence obtained by the IPN and our survey. In particular, this set includes explanations based on the existence of implicit and explicit contracts, cost-based pricing and coordination failure. The only difference between the top-four rankings is the relative position of the hypothesis about cost-based pricing; it is ranked third in Fabiani et al. (2005) but appears to be the most important reason for price stickiness in Estonia. Note, however, that even this difference disappears if we ask firms to focus on upward price rigidity; in that case, cost-based pricing drops to the third place and the top-four ordering becomes identical.

Not less interesting implications result if we differentiate the ranking of

Table 14: The ranking of explanations for price stickiness

	EA[1]	US	SW	UK	**EE**	EE($p\uparrow$)[2]	EE($p\downarrow$)[3]
Implicit contracts	**1**	4	1	5	**2**	1	2
Explicit contracts	**2**	5	3	1	**3**	2	5
Cost-based pricing	**3**	2	2	2	**1**	3	1
Coordination failure	**4**	1	4	3	**4**	4	4
Temporary shocks	**5**						
Judging quality by price	**6**	12		10	**5**		3
Change non-price factors	**7**	3		8	**6**	6	6
Menu costs	**8**	6	11	11	**8**	8	8
Costly information	**9**		13		**9**	7	9
Pricing thresholds	**10**	8	7	4	**7**	5	7

Notes: (1) The ranking of theories is based on the unweighted average of countries' scores. (2) The case of price increases. (3) The case of price decreases.

theories with respect to the direction of price changes, that is, whether the firms are refrained from increasing or decreasing prices. As mentioned above, the top four positions in the ranking corresponding to the upward price stickiness are given to the explanations based on implicit and explicit contracts, cost-based pricing and co-ordination failure. In contrast, the top four theories in the case of downward price stickiness are cost-based pricing, implicit contracts, judging quality by price and co-ordination failure. As a result, the comparison of the two rankings has several interesting implications. First, firms say that they do not want to lower prices unless and until after their costs have declined. Although the same argument is relevant in the case of price increases as well, it is not the most important consideration hindering price adjustment anymore. The understanding that prices should not be raised because customers dislike that is more important for upward price rigidity. Second, the presence of explicit contracts is not that important a cause of *downward* price stickiness, but the implicit understanding that customers prefer stable prices is. Third, judging quality by price ranks third in the list for downward price stickiness. This finding is quite remarkable, as it seems to be rather specific to our survey. Finally, Table 14 hints that pricing thresholds are quite more important for upward price stickiness in our survey than it is generally found to be in the euro area (Fabiani et al., 2005).

At this point, it is useful to consider our main findings concerning the reasons for sticky prices in the light of similar results by the IPN, which Fabiani et al. (2005) generalized in the form of Stylized fact 9. In particular, Fabiani et al. (2005) concluded that implicit and explicit contracts are the most rele-

vant causes of price stickiness in the euro area, followed by cost-based pricing and co-ordination failure. They also noted that the first two explanations support the view that price stickiness largely results from customers' preference for stable nominal prices, and that the four top-ranking explanations taken together imply that the main reasons preventing more frequent price adjustment are related to the price change stage rather than the price review stage of the price setting process. We can confirm, in turn, that the ranking of explanations for price stickiness in Estonia is broadly similar to that in the euro area, so the main implications carry through. We have evidence, however, that cost-based pricing and pricing thresholds are relatively more important reasons for sticky prices in Estonia than in the eurozone. In addition, our results indicate that there are differences between the most relevant reasons for upward and downward price stickiness. In particular, implicit contracts matter particularly much in the case of the former, while cost-based pricing and judging quality by price are more essential for the latter; the explanation based on the presence of explicit contracts is equally important in both cases.

It is possible that the differences between our and IPN findings with regard to the most relevant explanations for price stickiness result from differences in the sample coverage. For example, it can be argued that pricing thresholds appear to be more important in Estonia because our sample includes the trade sector and that is not always the case in the IPN country surveys. On the other hand, the possibility that there are systematic differences in the reasons for price stickiness among sectors is an interesting hypothesis in itself. We therefore look into the relative standing of the different explanations for price stickiness by sector. The average scores that the explanations received in the goods sector, trade sector and services are presented in Tables 15, 16 and 17, respectively.

Table 15: The scores of explanations for price stickiness – goods sector

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(1)]	**EE**
Implicit contracts	2.7		2.5	2.2		2.6	2.8	3.1	3.2	**2.7**	**2.7**
Explicit contracts	2.6	2.4	2.2	2.7	2.7	2.8	2.6	2.9	2.6	**2.6**	**2.7**
Cost-based pricing	2.4	2.2		2.5		2.7		2.7	2.7	**2.5**	**2.7**
Coordination failure	2.4		2.4	3.0	2.6	2.1	2.2	2.4	2.9	**2.5**	**2.5**
Temporary shocks	1.9	1.9	1.8	2.1	2.0	1.9	2.5	1.6	2.5	**2.0**	
Judging quality by price	1.9		1.7			1.8	2.4	1.8	2.3	**2.0**	**2.2**
Changing non-price factors	2.0		1.4			1.9	2.1	1.6		**1.8**	**2.1**
Menu costs	1.5	1.4	1.3	1.4	1.5	1.7	1.6	1.5	1.9	**1.5**	**1.8**
Costly information	1.7		1.3			1.7		1.7	1.7	**1.6**	**1.8**
Pricing thresholds	1.5		1.3	1.6	1.3	1.6	1.7	1.3	1.8	**1.5**	**2.0**

Notes: (1) Unweighted average of countries' scores.

According to Table 15, the four most relevant explanations for price stickiness in the goods sectors of Estonia and the eurozone as well as their respective rankings are essentially identical to those discussed in the case of aggregate results. As before, the top of the list is occupied by the explanations referring to implicit and explicit contracts, cost-based pricing and co-ordination failure. In fact, even the previous finding that cost-based pricing matters relatively more in the case of Estonia seems to emerge again. As for the remaining five explanations that do not receive much support, all of them get slightly higher evaluations in our survey than the average scores in the euro area as a whole. However, the 2.0 score that pricing thresholds got in our survey is considerably higher than the 1.5 average score received by this hypothesis in the case of the euro area, suggesting that differently from manufacturing firms in the eurozone, firms in the goods sector of Estonia do not consider this explanation for sticky prices to be completely irrelevant.

Table 16: The scores of explanations for price stickiness – trade sector

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(1)]	**EE**
Implicit contracts	2.4		2.6			2.4	2.6			**2.5**	**2.4**
Explicit contracts	1.8		1.9		1.9	2.3	2.3			**2.1**	**2.2**
Cost-based pricing	2.5					2.3				**2.4**	**2.6**
Coordination failure	2.2		2.6		2.7	2.4	2.3			**2.4**	**2.4**
Temporary shocks	1.8		1.8		2.1	1.7	2.4			**2.0**	
Judging quality by price	2.1		1.8			2.1	2.4			**2.1**	**2.3**
Changing non-price factors	1.7		1.3			1.8	2.0			**1.7**	**2.1**
Menu costs	1.7		1.6		1.8	1.7	1.9			**1.7**	**2.0**
Costly information	1.6		1.4			1.7				**1.6**	**2.0**
Pricing thresholds	2.1		1.7		2.0	2.0	2.1			**2.0**	**2.5**

Notes: (1) Unweighted average of countries' scores.

Some important differences in the ranking of explanations for nominal rigidity emerge if we turn to consider the trade sector (see Table 16). In the case of Estonia, cost-based pricing is still the most relevant reason for price stickiness (implicit contracts in the euro area), but it is very closely followed by the explanation referring to pricing thresholds. Somewhat surprisingly, the latter result does not show up in the case of trade firms in the IPN surveys. The average score that the explanation based on pricing thresholds received in the euro area is 2.0, which is higher than the corresponding score in the case of its goods sector (1.5) but considerably lower than both the leading theory in the case of the trade sector in the eurozone (implicit contracts with the average score of 2.5) and the 2.5 average that pricing thresholds scored among the trade firms in our survey. The third and fourth most popular explanations for price stickiness in the trade sectors of Estonia are implicit contracts and

co-ordination failure, which lead the list in the case of trade firms of the euro area as well. Finally, note that explicit contracts are rather unimportant for price rigidity according to trade firms in both our and IPN surveys (rank 6 in Estonia and 4–5 in the euro area).

Table 17: The scores of explanations for price stickiness – services sector

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**(1)	**EE**
Implicit contracts	2.7		2.6			2.8	2.8	3.0	3.0	**2.8**	**2.9**
Explicit contracts	2.7		2.6		3.0	2.8	2.5	3.0	2.8	**2.8**	**2.7**
Cost-based pricing	2.5					2.8		2.5	2.7	**2.6**	**2.7**
Coordination failure	2.0		2.4		2.3	2.0	2.1	2.1	2.7	**2.2**	**2.6**
Temporary shocks	1.7		1.8		1.9	1.7	2.3	1.5	2.2	**1.9**	
Judging quality by price	2.0		2.0			2.3	2.5	1.9	2.2	**2.1**	**2.5**
Changing non-price factors	1.6		1.3			1.7	1.9	1.8		**1.7**	**2.5**
Menu costs	1.4		1.4		1.6	1.9	1.6	1.5	1.9	**1.6**	**1.9**
Costly information	1.6		1.3			1.8		1.6	1.7	**1.6**	**1.9**
Pricing thresholds	1.6		1.6		1.3	1.7	1.7	1.2	1.9	**1.6**	**2.1**

Notes: (1) Unweighted average of countries' scores.

Finally, in the case of the services sector, the four most relevant explanations for price stickiness in the euro area as well as Estonia are implicit and explicit contracts, cost-based pricing and co-ordination failure (see Table 17). Since that is exactly the same set of reasons for nominal rigidity that dominated the list when we considered the rankings at the aggregate level and the goods sector alone, it seems appropriate to conclude that these explanations indeed represent the four major impediments of more frequent price adjustment in both economies. That is particularly so in the case of the explanation referring to the presence of implicit contracts between firms and their customers. According to Table 17, this reason for price stickiness is acknowledged as the most relevant by services firms in our and basically all IPN surveys. Note, however, that there are two explanations, namely, judging quality by price and changing non-price factors, that received considerable support among the service firms in our sample but not in the majority of IPN surveys. The indication that judging quality by price is more relevant for pricing decisions in Estonia is most easily noticeable in the case of services firms, but the same tendency can be noticed in the other two sectors as well (see Tables 15 and 16). All in all, judging quality by price is a more important consideration in the pricing decisions of firms in Estonia than in the euro area.

The final issue we consider in this section is the speed of price adjustment, measured by the amount of time it takes for firms to change their prices in response to a shock. We asked the firms to consider four different shocks — higher demand, lower demand, higher costs, and lower costs — that are

significant enough to make them willing to change the price, and inquired how much time, on average, it would normally take them to actually change their prices. We offered the following six options as possible answers: up to one month, from 1 to 3 months, from 3 to 6 months, from 6 months to one year, more than one year and, finally, the option saying that prices are not changed at all. We summarize these results for all firms of our survey in the bottom of Table 18. As before, we also show the respective findings of IPN surveys as reported by Fabiani et al. (2005).

Table 18: Speed of price adjustment after shock, percent[(1)]

	Higher costs	Lower costs	Higher demand	Lower demand
ES				
$\leq$ 1 month	18	21	15	13
1–3 months	17	21	18	18
$\geq$ 3 months	65	58	67	69
FR				
$\leq$ 1 month	35	37	34	31
1–3 months	34	35	27	29
$\geq$ 3 months	31	28	39	40
LU				
$\leq$ 1 month	34	42	47	40
1–3 months	24	31	25	28
$\geq$ 3 months	42	27	28	32
AT				
$\leq$ 1 month	4	3	2	2
1–3 months	51	71	65	61
$\geq$ 3 months	45	26	33	37
PT				
$\leq$ 1 month	22	28	24	23
1–3 months	31	32	27	33
$\geq$ 3 months	47	40	49	44
EE				
$\leq$ 1 month	**63**	**66**	**51**	**52**
1–3 months	**20**	**19**	**24**	**26**
$\geq$ 3 months	**17**	**14**	**24**	**22**

Notes: (1) Re-scaled figures excluding non-responses.

A comparison of the bottom panel of Table 18 with the rest of the table shows very clearly that firms would change prices considerably quicker in Es-

tonia than in the reference euro area countries. Even if we compare the implied speed of price adjustment in Estonia and Luxembourg, the country where the price adjustment is arguably the fastest among the sample of eurozone countries, the case for less price stickiness in Estonia carries through strongly. In particular, more than 60 percent of firms in our sample say they would adjust prices to changes in demand within one month. In contrast, the share of such firms in Luxembourg is only 35–40 percent. The difference between the incidence of firms that would alter prices in response to changes in costs within one month is not as great but still present: 51–52 percent in Estonia versus 40–47 in Luxembourg. It is worth stressing, however, that in Luxembourg, firms respond to shocks considerably more promptly than in the other euro area countries described in Table 18. All in all, it seems fair to say that according to this survey evidence, the share of firms that would change prices within one month after the occurrence of a shock is about twice larger in Estonia than in the euro area. We interpret this finding as a direct indication of a relatively higher nominal flexibility in Estonia.

The same conclusion can be reached even more easily if we consider an alternative way to compare the nature of price adjustment to shocks across different countries, namely, by contrasting the incidence of firms that say they would not adjust their prices at all. Surprisingly or not, the proportions of firms that choose this option as an answer are usually non-trivial, and they are reported in Table 19. The table shows very clearly that the share of firms that would not adjust prices in response to a demand or cost shock is systematically and considerably (about three times) lower in Estonia than in the reference euro area countries. Again, we take this as direct evidence of a relatively higher flexibility of prices in Estonia.

Table 19: Firms not adjusting their prices in response to a shock, percent[(1)]

	Higher demand	Lower demand	Higher costs	Lower costs
ES	33	26	13	25
FR	23	22	18	27
LU	38	33	12	32
AT	63	52	8	38
PT	34	26	9	14
EE	**12**	**9**	**4**	**14**

Notes: (1) Re-scaled figures excluding non-responses.

Having compared the survey evidence concerning the speed of price adjustment in Estonia and some euro area countries, we may next ask whether

the source and direction of a shock matters for how promptly firms respond by adjusting their prices. In this regard, no particular pattern emerges from the IPN data presented in Table 18. Our results, on the other hand, seem to suggest that firms change prices more promptly in response to demand rather than cost shocks. For example, the incidence of firms that would change prices within a month after a demand shock is 60 percent compared to the 50 percent incidence in the case of a cost shock. This, of course, implies that the share of firms postponing price adjustment is higher in the case of cost than demand changes. For example, the share of firms that would respond to a cost shock with a 1–3 month delay is 24–26 percent, but only 19–20 percent of firms would postpone their price adjustments for that much after a demand shock. The difference in the incidence is even bigger in the case of price adjustments that are delayed for more than three months. All in all, our results suggest that firms are somewhat more sluggish when changing prices in response to cost shocks than demand shocks. However, given that we cannot observe the same pattern in the survey results of other countries, we leave this conjecture as a hypothesis for our follow-up research project in which we will analyze the Estonian survey data in greater detail.

6. Determinants of price changes

One of the most interesting general patterns that emerged from the IPN survey evidence was the finding that there is an asymmetry in terms of those factors that are more important for resulting in price increases and those that are more relevant for causing price decreases. Fabiani et al. (2005) have summarized this result in the form of Stylized fact 11, which says, in particular, that cost shocks appear to be more relevant in making prices be adjusted upwards than downwards, but that changes in market conditions, such as shocks to demand and competitors' price are more important for price decreases than increases. In this section, we look into the importance of different factors for price increases and decreases as well as potential asymmetry using our survey data.

In the questionnaire, we asked firms to consider five factors and evaluate their relevance for resulting in price increases and decreases, one at a time. The set of factors included (changes in): labor costs, costs of raw materials, financial costs, demand and competitors' price. The evaluations were made using the same 1–4 scale. Tables 20 and 21 report the average scores that these factors receive in the case of price adjustments upwards and downwards, respectively.

According to Table 20, the factor that is particularly relevant for driving

Table 20: The importance of different factors driving price increases, mean scores

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**[(1)]	**EE**
Labor costs	2.9	2.7	2.7	2.5	2.9	3.5	2.7	3.4	3.3	**3.0**	**2.8**
Cost of raw materials	2.9	3.4	3.1	3.0	3.3		2.5	3.1	3.6	**3.1**	**3.6**
Financial costs	2.2	1.9	1.8		2.3	3.0	2.1	1.9	2.5	**2.2**	**1.7**
Demand	2.2	2.2	2.4	2.0	2.4	2.3	2.3	1.9	2.5	**2.2**	**2.5**
Competitors' price	2.5	2.1	2.5	2.3	2.6	2.4	2.5	2.0	2.7	**2.4**	**2.7**

Notes: (1) Unweighted average of country scores.

prices up in Estonia is increases in the cost of raw materials. Its average score of 3.6 is very high indeed. Increases in labor costs represent the second most important reason for raising prices, closely followed by changes in competitors' price. Increases in demand are relatively less important, while changes in financial costs turn out to be basically immaterial. In principle, these results are not very different from the respective findings by the IPN, but it is fair to say that the relevance divide between the cost factors and the remaining ones is not as clear-cut in Estonia as, say, in the case of the euro area as a whole. What we observe is an overwhelming agreement about the significance of rises in the cost of raw materials and the irrelevance of increases in financial costs for pushing prices up. The importance of changes in labor costs and competitors' price receive more-or-less equal support.

On the other hand, the dominant factors behind price decreases in Estonia are reductions in competitors' price, demand and costs of raw materials (see Table 21). Decreases in labor costs are not as important, while reductions in financial costs are essentially irrelevant again.[25] Compared to the scores assigned to the five price determinants in Table 20, the ranking of price factors in Table 21 shows that in the case of price decreases, the emphasis is shifted toward competitors' price and demand. The relevance of changes in the cost of raw materials is not as overwhelming now but still remains high.

Finally, to demonstrate and confirm the kind of asymmetry in price driving factors emphasized by Fabiani et al. (2005), we plot the difference between the average score that each of the five price determinants received in the question about price increases (Table 20) and the average score that they obtained in the inquiry about price decreases (Table 21). Figure 3 shows very clearly that the diagram corresponding to our findings is remarkably similar to the one

[25] It could be the case that the score assigned to labor costs is biased downwards due to the fact that there have hardly been any decreases in labor costs in the recent past, but we have no reference point to assess that. If anything, our average score for this factor is quantitatively very similar to the average for the eurozone reported by Fabiani et al. (2005).

Table 21: The importance of different factors driving price decreases, mean scores

	BE	DE	ES	FR	IT	LU	NL	AT	PT	**EA**(1)	**EE**
Labor costs	2.1	1.9	2.0	1.9	2.4	2.6	2.1	1.3	3.0	**2.1**	**2.0**
Cost of raw materials	2.3	2.8	2.6	2.6	2.9		2.0	2.2	3.3	**2.6**	**2.9**
Financial costs	1.8	1.6	1.5		2.1	2.5	1.8	1.6	2.3	**1.9**	**1.7**
Demand	2.5	2.4	2.4	2.3	2.8	2.7	2.5	2.0	3.0	**2.5**	**2.9**
Competitors' price	2.9	2.6	2.7	2.8	2.8	2.8	2.7	2.6	2.9	**2.8**	**3.0**

Notes: (1) Unweighted average of country scores.

drawn for the euro area. Figure 3 succinctly demonstrates that in the euro area as well as Estonia, cost factors are relatively more relevant for inducing price increases, while demand and competitors' price are more important for resulting in price reductions. Hence, our survey shows that Stylized fact 11 put forward in Fabiani et al. (2005) also applies to Estonia.

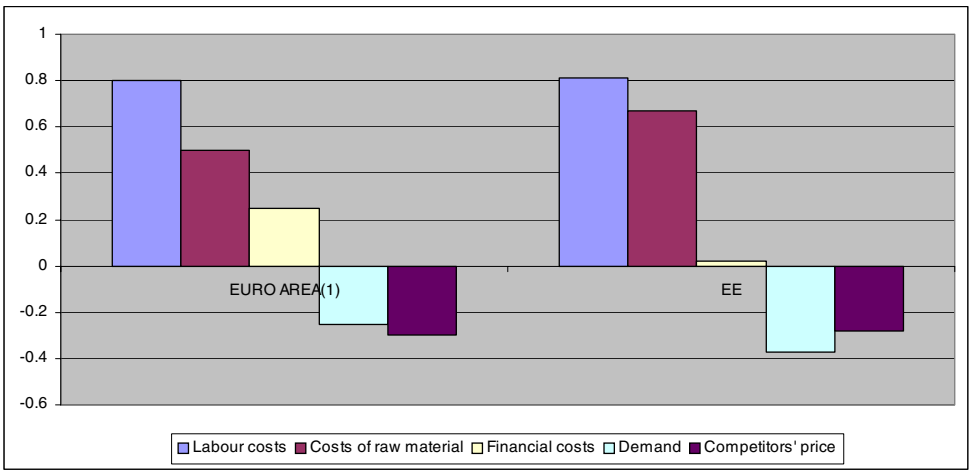

Figure 3: Asymmetries in price-driving factors

Notes: Differences between scores regarding price rises and price decreases. (1) Unweighted average of country scores.

7. Conclusions

Our main objective in this paper was twofold: to provide a broad overview of the price setting survey of Estonian firms and to evaluate our main findings in the context of results obtained by similar research projects in the euro area.

In the case of both undertakings, we drew substantially from Fabiani et al. (2005), taking their proposed stylized facts about the pricing behavior of firms in the euro area as the main guidelines for our work.

Generally, the price setting patterns that emerge from our survey are quite similar to those observed in euro area countries. The points on which our findings accord with the conclusions of Fabiani et al. (2005) are as follows. First, our results suggest that the assumption of monopolistically competitive markets is a better description of reality than perfect competition paradigm in Estonia as well. For example, our analysis shows that the majority of firms set prices following mark-up rules, and that price discrimination is a very widespread phenomenon. It is worth noting, however, that the incidence of price taking behavior is also non-negligible in Estonia and, in fact, is considerably higher than in the eurozone, suggesting that the pricing behavior in certain segments of the economy may be reminiscent of perfect competition.

Second, we find that the majority of firms follow pricing rules that allow for elements of state-dependence. In fact, the share of such firms is somewhat higher in Estonia because the incidence of purely time-dependent pricing is lower in our sample than in the IPN country surveys. Everything else being equal, state-dependence implies more flexibility in price setting than time-dependence.

Third, our survey data confirm that the main reasons for price stickiness are explicit and implicit contracts, coordination failure and cost-based pricing. In this context, the finding that is more specific to Estonia is the relative importance of explanations based on judging quality by price and pricing thresholds.

Finally, we find support for the stylized fact that firms adjust prices asymmetrically in response to shocks: cost shocks are more important for resulting in price increases than price decreases; reductions in demand are more likely to induce price changes than increases in demand.

On the other hand, a number of findings, including some already listed above, indicate that price setting is more flexible in Estonia than in the euro area. First, the share of firms using mainly time-dependent pricing rules is slightly lower in Estonia than in most of the euro area countries. Second, prices of around 45 percent of Estonian firms are mainly shaped by competitors' prices. Compared to other euro area countries for which these data are available, the Estonian ratio is the highest. Third, price changes are somewhat more frequent in Estonia than in the euro area. Finally, the speed of price adjustment after shocks is considerably higher and the share of firms not changing prices in the case of shocks is lower in Estonia than in the euro area. Basically the only result that points in the direction of higher price stickiness in Estonia is the finding that the share of firms setting prices in a forward-looking

manner (as indicated by the information set they use) is lower in Estonia than in euro area countries.

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Appendix 1. Stylized facts

Fabiani et al. (2005) put forward the following list of stylized facts characterizing the pricing behavior of firms in the euro area:

Stylized fact 1. Both time- and state-dependent pricing strategies are used by euro area firms. Around one-third of the companies follow time-dependent pricing rules while the remaining two-thirds use pricing rules with some element of state-dependence.

Stylized fact 2. Around half of the firms review their prices taking into account a wide range of information, including both past and expected economic developments; one-third of them adopt a backward-looking behavior.

Stylized fact 3. In most countries the modal number of price reviews lies in the range of one to three times a year. Services firms review prices less frequently than firms in the other sectors. Firms facing high competition pressures review their prices more frequently.

Stylized fact 4. Mark-up (constant or variate) pricing is the dominant price setting practice adopted by firms in euro area. The lower the level of competition, the more frequently used this method is.

Stylized fact 5. Prices of around 30% of euro area firms are shaped by competitors' prices.

Stylized fact 6. Price discrimination is common practice for euro area firms.

Stylized fact 7. Competitors' prices on the foreign market and transportation costs are the most relevant factors for pricing to market behavior.

Stylized fact 8. The median firm changes its price once a year. Prices are stickier in the services sector and more flexible in the trade sector. In most countries, firms facing strong competition pressures adjust their prices more frequently.

Stylized fact 9. Price changes are less frequent than price reviews.

Stylized fact 10. Implicit and explicit contracts are the most relevant explanations for sticky prices, which suggests that price rigidities are associated with customers' preference for stable nominal prices. Other relevant explanations rest on cost-based pricing and co-ordination failure. These results suggest that the main impediments for more frequent price adjustment are associated with the price change stage rather than with the price review stage of the price setting process.

Stylized fact 11. Cost shocks are more relevant in driving prices upwards than downwards, while shocks to market conditions (changes in demand and the competitors' price) matter more for price decreases than for price increases.

Stylized fact 12. Firms in highly competitive markets are more likely to respond to changes in underlying factors, especially in the case of demand shocks.

Appendix 2. Questionnaire

GENERAL INFORMATION

Q: 1
How many employees on average were on the payroll in your company in the year 2004?
…… employees (open answer, number is entered)

Q: 2
How large was the turnover of your company in 2004?
……..… kroons (open answer, number is entered)

Q: 3
What was the cost structure of your company in 2004 (as a proportion of the total expenses)?

(3) purchased goods, services, materials, energy	…….%
(4) labor costs	…….%
(5) amortization	…….%
(6) other costs (incl. other taxes)	…….%
Total	…….%

When answering the following questions please consider the product or product group that generates the largest share of your total turnover <u>in the Estonian market</u> and that is considered as a whole in terms of price setting. Further on this product is referred to as the "main product sold in the Estonian market".

Q: 4
What is the main product of your company in the Estonian market?
……..

Q: 5
What was the share of the main product of your company distributed in the Estonian market in the total sales revenue in 2004?
…….% of the total sales revenue

Q: 6
What was the share of the main product of your company in the sales revenue of the Estonian market?
…….% of the sales revenue in the Estonian market

Q: 7
Does your firm have the possibility to set the price itself or is it set by somebody else? (Please choose one option per row.)

		Completely	Partly	Not at all
(10)	We set the price ourselves	1	2	3
(11)	Prices are set by the parent company/head office	1	2	3

		Completely	Partly	Not at all
(12)	Prices are set/regulated administratively by the government or the local authorities	1	2	3
(13)	Our main customers determine the price	1	2	3
(14)	Other (please specify) …….	1	2	3

MARKET STRUCTURE

Please note that all the following questions only refer to the <u>main product of your company in the Estonian market</u>.

Q: 8
How would you characterize the degree of competition for your main product in the Estonian market? (Please choose one option.)

	Very tight	1
	Tight	2
(16)	Medium	3
	Weak	4
	Very weak or no competition	5
	Do not know/cannot say	6

Q: 9
What is the distribution of the sales turnover of your main product in the Estonian market by the following customer groups? (Please indicate the answer in percentages.)

(17)	Directly to consumers	……%
(18)	<u>Companies and institutions</u>	<u>……%</u>
	Total	……%

Q: 10
What is the share of regular customer groups in the sales revenue of your main product in the Estonian market?
(19) the share of the regular customer groups in the Estonian market in the sales revenue in the Estonian market is ……..%

Q: 11
Is the selling price (the price actually charged) of your main product in the Estonian market the same for all your customers simultaneously? (Please choose one option.)

	Yes, the selling price is the same for all customers	1
	The selling price varies according to the quantity sold	2
(20)	The selling price is decided case by case	3
	The selling price varies according to other indicators	4
	(Please specify)……	

Q: 12.

Do you make arrangements with your customers in the Estonian market in which you guarantee to offer your main product at a specific price for a certain period of time?

	No	1	(please continue with question 13)
(22)	Yes	2	

Q: 12A

Transactions under such arrangements account for …….. share of your sales revenue in Estonia. (Please choose one option.)

	0–25%	1
(23)	26–50%	2
	51–75%	3
	76–100%	4

Q: 12B

If you have such arrangements in place, for how long do you usually guarantee the fixed selling price? (Please indicate the number of months.)

(24) Usually we guarantee the fixed selling price for …….. months.

Q: 13

Keeping everything else constant (including the price of your competitors), if you decided to increase the price of your main product in the Estonian market by 10%, to what extent would the quantity sold by your company change? (Please choose one option.)

(25)	Quantity would decrease by approximately ……..%	1
	Quantity would remain unchanged	2
	Quantity would increase by approximately ……..%	3
	Do not know/cannot say	4

GENERAL PRICING

Q: 14

To what extent are the following pricing methods relevant in your company when determining the selling price of your main product in the Estonian market? (Please choose one option per row.)

		Un-important	Minor importance	Important	Very important	Do not know
(28)	We proceed from the cost price and add a profit ratio	1	2	3	4	5
(29)	The market is very competitive; therefore we set our price in accordance with the market price level	1	2	3	4	5

		Un-important	Minor importance	Important	Very important	Do not know
(30)	The price is regulated administratively by the government or the local authorities	1	2	3	4	5
(31)	The price is dictated mainly by our customers	1	2	3	4	5
(32)	Other principle (please specify) …… ……		2	3	4	

PRICE REVIEWING

Note: Consider a price revision (price recalculation) as a discussion, analyze or assessment of all information and factors relevant for price determination. However, price revision does not necessarily mean that the price is actually changed.

Q: 15
Do you review (recalculate) the price of your main product in the Estonian market … ? (Please choose one option.)

(34)
… regularly, at specific time intervals 1 (please continue with question 15A)
… in response to specific events (e.g. the market situation has changed) 2 (please continue with question 16)
… at specific time intervals as well as in response to specific events 3 (please continue with question 15A)

Q: 15A
How often do you review the selling price of your main product in the Estonian market? (Please choose one option.)

	Once a week or more often	1
	Monthly	2
	Quarterly	3
(35)	Twice a year	4
	Once a year	5
	Less than once a year	6
	There are no regular time intervals	7

Q: 16

Considering your main product in the Estonian market, do the price reviews result in actual price changes in your company? (Please choose one option that best characterizes price changes in the case of your main product in the Estonian market.)

	Yes, always	1
(36)	In general, yes, but not always	2
	In general, not	3

PRICE CHANGING

Q: 17

How often do you change the selling price of your main product in the Estonian market? (Please choose one option.)

	Once a week or more often	1
	Monthly	2
	Quarterly	3
(37)	Twice a year	4
	Once a year	5
	Less than once a year	6
	There are no regular time intervals	7

Q: 18

In which month/months are prices usually changed in this case? Several options could be selected!

(38)	January	1	July	1
(39)	February	1	August	1
(40)	March	1	September	1
(41)	April	1	October	1
(42)	May	1	November	1
(43)	June	1	December	1

Q: 19

What circumstances do you take into account most when changing the price of your main product in the Estonian market? (Please choose one option.)

	Various information on all factors affecting the product price (e.g. changes in costs, in demand, in the price of main competitors, etc.)	1
(50)	Usually one certain factor (e.g. increase in employees' wages, changes in the cost price of the product or increase in consumer prices)	2

Q: 20

What kind of information do you take into account most when changing the price of your main product? (Please choose one option.)

	The past and current behavior of the factors affecting the product price (demand, costs, the price of main competitors, etc.)	1
(51)	The recent behavior as well as future outlook of the factors affecting the product price, i.e. expected changes.	2

Q: 21

Do you adjust the timing of your own price changes for your main product in the Estonian market to those of your suppliers and competitors? (Please choose one option for suppliers as well as one for competitors.)

		Always	Sometimes	No
(52)	At the same time as the suppliers	1	2	3
(53)	At the same time as the competitors	1	2	3

Q: 22

Did your company raise or lower the selling price of your main product in the Estonian market during the last 12 months? (Please choose one option and indicate the share.)

(54)	Raised it	…. %	1
	Left it unchanged		2
	Lowered it	….. %	3

Q: 23

If you consider all the price changes (increases and reductions) for your main product in the Estonian market during the last 24 months, how were the price changes distributed? (Please choose one option per row.)

	We only raised the price	1
	Mostly we raised the price	2
(57)	Price increased and decreased equally	3
	Mostly we lowered the price	4
	We only lowered the price	5

Q: 24

Indicate the <u>most frequent</u> (typical) range of price changes for your main product in the Estonian market. (Please choose one option for price increase as well as one for price decrease.)

	Price increases		**Price decreases**	
	Price increased up to 2%	1	Price decreased up to 2%	1
	Price increased 2.1–5%	2	Price decreased 2.1–5%	2
	Price increased 5.1–10%	3	Price decreased 5.1–10%	3
(58)	Price increased 10.1–15%	4	Price decreased 10.1–15%	4
	Price increased 15.1–20%	5	Price decreased 15.1–20%	5
	Price increased 20.1–25%	6	Price decreased 20.1–25%	6
	Price increased more than 25%	7	Price decreased more than 25%	7
	We did not raise the price	8	We did not lower the price	8

DETERMINANTS OF PRICE CHANGES

Q: 25
Please indicate the importance of factors that would make you raise/lower the price of your main product in the Estonian market? (Please choose one option per row.)

	Factors causing a price <u>increase</u>	Unimportant	Minor importance	Important	Very important
(60)	An increase in labor costs in the company (wages, social tax)	1	2	3	4
(61)	An increase in interest costs	1	2	3	4
(62)	An increase in the price of purchased goods/services or raw materials	1	2	3	4
(63)	An increase in demand	1	2	3	4
(64)	An increase in competitors' price	1	2	3	4
(65)	An increase in consumer prices	1	2	3	4
(66)	A decrease in competition	1	2	3	4
(67)	An improvement of our product quality (incl. design)	1	2	3	4
(68)	A decrease in productivity	1	2	3	4
(69)	A decrease in stock reserves	1	2	3	4
(70)	Other factors (please specify) ……		2	3	4
(72)	……		2	3	4
(74)	……		2	3	4

	Factors causing a price <u>decrease</u>	Unimportant	Minor importance	Important	Very important
(76)	A decrease in labor costs in the company (wages, social tax)	1	2	3	4
(77)	A decrease in interest costs	1	2	3	4
(78)	A decrease in the price of purchased goods/services or raw materials	1	2	3	4
(79)	A decrease in demand	1	2	3	4
(80)	A decrease in competitors' price	1	2	3	4
(81)	An increase in competition	1	2	3	4
(82)	An increase in productivity	1	2	3	4
(83)	An intention to gain a market share	1	2	3	4
(84)	An increase in stock reserves	1	2	3	4
(85)	Other factors (please specify) ……		2	3	4
(87)	……		2	3	4
(89)	……		2	3	4

Q: 26
Assume a change in demand or production costs occurs that is significant enough to make you consider adjusting the price of your main product in the Estonian market. How long would it usually take till you actually change the price? (Please choose one option for every circumstance (per every row).)

		Up to 1 week	1 week to 1 months	1–3 months	3–6 months	6–12 months	More than 1 year	Prices are not changed	Do not know
(91)	Increase in demand	1	2	3	4	5	6	7	8
(92)	Decrease in demand	1	2	3	4	5	6	7	8
(93)	Increase in production costs	1	2	3	4	5	6	7	8
(94)	Decrease in production costs	1	2	3	4	5	6	7	8

The following questions concern the price changes during the period of Estonia's accession to the European Union in the year 2004.

Q: 27
Regarding your field of activity as a whole, please indicate whether Estonia's accession to the European Union affected the selling prices of the products in your field of activity. (Please choose one option.)

	In general selling prices increased	1
(95)	In general selling prices remained the same	2
	In general selling prices decreased	3
	Do not know/cannot say	4

Q: 28
Did you change the price of your main product in the Estonian market because of Estonia's entry to the European Union? (Please choose one option.)

	We increased the price of our main product	1
(96)	We did not change the price of our main product	2
	We lowered the price of our main product	3

Q: 29
Did joining the European Union have any effect on prices of goods and services <u>purchased</u> by your company? (Please choose one option.)

	Prices increased in general	1
(97)	Prices did not change in general	2
	Prices decreased in general	3

FACTORS HAMPERING PRICE ADJUSTMENT

Q: 30
There can be various reasons for why a price is not (or is very slightly) changed during a certain period. Please indicate their importance in your company. (Please choose one option per row.)

	Reasons for postponing (renouncing) price increases	Un-important	Minor import-ance	Import-ant	Very important	I dDo not know
(98)	The existence of a formal (written) contract: prices can only be changed when the contract is reviewed	1	2	3	4	5
(99)	The existence of an informal contract (regular contact with a customer without any written contract): customers prefer a stable price, a change could damage customer relations	1	2	3	4	5
(100)	Price changes entail direct costs (printing new catalogues, updating the web site, etc.)	1	2	3	4	5
(101)	Costly in terms of collecting relevant information	1	2	3	4	5
(102)	Risk that competitors might not adjust their prices (your company might be the first)	1	2	3	4	5
(103)	Our costs per unit of output do not change much over the business cycle, thus making our prices relatively stable	1	2	3	4	5
(104)	Our price is set at an attractive threshold (e.g. 9.95 instead of 10.15), thus we wait when it is optimal to change our price to another attractive level	1	2	3	4	5
(105)	The company's decision-making process is time-consuming	1	2	3	4	5
(106)	Instead of price increases we change other product parameters, e.g. extend delivery time	1	2	3	4	5

	Reasons for postponing (renouncing) price increases	Un-important	Minor import-ance	Import-ant	Very important	I dDo not know
(107)	Other factors (please specify)…… ……		2	3	4	

	Reasons for postponing price decreases	Un-important	Minor import-ance	Import-ant	Very important	Do not know
(109)	The existence of a formal (written) contract: prices can only be changed when the contract is reviewed	1	2	3	4	5
(110)	The existence of an informal contract (regular contact with a customer without any written contract): customers prefer a stable price, a change could damage customer relations	1	2	3	4	5
(111)	Price changes entail direct costs (printing new catalogues, updating the web site, etc.)	1	2	3	4	5
(112)	Costly in terms of collecting relevant information	1	2	3	4	5
(113)	Risk that competitors might not adjust their prices (your company might be the first)	1	2	3	4	5
(114)	Our costs per unit of output do not change much over the business cycle, thus making our prices relatively stable	1	2	3	4	5
(115)	Our price is set at an attractive threshold (e.g. 9.95 instead of 10.15), thus we wait when it is optimal to change our price to some new attractive level	1	2	3	4	5
(116)	The company's decision making process is time-consuming	1	2	3	4	5

	Reasons for postponing price <u>decreases</u>	Un-important	Minor import-ance	Import-ant	Very important	Do not know
(117)	We are afraid that customer will interpret a price reduction as a reduction in quality	1	2	3	4	5
(118)	Instead of price increases we change other product parameters, e.g. extend delivery time	1	2	3	4	5
(119)	Other factors (please specify)…… ……		2	3	4	

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