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**ABSTRACT**

This study investigates the price setting behavior of Turkish industries based on the results of a survey that was conducted by the Central Bank of the Republic of Turkey. The results show that under normal conditions, the majority of the firms follow time-dependent pricing rule but when significant events occur substantial fraction of them alter their behavior to state-dependent reviewing. The median Turkish firm reviews its prices every month, but changes its prices four times a year. Price reviews and changes are affected by: the market share, price discrimination, customer type, firm size and the existence of regulated prices.

**Keywords**: price-setting, price-rigidity, survey

**JEL codes**: E30, D40

# I. INTRODUCTION

The impact of monetary policy on the economy and in particular on output and prices has long been a key issue in macroeconomic theory. Standard theories of the real effects of monetary policy focus on the stickiness of wages or prices. In the presence of nominal stickiness, the central bank can affect output in the short run because monetary policy is able to respond to, at least some of the shocks hitting the economy before the adjustment of wages and prices. In this context, price or wage stickiness plays an important role in the transmission and propagation of nominal shocks to the real economy.

Knowing how fast and how large the policy changes affect the economy are crucial in the implementation of monetary policy. Micro-founded models of price-setting behavior are useful for understanding aggregate inflation dynamics and for evaluating the performance of alternative monetary policy regimes. Hence, information gathered from the firms' about their price setting behavior and knowing which sticky price theories are closest to their actual behavior are important for building a macroeconomic model to be used for policy analysis.

In this paper, price-setting behavior in Turkey is investigated on the basis of a survey that was carried out by the Central Bank of the Republic of Turkey between May and July 2005 on a final sample of 999 firms. Since the firms' price setting behavior is crucial in designing and implementing monetary policy, the purpose of this survey is to understand the price setting behavior of Turkish companies. To our knowledge, this is the first survey in Turkey to learn about firms' pricing policies. Karadaş et al. (2006) reported the preliminary results of the price setting survey by classifying the firms according to the NACE[i] classification. The main contribution of our study is to analyze the results according to European Commission Main Industrial Groupings classification in order to have more detailed sectoral information about the pricing behavior and investigate sectoral heterogeneities in the pricing behavior of goods during the stages of production. Besides, we also tried to identify the factors that determine both the price responses to shocks and price reviews and changes by estimating probit models.

Blinder (1994) initiated the use of survey methodology to identify the pricing behavior of firms. Furthermore, Hall et al. (2000), Apel et al. (2005), Dabušinskas and Randveer (2006), Munnik and Kuan (2007) and nine countries in the Inflation Persistence Network[ii] (IPN) followed this approach, and carried out surveys to capture the characteristics of price setting in their countries.

The advantage of using survey analysis is that firms are directly asked about their pricing behavior such as frequencies of price reviews and changes, the speed, magnitude and the reasons of price adjustments. Thus, we can analyze the pricing behavior of firms from many respects, which cannot be carried out solely by analyzing price indices. However, survey analysis also has disadvantages, such that responses may be sensitive to the wording of the questions and the economic conditions in that year, and firms may not actually tell the truth when answering the questions.

The remainder of this paper is organized as follows. Section 2 briefly describes the structure of the survey and the features of the sample. Section 3 focuses on the main characteristics of the market, which are important for the pricing behavior of the firms. Section 4 presents the price setting and price adjustment behaviors of the firms. In section 5 probit regressions are estimated to identify the factors that determine both the price responses to shocks and price reviews and changes. Finally, section 6 concludes.

## II. THE SURVEY

The price setting survey was conducted by the Central Bank of the Republic of Turkey (CBRT) between May and July 2005 on a final sample of 999 firms. The sample of firms was drawn from the firms that are present in the CBRT Company Accounts Database in 2003. Table I reports the classification of the respondents by industry. The overall response rate of the survey is 27.7, which is quite high given that the firms face such a long and complex survey for the first time. It is noteworthy that, the lowest response rate is recorded in the consumer non-durables industry.

In order to make comparisons with other countries, most of the questions of the survey are designed parallel to the other similar surveys used by Blinder et al. (1998), Hall et al. (2000), Apel et al. (2005) and the ones that were developed together in the IPN. The survey is organized in seven sections containing a total of 64 detailed questions.

To investigate differences across industries, we present the results both for total industry and sectoral groupings. In distinguishing between industrial groupings, the European Commission Main Industrial Groupings (MIGS) classification is followed. MIGS classification splits the industries according to the purpose of use of the goods, i.e. intermediate goods, capital goods, consumer goods (durables and non-durables) and energy[iii] producing industries. Capital goods (plant, equipment, and inventories) are used as a means of producing other goods or services, intermediate goods are transformed or used up in the

production of final goods, and consumption goods (durables and nondurables) are used by households. The sectoral breakdown of the sample shows that around half of the firms are the producers of intermediate goods and the proportion of the firms that produce consumer durables (4%) is considerably lower than the other industries in the survey (Figure I).

The way the sample has been established created a bias towards the larger companies, Figure II shows the proportions of the respondents for three ranges of firm sizes based on the number of employees. "Small Firms" are those with less than 50 employees; "Medium Firms" are those with between 50 and 199 employees; and "Large Firms" are those with 200 or more employees.

In order to provide that the sample adequately represents the whole Turkish industries, the answers of each firm are weighted with the net sales criterion. The weights are calculated in two steps. In the first step, for each firm a basic weight, $w_{1i}$, which is the ratio of the firms'net sales to the total net sales of the sector that it belongs, is calculated. In the second step, a sectoral weight, $w_{2j}$, which is the ratio of the sectors' net sales to the total net sale is calculated. While calculating sectoral weights, the firms that are present in the CBRT Company Accounts Database in 2003 are taken as the population. Finally, basic and sectoral weights are multiplied to find the final weights ($w_{ij}$). All results presented in the remainder of this study are analyzed using this weighting scheme.

$$w_{1i} = \frac{s_{ij}}{\sum_i s_{ij}} \qquad w_{2j} = \frac{S_j}{\sum_j S_j} \qquad w_{ij} = w_{1i} \times w_{2j}$$

where;
$s_{ij}$ is the net sale of the $i^{th}$ firm in the $j^{th}$ sector who responded the survey
$\sum_i s_{ij}$ is the total net sales of the firms in the $j^{th}$ sector who responded the survey
$S_j$ is the total net sales of the firms in the $j^{th}$ sector (population)
$\sum_j S_j$ is the total net sales of the all firms (population)

## III. MARKET CHARACTERISTICS

Since firms sell several types of goods; when answering the questionnaire, the respondents are asked to refer to their main product as the one that generated the highest turnover in 2004. By this way, we prevent the respondents from switching products, which may have different pricing strategies. Besides, with the aim of understanding inflation dynamics in Turkey, main product is defined as the one that has the highest turnover in domestic sales. Since the percentage of the turnover from the main product is 66.2 percent, we

can say that the survey results have a high representative power for the general pricing behavior (Table II).

We also asked firms about their share of the export receipts in the total sales of their main product and dropped the firms from the sample that have over 90 percent of their sales to foreign markets in order to focus on the pricing strategies in the domestic market. Thus, the share of sales to foreign markets, which is found as 33.5 percent, does not measure the degree of openness in our sample (Table II).

When firms asked about the market share of their main product; only 5.4 percent of them reported themselves as being not among the first eight firms (Table II). Thus, the respondents seem to be the big companies, which is not surprising given that our sample has a bias towards larger firms.

Moreover, when the shares of customer groups are investigated, it is observed that the producers of intermediate and capital goods sell their main product primarily to the other firms or entities and the producers of consumer durables and consumer non-durables sell to the hpouseholds, as expected (Table II). This suggests that the pricing behavior of the firms that produce intermediate and capital goods refer to the producer prices whereas the pricing behavior of the firms that produce consumer durables and non-durables refer to the consumer prices.

The degree of competition is an important factor that affects pricing decisions. In case of perfect competition, economic theory argues that a firm equates the price of a final good to its production cost. In other words, the presence of perfect competition forces firms to decrease their price to the level of marginal cost. However, in case of imperfect competition, firms may be able to charge a mark up over their marginal costs in order to gain monopoly profits. Therefore, the degree of competition is inversely proportional to the firms' ability to mark-up and higher competition among firms is generally seen to put downward pressure on the price level.

In the survey, firms are asked about the number of competitors they have in the domestic market. In fact, it should be noted that the results of this question might not reflect the competition in total industry since our sample has a bias towards larger firms and most of the firms reported themselves as being among the first eight firms. As shown in Table II, around 21.5 percent of the firms in the survey have more than 15 competitors, implying in turn the significant market power of firms (Table II). Noticeably, in the survey the degree of competition is found to be weaker for the firms that produce consumer durables.

## IV. PRICING BEHAVIOR

In the firms' pricing behavior, the presence of price discrimination is an important factor. Price discrimination occurs when the prices of similar products sold by the same firm show variation that cannot be explained by variations in marginal costs. To investigate the extent of price discrimination, firms are asked about their pricing policy and it is found that the uniform pricing across customers is more common in the consumer durables and non-durables, whereas the use of price discrimination is particularly high among the firms that produce intermediate and capital goods (Table III). As already mentioned, the producers of intermediate and capital goods sell their product to the other firms and the producers of consumer durables and consumer non-durables sell to the households. Thus, firms set the same price to households, whereas they may charge different prices to different firms. Namely, there is a different elasticity of demand for the consumers of intermediate and capital goods and the firms may charge higher price to the consumers with a more inelastic demand and a relatively lower price to the group with a more elastic demand.

From the many pricing policies that exist in the economic literature, six of them are proposed to the firms in the survey. Mark-up pricing is an aspect of average cost pricing in which firms calculate the average cost of a product and add on a mark-up. Mark-ups must be sizable enough to cover all anticipated business expenses and reductions (markdowns, stock shortages, employee and customer discounts) and still provide the business with a good profit. In this study, like Germany and Netherlands, a distinction is made between constant and variable mark-up. In monopolistic competition, there are many firms producing a different type of product, as opposed to perfect competition in which all firms offer the same product. Each firm, then, has a monopoly in the market of their own product. On the other hand, in oligopolistic competition, there are few companies, so to compete, firms make decisions based on planning against their rivals. Moreover, regulated prices refer to prices that are insensitive to supply and demand because they are determined by pre-established contract or set by a public sector entity.

When the pricing policies of the firms are investigated, it is observed that oligopolistic pricing behavior dominates in all sectors except capital goods (see Table III). Namely, industries, except the one that produces capital goods, are dominated and controlled by a few firms operating in the market. Thus, firms can collude in order to maximize joint profits and, even if there is no co-ordination agreement, strategic behavior will lead to prices that are above the competitive levels. However, in the firms that produce capital goods, variable

mark-up pricing rule is more common, where mark-up is related to both cost and demand conditions and mark-up usually rises during the expansion phase of the business cycle and declines during the contraction. In particular, mark-up may also change across the firms since the producers of capital goods charge different prices for different firms. On the other hand, around 18 percent of the firms that produce consumer non-durables reported their price as being regulated due to the fact that they could not deviate from the regulated prices in certain products like drugs, sugar etc. Thus, the uniform pricing policy in the consumer non-durables sector may be attributed partially to the existence of regulated prices.

In the literature, there are two types of price setting behavior: time-dependent and state-dependent. In time-dependent pricing models, firms change their price on a periodic basis and the timing of individual price changes is exogenous. In particular, a firm might set its price every *n*th period (Taylor, 1980) or randomly (Calvo, 1983). On the other hand, in state-dependent pricing models, there is no routine price reviewing and prices do not change unless there is a major shock that hits the economy which makes the difference between the actual and the target price level to reach a trigger level that induces an adjustment (Barro, 1972 and Sheshinski and Weiss, 1977).

In order to find out whether the firms follow state-dependent or time-dependent pricing rules, they are asked about their strategy that they follow when reviewing their prices and the respondents choose from the following answers: i) the firm reviews its price regularly (time-dependent) ii) the firm reviews its price only on specific occasions (state-dependent) iii) the firm reviews its price regularly, but also have price reviews on specific occasions (time and state-dependent)

According to the results presented in Table III, excluding capital goods, more than half of the firms review their prices following both time and state-dependent rule. Under normal conditions, the majority of the firms, approximately 88.6 percent, follow time-dependent strategy but when significant events occur, 58.0 percent of them will alter their behavior to state-dependent reviewing. The share of firms following time-dependent rules (30.6%) is very similar to the figure in the Euro area (33%), but the share of firms using mainly state-dependent pricing rules is slightly lower in Turkey (11.5%) than the corresponding figure for the Euro area (19%).

The use of mainly time-dependent price reviewing is more frequent in the firms that produce capital goods. This finding suggests that the shocks cannot be incorporated in the

contracts of capital goods where there exist large time lags between the order and the delivery of the product at a fixed price. However, offers and orders for intermediate and consumer goods take place contemporaneously such that shocks may be quickly incorporated in contracts.

The frequencies of price reviews and price changes are other indicators of the degree of price stickiness. The price setting takes place in two stages; the prices are first reviewed and then eventually changed. In highly competitive markets, firms are expected to adjust their price in response to shocks more rapidly to prevent a fall in profits. Thus, the more competitive the market, the greater is the response of prices to cost and demand shocks. Also, it is expected to have some differences between the frequency of price reviews and price changes due to the specific additional costs of implementing price changes.

The firms, which follow time-dependent price reviewing, are asked directly the frequency of their price reviews and price changes in the last twelve months. Table III shows that the median price changes are less frequent than median price reviews, as expected. The median Turkish firm reviews its prices every month, but changes its prices four times a year. It shows that the degree of price stickiness is much lower in Turkey than in the Euro area, given that the price reviews lies in the range of one to three times a year and the median price change is once a year in the Euro area[iv]. Since the frequency of price changes and price reviews are expected to be correlated with inflation, finding prices less rigid than any country is not surprising, considering the annual inflation was around 8 % in Turkey at the time of the survey.

A large literature in macroeconomics holds that, because of sticky prices, changes in monetary policy temporarily affect the real quantities of goods and services produced. The magnitude and persistence of the effects should vary across countries in relation to their extent of price stickiness. Thus, finding prices in Turkey less rigid than the prices in the euro area implies that the monetary shock in Turkey has smaller and less persistent impact on the economic activity than in the Euro area.

Moreover, it is interesting that the producers of consumer non-durables change their prices twice during the year while for consumer durables and capital goods it is five times on average. Thus, the highest level of price stickiness is found in consumer non-durables indicating that in this industry the effects of the monetary policy are bigger and more persistent than other industries. It is also worth noting that in most of the countries[v] in the euro area, firms that face higher competitive pressures review and adjust their prices more

frequently. However, we find no significant relationship between the degree of competition and the frequency of price reviews and changes, contrary to

In this study, firms are also asked about their reasons for not changing their prices even though there are pressures for a change. In the literature, there are many theories of price stickiness, but in this study, considering the country specific conditions, 6 theories for price stickiness are proposed to firms. Table IV presents the ranking scores of these theories. "Explicit contracts" and "Implicit contracts" theories suggest that there are formal and informal contracts between buyers and sellers, which can fix prices over some time horizon (Okun, 1981). "Constant marginal cost" theory puts forward that that prices are sticky because both marginal costs and mark-ups are constant over the business cycle (Hall, 1986). "Coordination failure" theory suggests that firms fear of price adjustments (upwards or downwards) because by adjusting prices, they can start a price war or they can loose their market share (Cooper and John, 1988 and Ball and Romer, 1991). "Temporary shocks" theory suggest that firms may not prefer to adjust their prices immediately, if they regard the shock they face as temporary and prices will change in the opposite direction soon afterwards. In the survey, taking into account the country specific characteristics, CBRT proposed "mark-up" as a new theory besides the theories that are present in the literature. This theory suggests that even if there is an increase in costs, firms do not change their prices until the decline in profit margin reaches a certain threshold. It can be argued that this theory covers all five theories explained above. However, in these theories there are also other factors, besides the decline in profit margin that forces firms not to change prices, whereas "mark-up" theory suggests that only the decline in profit margin determines the decision of the firms.

The results indicate that "mark-up" is one of the important sources of price stickiness for all firms, whereas the other important sources are "coordination failure" and "temporary shocks" for consumer non-durables and capital goods and "nominal contracts" (explicit and implicit) for consumer durables and intermediate goods. Thus, most of the firms prefer not to change their prices until the decline in the profit margin reaches a certain threshold. On the other hand, contracts introduce more inertia to the prices of consumer durables and intermediate goods and the fear of price wars and considering shocks as temporary are more important reasons for the price stickiness in the consumer durables and intermediate goods.

Table V reports the rankings of the factors that are effective to change the prices. The results indicate that changes in costs and exchange rates are the main driving forces underlying price increases. However in the case of price decreases, in addition to cost

changes, changes in competitors' prices become important for the producers of consumer goods, whereas demand changes and exchange rate changes turn out to be important for the producers of intermediate goods and capital goods, respectively. On the other hand, the impacts of changes in demand, competitors' prices, productivity and market share are larger for price reductions, whereas changes in costs and exchange rates are more important for upward adjustments. The results suggest that the upward and downward price adjustments are driven by different factors.

We also investigated how long it takes for a firm to adjust its prices to both positive and negative shocks to both demand and cost shocks. The speed of price adjustments presented in Table VI shows that, in the case of cost shocks, median firm adjusts its price symmetrically within a month, but in the case of demand shocks, the adjustment time of prices is 5 days shorter downwards than upwards. Also, there are some sectoral differences in the speed of price adjustments. Firstly, the reaction time of the manufacturers of intermediate goods to cost and demand shocks are shorter than the others, which is not surprising given that the intermediate goods are inputs in the production of final goods. Secondly, except capital goods, prices are more flexible downwards than upwards in response to demand shocks. The cost and demand shocks have symmetric effects on the price of the capital goods. On the other hand, intermediate goods prices seem to be more flexible upwards than downwards in the face of cost shocks, while the opposite is true for the consumer non-durables prices. Thus far, these estimated lags in price adjustments in different sectors provide valuable information for the macro models when deciding on lags in adjusting prices.

Optimal monetary policy also depends on the degree of exchange rate changes "pass through" to prices. Turkey is a small, open and emerging economy and it is important for monetary authority to know about the responsiveness of prices to changes in exchange rates to provide the necessary adjustment to real shocks. For this reason, in addition to cost and demand shocks, we also tried to capture the responsiveness of prices to exchange rate shocks. When the price responses to exchange rate changes are investigated, for the producers of intermediate goods and consumer durables, the number of days that the exchange rate should stay to change the price is shorter (15 days) than that is required (30 days) for the producers of consumer non-durables and capital goods (Table VII). Thus, intermediate goods and consumer durables prices respond more quickly to exchange rate shocks. Faster adjustment could be related to the fact that prices for intermediate goods and consumer durables are more strongly related to world market prices since they can easily be substituted by foreign products.

## V. FACTORS DRIVING PRICE CHANGES

In this section, we estimated probit models in order to capture which factors are effective behind the price stickiness. With the aim of investigating asymmetry in the firms' pricing behavior, initially probit models are estimated separately for both positive and negative shocks to both cost and demand. In these models, the dependent variables take 1 if a firm indicates that demand or cost shocks are reflected to its prices within one month and take 0 otherwise. The detailed descriptions of the dependent and independent variables are given in the Appendix Table.

Degree of competition is an important factor that affects price stickiness. We expect the firms in a higher competitive environment to adjust its prices more rapidly when faced with shocks. Thus, in our models dummy variables that capture the firms' market share and the number of its competitors are taken as the independent variables to reflect the degree of competition. Also the firms' export share is taken as an independent variable to investigate the effect of foreign markets in price stickiness.

Moreover, we expect the customer type and price discrimination to affect the degree of price stickiness. Firms may have different pricing policies to different types of customers. Percentage of sales to households and percentage of sales to firms are taken as independent variables to capture the customer type, whereas a dummy variable is created to reflect whether the firm makes price discrimination among customers or not.

Besides, with the idea that the pricing policies may affect the price stickiness, three dummy variables that show that the prices are regulated and that capture whether the firms follow a constant markup or variable mark-up rule are created. Finally, a set of dummy variables is created to control for different sectors and the size of the firms.

Table VIII presents the estimation results of the probit regressions for both demand and cost shocks. Results show that the market share affects the probability of changing prices inversely and the coefficients are significantly different from zero except the case of negative demand shock. Thus, increasing market share decreases the responsiveness of prices to changes in demand and cost except the case of negative demand shock where the market share does not affect the responsiveness of prices. Moreover, the export intensity of firms significantly reduces the price responsiveness when there is a positive demand shock and negative cost shock. Also the degree of competition and regulated prices significantly increase the price responsiveness when there is a positive demand shock. On the other hand, estimation results show that responsiveness of prices to changes in cost and demand is not

affected by the customer type (households or firms) and price discrimination. As noted earlier, "mark-up" is one of the important sources of price stickiness for all firms in the survey, however estimation results show that applying a mark-up rule (either constant or variable) do not significantly affect the responsiveness of prices to changes in cost and demand.

In addition to the models for cost and demand shocks, we also estimated probit regressions to identify the factors that determine both price reviews and changes. In these models, the dependent variables take 1 if a firm indicates that the number of price reviews (changes) in the last twelve months is greater than 12 (4) and take 0 otherwise. Table IX presents the estimation results for both price reviews and changes. Estimation results show that being a small-sized company, charging the same price for all customers, having a large market share and having other firms as customers significantly decrease the probability of reviewing and changing prices. On the other hand, applying a variable mark-up rule and having households as consumers decreases the probability of changing prices. Besides, results also suggest that producers of intermediate goods review their prices more often.

## VI. CONCLUSION

In implementing the monetary policy, knowing how the firms set their prices is very important in order to understand the dynamics of inflation. This study investigates the price setting behavior of Turkish industries based on the results of a survey that was carried out by Central Bank of the Republic of Turkey and it covers much new ground about the price setting behavior of firms, which cannot be discovered using conventional econometric techniques.

In the survey, most of the firms appear to have a significant market power, thus the firms operate in an oligopolistic market. The main findings of the survey results can be summarized as follows. The price discrimination is particularly high among the firms that produce intermediate and capital goods. The finding that under normal conditions the majority of Turkish firms follow time dependent strategy but when significant events occur substantial proportion of them alter their behavior to state-dependent reviewing suggests that macroeconomic models for monetary policy should combine both price adjustment mechanisms.

The results suggest that prices in Turkey are not as rigid as found in the similar analyses for other countries. The median price review frequency is once per month, while the

median price change frequency is four times per year. But, like the other country findings, price changes are less frequent than price reviews. And in addition to this, we find no evidence in support of Keynesian assumption that prices are more sticky downwards than upwards.

"Mark-up" is found to be the one of the important sources of price rigidity for all firms, whereas the other important sources are "coordination failure" and "temporary shocks" for consumer non-durables and capital goods and "nominal contracts" for consumer durables and intermediate goods.

When the sensitivity of prices to shocks investigated, it can be seen that the upward and downward price adjustments are driven by different factors. In the case of cost shocks, median firm adjusts its price symmetrically within a month, but in the case of demand shocks, the downward adjustment time of prices to demand shocks is shorter.

There is some evidence that increasing market share decreases the responsiveness of prices to changes in demand and cost except the case of negative demand shock and the degree of competition and regulated prices significantly increases the price responsiveness when there is a positive demand shock. Moreover, the export intensity of firms significantly reduces the price responsiveness when there is a positive demand shock and negative cost shock. On the other hand, price reviews and changes are affected by: the market share, price discrimination, customer type, firm size and the existence of regulated prices. In particular, the frequency of price reviews and changes are less frequent for the small firms, for the firms that do not make price discrimination and when there are no regulated prices.

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# APPENDIX TABLE

## DESCRIPTIONS OF THE DEPENDENT AND INDEPENDENT VARIABLES

| | | |
|---|---|---|
| **Dependent variables** | | |
| Positive demand shock | =1 | if an increase in demand is reflected to the prices within 30 days |
| | =0 | elsewhere |
| Negative demand shock | =1 | if a decrease in demand is reflected to the prices within 30 days |
| | =0 | elsewhere |
| Positive cost shock | =1 | if an increase in costs is reflected to the prices within 30 days |
| | =0 | elsewhere |
| Negative cost shock | =1 | if a decrease in costs is reflected to the prices within 30 days |
| | =0 | elsewhere |
| Price reviews | =1 | if the number of price reviews in the last twelve months is larger than 12 |
| | =0 | elsewhere |
| Price changes | =1 | if the number of price changes in the last twelve months is larger than 4 |
| | =0 | elsewhere |
| **Independent variables** | | |
| Export share | =1 | If the firms' share of the export receipts in the total sales is greater than 40% |
| | =0 | elsewhere |
| Market share | =1 | If the firms' market share in the domestic market is greater than 40% |
| | =0 | elsewhere |
| Rivals | =1 | If the number of competitors is greater than 10 |
| | =0 | Elsewhere |
| Price_no discrimination | =1 | Same price to all customers |
| | =0 | elsewhere |
| Constant mark-up | =1 | If the price is determined "partly", "significantly" or "completely" by adding to the unit costs a constant mark-up |
| | =0 | elsewhere |
| Variable mark-up | =1 | If the price is determined "partly", "significantly" or "completely" by adding to the unit costs a variable mark-up |
| | =0 | elsewhere |
| Regulated Prices | =1 | If the price is determined "partly", "significantly" or "completely" by the public authority or a regulatory |
| | =0 | elsewhere |
| Sales to households | Percentage of sales to households | |
| Sales to firms | Percentage of sales to other firms | |
| Size | 3 dummies that capture whether the firm is small-sized (less than 50 employees), medium-sized (between 50 and 199 employees) or large-sized (more than 200 employees). | |
| Sector | 4 dummies that capture whether the firm is a manufacturer of capital goods, intermediate goods, consumer durables or consumer non-durables. | |

# TABLES

### TABLE I

### THE SAMPLE

| Industry | Population | Respondents | Response Rate |
|---|---|---|---|
| Intermediate Goods | 1738 | 532 | 30.6 |
| Capital Goods | 498 | 157 | 31.5 |
| Consumer Durables | 159 | 39 | 24.5 |
| Consumer Non-Durables | 1204 | 268 | 22.3 |
| Energy | 7 | 3 | 42.9 |
| **Total** | **3606** | **999** | **27.7** |

## TABLE II

### MAIN CHARACTERISTICS OF THE MARKET (2004)

| | Intermediate Goods | Capital Goods | Consumer Durables | Consumer Non-Durables | **Total** |
|---|---|---|---|---|---|
| **Main Product Information** | | | | | |
| Percentage of the turnover from the main product | 68.5 | 66.7 | 73.4 | 60.3 | 66.2 |
| Percentage of the export value to the turnover from the main product | 34.9 | 31.5 | 72.8 | 23.8 | 33.5 |
| **The Market Share in the Domestic Market** | | | | | |
| The first firm | **47.5** | **48.8** | **56.5** | **42.7** | **48.6** |
| One of the first four firms | **33.6** | **40.0** | **43.1** | **36.8** | **35.3** |
| One of the first eight firms | 12.3 | 10.9 | 0.4 | 12.0 | 10.7 |
| Not among the first eight firms | 6.6 | 0.3 | 0.0 | 8.4 | 5.4 |
| **The Shares of the Customer Groups** | | | | | |
| Household | 15.7 | 45.2 | **96.5** | **70.4** | 43.6 |
| Other firms or entities affiliated to the firm | 6.6 | 0.9 | 0.1 | 6.8 | 5.3 |
| Other firms or entities | **71.5** | **46.8** | 2.9 | 19.5 | 46.2 |
| Public Sector | 6.2 | 7.1 | 0.5 | 3.3 | 4.9 |
| **The Number of Competitors** | | | | | |
| <5 | 30.5 | 21.9 | **65.9** | 33.5 | 33.0 |
| Between 5-15 | **51.9** | **47.2** | 32.4 | **38.6** | 45.5 |
| >15 | 17.6 | 30.8 | 1.6 | 28.0 | 21.5 |

## TABLE III

### PRICING POLICIES

| | Intermediate Goods | Capital Goods | Consumer Durables | Consumer Non-Durables | **Total** |
|---|---|---|---|---|---|
| **Price Discrimination** | | | | | |
| Same price to all customers | 28.0 | 29.9 | **91.7** | **45.0** | 37.7 |
| Different prices to some customers | **49.8** | **53.7** | 7.5 | 40.8 | **45.8** |
| Different prices to most of the customers | 10.3 | 5.2 | 0.3 | 4.2 | 6.6 |
| Different price for each customer | 11.8 | 11.2 | 0.5 | 10.1 | 9.9 |
| **The Ranking† of the Pricing Policies** | | | | | |
| Constant mark-up | 28.1 | 23.6 | 18.9 | 33.2 | 27.2 |
| Variable mark-up | 46.4 | **66.3** | 36.5 | 36.3 | 47.6 |
| Perfect Competition | 29.5 | 20.7 | 13.4 | 21.0 | 23.3 |
| Monopolistic | 16.1 | 7.5 | 28.1 | 12.5 | 14.2 |
| Oligopolistic | **49.3** | 55.6 | **54.3** | **46.9** | **50.6** |
| Regulated Prices | 1.6 | 0.1 | 0.0 | 18.0 | 5.8 |
| **Price Reviewing Strategies** | | | | | |
| Time-dependent | 26.6 | **54.6** | 42.8 | 23.1 | 30.6 |
| Time- and State- Dependent | **61.7** | 45.1 | **56.5** | **65.9** | **58.0** |
| State- Dependent | 11.7 | 0.3 | 0.6 | 10.9 | 11.5 |
| **Number of Price Reviews and Changes** | | | | | |
| Number of price reviews | 12 | 12 | 12 | 12 | 12 |
| Number of price changes | 4 | 5 | 5 | 2 | 4 |

† The ranking scores are calculated as: ('0'*"Percentage of firms that answered "Never") + ('1/3'*"Percentage of firms that answered "Partly") + ('2/3'*Percentage of firms that answered "Significantly") + ('1'*Percentage of firms that answered "Completely").

## TABLE IV

### RANKING OF POSSIBLE EXPLANATIONS FOR PRICE STICKINESS†

| Industry | Implicit Contracts | Explicit Contracts | Constant Marginal Costs | Coordination Failure | Temporary Shocks | Mark-up |
|---|---|---|---|---|---|---|
| Intermediate Goods | **43,3** | **41,7** | 27,5 | 27,9 | 39,2 | **46,8** |
| Capital Goods | 26,0 | 22,6 | 16,7 | **27,0** | **53,4** | **40,5** |
| Consumer Durables | **54,2** | **58,6** | 22,3 | 31,4 | 41,4 | **44,6** |
| Consumer Non-Durables | 31,3 | 30,4 | 20,4 | **36,6** | **40,7** | **48,7** |
| **Total** | 36,9 | **37,1** | 22,6 | 30,8 | **40,6** | **44,8** |

† The ranking scores are calculated as: ('0'*"Percentage of firms that answered "Does not reflect at all") + ('1/3'*"Percentage of firms that answered "Partly reflects") + ('2/3'*"Percentage of firms that answered "Mostly reflects") + ('1'*"Percentage of firms that answered "Completely reflects") and they can take values between '0' and '100'.

## TABLE V

### THE RANKİNG† OF THE FACTORS THAT ARE EFFECTİVE

| | **to increase the price** | | | | | **to decrease the price** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Intermediate Goods | Capital Goods | Consumer Durables | Consumer Non-Durables | Total | Intermediate Goods | Capital Goods | Consumer Durables | Consumer Non-Durables | Total |
| A change in costs | **67.3** | **65.4** | **57.0** | **63.5** | **66.1** | **53.7** | **56.7** | **63.0** | **51.8** | **55.9** |
| A change in demand | 43.3 | 36.2 | 32.3 | 33.4 | 37.1 | **54.2** | 48.1 | 56.2 | 47.6 | 50.9 |
| A change in productivity | 14.6 | 10.6 | 3.7 | 19.9 | 14.0 | 32.4 | 25.7 | 57.5 | 27.1 | 32.1 |
| A change in competitors' prices | 42.7 | 48.9 | 37.0 | 46.1 | 43.9 | 50.1 | 50.8 | **65.8** | **50.7** | **51.2** |
| A change in the market share | 27.9 | 17.5 | 11.8 | 21.8 | 22.3 | 40.3 | 33.6 | 56.0 | 34.6 | 38.8 |
| A change in the exchange rates | **48.9** | **56.2** | **44.9** | **48.5** | **50.2** | 40.1 | **56.3** | 39.3 | 36.5 | 43.4 |
| A change in the general price level | 30.1 | 51.2 | 37.9 | 27.3 | 33.5 | 24.1 | 33.2 | 41.4 | 20.4 | 26.3 |

† The ranking scores are calculated by: ('0'*"Percentage of firms who answered "Never") + ('1/3'*"Percentage of firms who answered "Partly") + ('2/3'*Percentage of firms who answered "Significantly") + ('1'*Percentage of firms who answered "Completely").

## TABLE VI

### SPEED OF PRICE ADJUSTMENTS AFTER SHOCKS

**(In days, Median)**

| Economic Activity | Increase in costs | Decline in costs | Increase in demand | Fall in demand |
|---|---|---|---|---|
| Intermediate Goods | 15.0 | 20.0 | 22.5 | 15.0 |
| Capital Goods | 30.0 | 30.0 | 30.0 | 30.0 |
| Consumer Durables | 30.0 | 30.0 | 60.0 | 30.0 |
| Consumer Non-Durables | 30.0 | 25.0 | 30.0 | 15.0 |
| **Total** | 30.0 | 30.0 | 30.0 | 25.0 |

## TABLE VII

### PRICE RESPONSES TO EXCHANGE RATE CHANGES

| | | Percentage change in exchange rates to review prices | Number of days that exchange rate should stay to change prices | Percentage change in prices after an exchange rate change |
|---|---|---|---|---|
| Increase in Exchange Rates | Intermediate Goods | 5.5 | 15 | 5 |
| | Capital Goods | 5 | 30 | 3 |
| | Consumer Durables | 10 | 15 | 4 |
| | Consumer Non-Durables | 10 | 30 | 5 |
| | Total | 7 | 30 | 5 |
| Decrease in Exchange Rates | Intermediate Goods | 7 | 15 | 4 |
| | Capital Goods | 5 | 30 | 3 |
| | Consumer Durables | 10 | 15 | 4 |
| | Consumer Non-Durables | 10 | 30 | 5 |
| | Total | 7.5 | 30 | 4 |

## TABLE VIII

### PRICE RESPONSE TO COST AND DEMAND SHOCKS: RESULTS FROM PROBIT REGRESSIONS

| | Positive Cost Shock | | Negative Cost Shock | | Positive Demand Shock | | Negative Demand Shock | |
|---|---|---|---|---|---|---|---|---|
| | coefficient | p-value | coefficient | p-value | coefficient | p-value | coefficient | p-value |
| Price_ no discrimination | -0.13 | 0.51 | 0.18 | 0.36 | -0.14 | 0.48 | -0.02 | 0.92 |
| Export Share | 0.00 | 0.13 | **-0.01*** | **0.02** | **-0.01*** | **0.03** | 0.00 | 0.30 |
| Market Share | **-0.01*** | **0.05** | **-0.01**** | **0.10** | **-0.01**** | **0.07** | 0.00 | 0.22 |
| Rivals | 0.18 | 0.38 | -0.15 | 0.43 | **0.39**** | **0.07** | 0.25 | 0.25 |
| Constant Markup | 0.13 | 0.54 | 0.06 | 0.78 | 0.09 | 0.66 | -0.13 | 0.55 |
| Variable Markup | 0.03 | 0.91 | -0.12 | 0.63 | -0.07 | 0.80 | -0.06 | 0.83 |
| Regulated Prices | 0.65 | 0.17 | 0.30 | 0.48 | **0.96**** | **0.09** | 0.36 | 0.43 |
| Sales to households | 0.00 | 0.76 | 0.00 | 0.76 | 0.00 | 0.43 | 0.00 | 0.33 |
| Sales to firms | 0.00 | 0.72 | 0.00 | 0.58 | 0.00 | 0.83 | 0.00 | 0.91 |
| Employees 0-49 | -0.02 | 0.94 | 0.05 | 0.84 | 0.02 | 0.93 | -0.10 | 0.68 |
| Employees 50-199 | -0.07 | 0.74 | 0.14 | 0.46 | 0.31 | 0.14 | 0.27 | 0.21 |
| Employees at least 200 | | | | | | | | |
| Intermediate goods | 0.14 | 0.52 | 0.16 | 0.47 | 0.17 | 0.47 | 0.22 | 0.34 |
| Capital goods | -0.04 | 0.88 | -0.02 | 0.94 | -0.03 | 0.93 | 0.19 | 0.52 |
| Consumer Durables | 0.63 | 0.15 | 0.05 | 0.89 | 0.55 | 0.20 | 0.24 | 0.56 |
| Consumer Non-Durables | | | | | | | | |
| Constant | 0.45 | 0.39 | 0.93 | 0.09 | 0.50 | 0.36 | 0.66 | 0.24 |
| Number of observations | 264 | | 264 | | 264 | | 264 | |
| Loglikelihood | -160.5 | | -161.2 | | -148.8 | | -141.3 | |
| Pseudo R-square | 0.040 | | 0.033 | | 0.081 | | 0.041 | |
| Chi-square (dof) | 13.63 | Prob > chi2 = 0.4777 | 10.93 | Prob > chi2 = 0.6914 | 26.24 | Prob > chi2 = 0.0241 | 12 | Prob > chi2 = 0.6064 |

* indicates significance at 5% level
** indicates significance at 10% level

## TABLE IX

### PRICE REVIEWS AND CHANGES: RESULTS FROM PROBIT REGRESSIONS

| | Price Reviews | | Price Changes | |
|---|---|---|---|---|
| | coefficient | p-value | coefficient | p-value |
| Price_ no discrimination | **-0.38*** ** | **0.11** | **-0.60*** | **0.01** |
| Export Share | 0.00 | 0.61 | 0.00 | 0.69 |
| Market Share | **-0.02*** | **0.00** | **-0.01**** | **0.08** |
| Rivals | 0.26 | 0.23 | 0.05 | 0.81 |
| Constant Markup | 0.04 | 0.86 | -0.02 | 0.93 |
| Variable Markup | 0.23 | 0.47 | **-0.57*** | **0.03** |
| Regulated Prices | **0.74**** | **0.09** | **1.37*** | **0.00** |
| Sales to households | 0.00 | 0.72 | **-0.01*** | **0.02** |
| Sales to firms | **-0.01*** ** | **0.12** | **-0.01*** | **0.01** |
| Employees 0-49 | **-0.57**** | **0.07** | **-0.63*** | **0.02** |
| Employees 50-199 | -0.30 | 0.17 | **-0.37**** | **0.08** |
| Employees at least 200 | | | | |
| Intermediate goods | **0.56*** | **0.03** | 0.19 | 0.44 |
| Capital goods | 0.51 | 0.13 | 0.14 | 0.66 |
| Consumer Durables | -0.42 | 0.46 | 0.30 | 0.50 |
| Consumer Non-Durables | | | | |
| Constant | -0.53 | 0.39 | 1.00 | 0.08 |
| Number of observations | 264 | | 264 | |
| Loglikelihood | -112.93141 | | -126.17956 | |
| Pseudo R-square | 0.1284 | | 0.1302 | |
| Chi-square (dof) | 33.28 | Prob > chi2 = 0.0026 | 37.78 | Prob > chi2 = 0.0006 |

* indicates significance at 5% level
** indicates significance at 10% level
*** indicates significance at 15% level

# FIGURES

**Figure 1. The size of the companies by the number of employees**

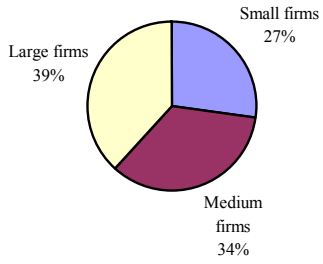
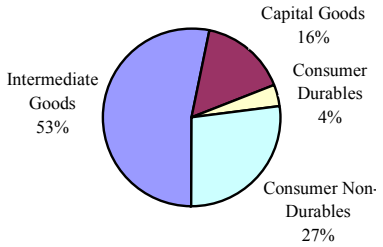



**Figure 2. Sectoral decomposition**



## FOOTNOTES

[i] Classification of Economic Activities in the European Community

[ii] Inflation Persistence Network is a research network that was founded with the aim of examining the inflation persistency in the euro area. In the framework of the IPN, nine central banks carried out the price setting survey: France (Loupias and Ricart (2004)), Italy (Fabiani et al. (2004)), Austria (Kwapil et al. (2005)), Germany (Stahl (2005)), Belgium (Aucremanne and Druant (2005)), Portugal (Martins (2005)), Luxembourg (Lünnemann and Mathä (2005)), Spain (Álvarez and Hernando (2005)) and Netherlands (Hoeberichts and Stokman (2006)).

[iii] The results for the energy sector are not given since we have only 3 firms, which participated the survey from this sector.

[iv] Fabiani et al. (2005).

[v] Except Austria and Portugal.