

Fabiani, Silvia; Gattulli, Angela; Sabbatini, Roberto

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The pricing behaviour of Italian firms: new survey evidence on price stickiness

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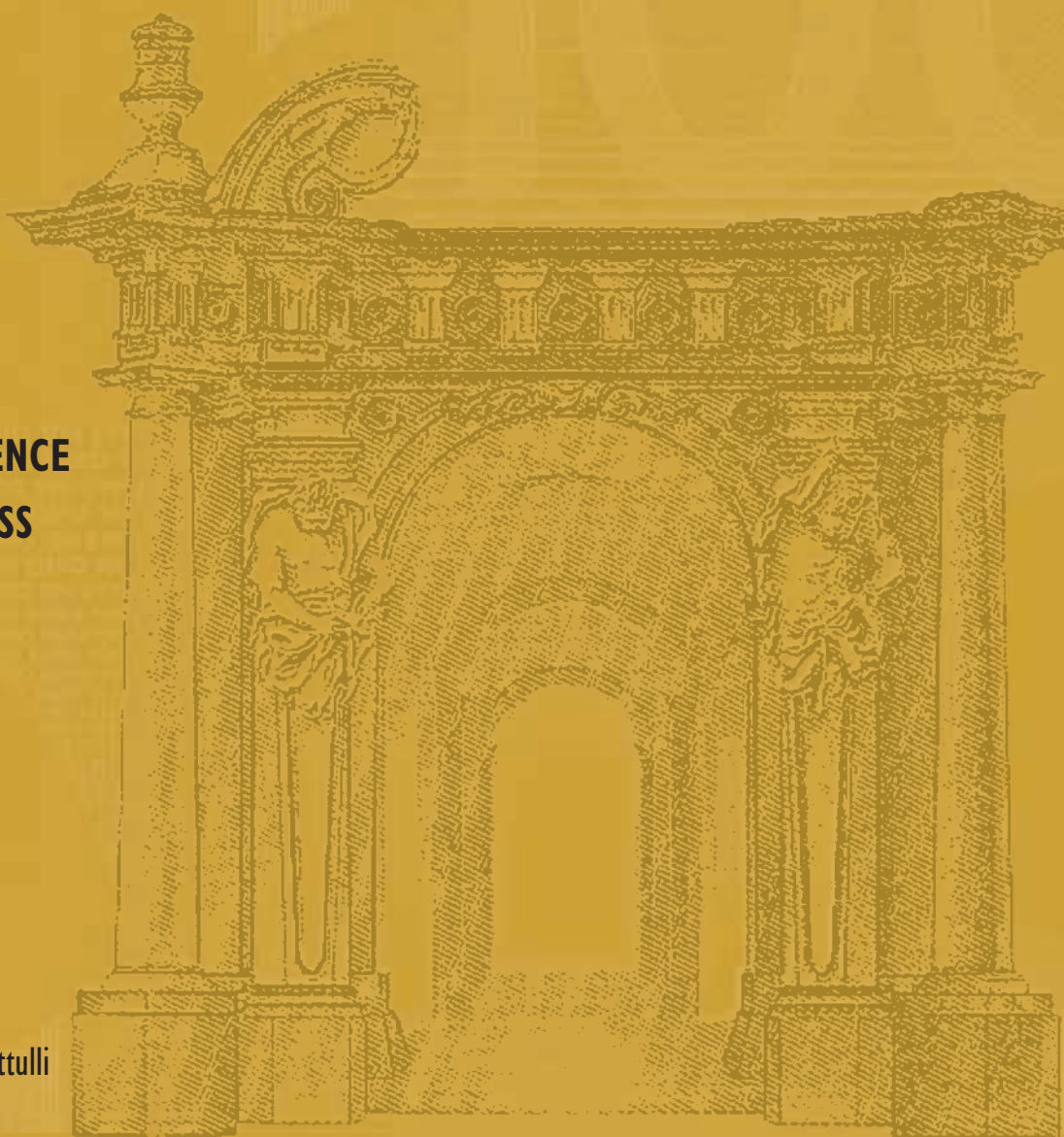
WORKING PAPER SERIES

NO. 333 / APRIL 2004

**EUROSYSTEM INFLATION
PERSISTENCE NETWORK**

THE PRICING BEHAVIOUR OF ITALIAN FIRMS: NEW SURVEY EVIDENCE ON PRICE STICKINESS

by Silvia Fabiani, Angela Gattulli
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and Roberto Sabbatini²



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¹ This study has been conducted in the context of the Eurosystem Inflation Persistence Network (IPN). We are indebted to an anonymous referee and to all participants to the IPN for their useful comments; we are also grateful to Luigi Guiso, Marco Magnani and Ivan Faiella for their comments on a preliminary version of the paper. The views expressed in this paper are those of the authors alone and do not necessarily reflect those of the Bank of Italy.

² Bank of Italy, Research Department.

The Eurosystem Inflation Persistence Network

This paper reflects research conducted within the Inflation Persistence Network (IPN), a team of Eurosystem economists undertaking joint research on inflation persistence in the euro area and in its member countries. The research of the IPN combines theoretical and empirical analyses using three data sources: individual consumer and producer prices; surveys on firms' price-setting practices; aggregated sectoral, national and area-wide price indices. Patterns, causes and policy implications of inflation persistence are addressed.

The IPN is chaired by Ignazio Angeloni; Jordi Galí (CREI, Universitat Pompeu Fabra) and Andrew Levin (Board of Governors of the Federal Reserve System) act as external consultants and Michael Ehrmann as Secretary.

The refereeing process is co-ordinated by a team composed of Vítor Gaspar (Chairman), Silvia Fabiani, Carsten Folkertsma, Jordi Galí, Andrew Levin, and Philip Vermeulen. The paper is released in order to make the results of IPN research generally available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are the author's own and do not necessarily reflect those of the Eurosystem.

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Address

Kaiserstrasse 29
60311 Frankfurt am Main, Germany

Postal address

Postfach 16 03 19
60066 Frankfurt am Main, Germany

Telephone

+49 69 1344 0

Internet

<http://www.ecb.int>

Fax

+49 69 1344 6000

Telex

411 144 ecb d

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Abstract

This study examines price setting behaviour of Italian firms on the basis of the results of a survey conducted by Banca d'Italia in early 2003 on a sample of around 350 firms belonging to all economic sectors. Prices are mostly fixed following standard mark-up rules, although customer-specific characteristics have a role, in particular in manufacturing and services where price discrimination across customers matters. Rival prices mostly affect price-setting strategies in industrial firms. In reviewing their prices, firms follow either state-dependent rules or a combination of time and state-dependent ones. Concerning the frequency of price adjustments, a considerable degree of stickiness emerges both at the stage in which firms evaluate their pricing strategies and the stage in which they actually implement the price change. In 2002 most firms changed their price only once. Three alternative explanations of nominal rigidity are ranked highest by the firms interviewed: explicit contracts, tacit collusive behaviour and the perception of the temporary nature of the shock. Prices respond asymmetrically to shocks, depending on the direction of the adjustment (positive *vs* negative) and the source of the shock (demand *vs* supply). Real rigidities – captured by the degree of market competition, customers' search costs, the sensitivity of profits to changes in demand – play an important role in determining this asymmetry. Moreover, whereas cost shocks impact more when prices have to be raised than when they have to be reduced, demand decreases are more likely to induce a price change than demand increases.

Key words: nominal rigidity, real rigidity, price-setting, inflation persistence, survey data.

JEL classification: E30, D40.

Non-technical summary

The issue of firms' pricing behaviour and in particular of nominal price stickiness has a long theoretical tradition. The empirical evidence, however, is rather limited and typically refers to price setting by a single firm or in a single market. In this paper we explore how Italian firms set and change their prices on the basis of the results of a Bank of Italy survey, conducted in 2003 on a sample of Italian firms with more than 50 employees belonging to the main economic sectors.

The firms included in our sample have as reference market mostly the domestic one. On such a market manufacturing firms (which are generally larger) tend to have a lower number of competitors than those in the service and in the retail industry. The majority of respondents have long-standing relationships with their customers, short-term ones being rather important only in the retail and service sector.

Prices are mostly fixed following standard mark-up rules, although customer-specific characteristics seem to have a role, in particular in manufacturing and services where the price can vary according to the quantity sold or tends to be decided case by case. In particular, service firms set their price on the basis of a certain degree of direct negotiation, which includes aspects that go beyond quantity (e.g. after sales assistance, etc.).

Differently from what found for the US and the UK, where prices are mostly reviewed periodically at given intervals (time-dependent rules), Italian firms tend to review their price in response to particular events, following a state-dependent rule, or on the basis of a combination of state and time-dependent rules. Those firms that normally revise their price in response to specific events are more affected by cost changes than by variations in demand conditions; this broadly holds across sectors, although prices are very sensitive to demand shocks for retail firms.

The evidence for Italy of the nature and causes of price stickiness is broadly consistent with that highlighted in similar analyses for other countries. It suggests that prices in Italy are indeed quite rigid. This feature concerns all the economic sectors considered and it emerges both at the stage in which firms evaluate their pricing strategies and at the stage in which they actually implement the price change. Firms that adopt a time dependent rule typically revise their price once a year. In both 2001 and 2002 the majority of firms changed their prices once.

Among the alternative explanations advocated by the theoretical literature to explain nominal price rigidity, three are ranked highest by the firms interviewed. First, the presence of explicit contracts, which maintain prices stable at least until re-negotiation; the importance of this factor is the highest in the service sector and the lowest in retailing. The second most important theory is firms' collusive behaviour, i.e. the idea that firms do not change their price in order not to trigger a price war at the end of which all market participants would be worse-off. Third, price inertia can depend on the perceived temporary nature of the shock. It is worth outlining that some of the factors often indicated in the literature as important causes of price stickiness do not seem to be considered as such by Italian firms, confirming what found in previous studies for other countries. This holds, in particular, for rigidities induced by price setting at attractive thresholds (which implies a discontinuous relationship between price and demand) as well as by the existence of physical and information costs involved in the adjustment process (menu costs).

The results presented in the final part of the paper show that nominal prices respond asymmetrically to shocks, depending on the direction of the adjustment and on the source of the shock. Overall, cost shocks impact more when prices have to be raised than when they have to be reduced, while demand decreases are more likely to induce a price change than demand increases. These asymmetries are affected by variety of factors, also related to the degree of real rigidity. For instance, in the case of demand shocks, prices tend to change less promptly in a non-competitive environment. Also constant marginal costs and the fact that customers incur high search costs reduce the responsiveness of nominal prices to a change in demand, but only as far as upward adjustments are concerned. As for cost shocks, the adjustment of prices is significantly and inversely correlated with the degree of market power while it is not affected by search costs. Moreover, cost increases tend to be more easily translated into prices when there is some form of price regulation.

Finally, there is no evidence that firms, facing a positive demand shock, would first act on non-price elements, such as delivery times or the level of stocks, instead of increasing their price; eventually, they are more willing to change the level of stocks, with the expected exception of firms in the service sector. As for downward adjustments, firms do not fear that customers would perceive a price reduction as a fall in the quality of goods or services; hence, this factor does not contribute to explain downward nominal rigidity.

1 Introduction

The behaviour of prices, and in particular the issue of nominal price stickiness and its implications for the conduct of monetary policy, has a long and consolidated theoretical tradition.¹ Due to the scarcity of available data, however, the number of empirical studies of firms' pricing behaviour is quite small and most of them typically refer to price-setting by a single firm or in a single market (Cecchetti, 1986; Kayshap, 1995). Recent analyses have examined price behaviour in a number of European countries on the basis of sectoral consumer price indices (Hall and Yates, 1997, 2000; Yates, 1998; Aucremanne *et al.*, 2002; Suvanto and Hukkinen, 2002; Fabiani *et al.*, 2003), while evidence based on micro consumer price data (elementary price quotes) mostly refers to the US (see for example Bils and Klenow, 2002).²

In this paper we follow a different approach, initiated by the work of Blinder (1994), Blinder *et al.* (1998) for the US and of Hall *et al.* (2000) for the UK, which relies on information collected directly from firms.³ Our analysis investigates a number of aspects of pricing behaviour in Italy on the basis of the questionnaire responses of a sample of around 350 industrial and service firms at the beginning of 2003. Our aim is to gather some evidence of how firms set their prices, how often and why they change (or do not change) them. In particular, we are interested in evaluating the extent of price stickiness across firms with different characteristics and across economic sectors and, in particular, in analysing the main explanatory factors.⁴

The plan of the paper is as follows. Section 2 briefly presents the sample of firms interviewed and the structure of the questionnaire. Section 3 focuses on the main characteristics of each firm's reference market and its relationships with its customers. Section 4 addresses the issue of how the firm sets its price. Section 5 explores how rigid this price is, when and how it changes, and what are the main factors underlying its stickiness. The reaction of prices to

¹ For a survey, see Taylor (1999).

² For a summary of the main findings of the empirical literature, both for Italy and for other European countries and the US, see Fabiani *et al.* (2003).

³ The survey approach was also adopted by Koehler (1996) and Apel *et al.* (2001), who analysed survey evidence respectively for Germany and Sweden.

⁴ Clearly, the use of survey data is subject to a few caveats: the uncertain quality of the answers provided by firms regarding one of their most strategic variables (prices), which is difficult to assess; and the absence of the time dimension, which implies that results can be affected in an unpredictable way by the peculiarity of the period in which the survey is carried out. These aspects notwithstanding, the "qualitative" information collected by interviewing firms about their pricing strategies highlights important aspects which could not be assessed otherwise and which are complementary to those that can be investigated using either micro or aggregate data.

demand and cost shocks is investigated in Section 6, which also presents an empirical exercise designed to detect and explain any asymmetries in price adjustment. Section 7 provides some concluding remarks.

2 The survey

The survey was carried out by a private company in January 2003 (see Appendix B for details) using a questionnaire and a sample of firms provided by the Bank of Italy.⁵

The population from which the sample was drawn consists of firms with more than 50 employees, belonging to all sectors excluding the public sector, agriculture, banking, insurance, transport and housing services and a small number of other service branches, as the questionnaire was not suitable for firms belonging to such sectors, in particular because of the difficulty related to the identification of the main product.⁶

The population was stratified according to size and geographical area but not with respect to the sector of activity, in order to avoid cells with too few observations.

Of the 700 or so industrial and service firms with more than 50 employees sampled according to the above procedure, 333 agreed to participate in the survey and completed the questionnaire (see Table 1 in Appendix B). The response rate (around 50%) was acceptable given the complexity of the actual questionnaire; the rate is in fact only slightly lower than in the analysis by Blinder *et al.* (1998) and Hall *et al.* (2000).

Table 1 reports the classification of the 333 respondents by economic activity: around 2/3 of them belong to the industrial sector, the remaining ones to the service sector. The latter's under-representation is due both to the fact, as mentioned above, that we had to exclude *a priori* a few branches and to the lower response rate among service firms (37.1 and 40.2% in retail and other services, respectively) than manufacturing ones (48.5%). The highest rate of response was recorded in the food industry (68.8%). Differences in the response rate by firm size and geographical area were more limited.

⁵ The sample was drawn from a larger one, currently used for the Bank of Italy quarterly survey of inflation expectations. In order to test whether firms were able to provide suitable answers to all questions, the questionnaire was pre-tested on a pilot sample of around 20 firms; on the basis of their answers a few minor changes were introduced.

⁶ This selection was partly the results of the pilot survey.

Table 1 - The sample

	Firms in the initial sample	Respondents	Response rate
Economic activity			
Industry excluding construction	423	215	50.8
<i>of which: Manufacturing excl. food</i>	375	182	48.5
<i>Food</i>	48	33	68.8
Construction	13	4	30.8
Retail	124	46	37.1
Other services	169	68	40.2
Size			
Up to 199 employees	259	129	49.8
200-999 employees	335	140	41.8
> 999 employees	135	64	47.4
Geographical area			
North-west	309	133	43.0
North-east	175	88	50.3
Centre	131	62	47.3
South-islands	114	50	43.9
Total	729	333	45.7

Firms were allowed to answer either by compiling the questionnaire in an electronic format on the Internet or by replying by fax. The use of the Internet facilitated and speeded up the whole procedure, and also helped to contain the cost of the survey.⁷

The questions were mostly multiple-choice. In some cases the possible answers were coded on a 4-point scale (1=unimportant; 2=minor importance; 3=important; 4=very important). Since in a few questions the possible answers were not mutually exclusive, we left some flexibility by allowing firms to choose more than one answer. In some cases we also left "open-answers", which could be used by respondents to express their views in their own words. A small number of questions required a precise quantitative answer.

On the basis of the stratification criteria described above, the answers provided by each firm were weighted with the ratio between the number of firms in the population belonging to each cell and the number of respondents in the same cell. All results presented in the remainder of this paper are hence analysed and reported as estimated proportions of the population, as they are based on this weighting scheme (see Appendix B for details). For most answers, results are presented both for the total sample and with a sectoral breakdown, in order to investigate eventual differences in pricing behaviour across industries. The significance of such

⁷ The use of the Internet was motivated by the fact that the survey was outsourced to the same company that has been carrying out over the last few years the quarterly Bank of Italy survey of inflation expectations. Moreover, the same sample of firms was used. The above survey is regularly conducted through the Internet, though firms can also use the fax to send their answers. The percentage of firms which have preferred to rely on the Internet has increased over time, up to around 90% in the last two years. Firms report to be quite pleased with the use of the Internet and there is no evidence that the response rate is affected by that.

differences is computed on the basis of standard statistical tests and discussed, where deemed necessary, in the text (for the significance tests see the tables reported in the Appendix C).

The questionnaire draws upon those developed by Blinder *et al.* (1998) for the US and by Hall *et al.* (1997, 2000) for the UK.⁸ It is organised in four sections (the complete questionnaire is presented in Appendix A). The first collects general information on the market in which the firm operates and some features of its relationship with its customers. The second section focuses on the price-setting mechanism and in particular on the determinants of the price level. The third section deals with the main aspects underlying price reviews and price changes. The final part of the questionnaire tries to assess whether firms facing different kinds of shocks behave asymmetrically when the price has to be increased or decreased.

The survey refers to the firms' "main product (or service)", defined as the one that generated the highest turnover in 2002. Since for around 74% of the responding firms it accounts for more than 40% of turnover (Table 2), the decision to focus on pricing strategies for the main product does not seem to be over restrictive.

Table 2 - What is the percentage turnover from your "main product"?		
% turnover	N° firms	%
0-20	21	6.3
21-40	33	9.9
41-60	70	21.0
61-80	56	16.8
81-100	122	36.6
N.a. ⁽¹⁾	31	9.3
Total	333	100.0

Notes: ⁽¹⁾ Firms which did not provide an answer.

3 Market structure and firm-customer relationships

Turning to the firm's market (i.e. the market in which it sells its main product), we first enquired whether it is mainly the domestic market (national or local) or a foreign one (questions A4-A5). This is an important piece of information as pricing policies might differ in the two cases. The domestic is the main market for around 80% of the firms. Only in the manufacturing sector did a large proportion of respondents (around 25%) indicated foreign

⁸ The empirical analysis by Blinder *et al.* (1998) is based on a sample of around 200 private firms, which were interviewed face-to-face by graduate students between April 1990 and March 1992; for the initial random sample, the response rate was around 60%. The survey conducted by the Bank of England (Hall *et al.*, 1997, 2000) is based on a much larger sample, since 1100 firms were initially approached (interviews were conducted in September 1995) and 654 provided usable answers; the sample is biased towards large companies, mostly belonging to the manufacturing sector (68% of the total).

markets as most important for sales of their main product (Table 3). On the domestic market, firms belonging to manufacturing, construction and food industries mostly conduct business at the national level; conversely, the local market is particularly important in the retail sector (60.7%). Such differences, in particular between manufacturing and the other sectors, are confirmed as being statistically significant by the formal tests described in the previous section and reported in Table C3 in Appendix C).

Table 3 - What is the most important market (in terms of turnover) for your “main product”?						
	Local market	National market	Other euro area countries	Non-euro area countries	N.a ⁽¹⁾	Total
Total	25.4	55.0	9.3	7.1	3.2	100
Manufacturing excl. food	10.8	58.5	15.4	9.8	5.5	100
Food	31.3	55.7	6.4	5.9	0.7	100
Construction	36.5	63.5	0.0	0.0	0.0	100
Retail	60.7	36.1	0.0	2.9	0.3	100
Other services	36.1	59.4	1.0	3.5	0.0	100

Notes: For the significance of sectoral differences, see Appendix C. ⁽¹⁾ Firms which did not provide an answer.

The strategic interaction between firms competing on the same market is clearly a crucial variable in price-setting behaviour. In principle, the higher the degree of competition the more the firm’s pricing strategy is likely to be affected by the behaviour of its competitors. In particular, we expect firms in highly competitive markets to revise their prices more frequently since, as suggested by Hall *et al.* (1997), setting the wrong price has more serious consequences.

We tried to capture the role played by competitive pressures by asking firms to provide information on their market share (question A6) and on the number of their competitors (question A7), both referring to the relevant market for the main product.

In general, the firms interviewed seem to be “big players”. Overall, only around 19% of them are not among the first 10 companies on the relevant market (Table 4); 11.6% reported themselves as being the first firm, 30.7% as being among the first 4. This is not surprising, given that the survey covers only firms with more than 50 employees and, in particular, that firms are asked to focus on a very narrowly-defined category of goods or services. This could partly explain why the degree of market power, as captured by the above indicator, is higher for manufacturing and retail firms than for service ones.



This picture is broadly confirmed by the information concerning the number of competitors.⁹ Around 17% of the sample reported having less than 5 rivals (Table 5). This share is much higher in other services (26.6%).

Table 4 - On the domestic market, your firm is:						
	The first firm	One of the first 4 firms	One of the first 10 firms	Not among the first 10 firms	Don't know/ no answer	Total
Total	11.6	30.7	23.5	18.6	15.6	100
Manufacturing excl. food	11.8	36.8	20.6	15.9	14.9	100
Up to 199 employees	9.0	36.0	20.8	17.2	17.0	100
200-999 employees	23.7	42.6	20.0	9.6	4.1	100
> 999 employees	42.9	30.9	17.2	5.5	3.5	100
Food	12.7	21.6	23.3	24.9	17.5	100
Up to 199 employees	13.4	16.9	24.9	25.4	19.4	100
200-999 employees	7.2	61.2	9.7	21.9	0.0	100
>999 employees	0.0	0.0	0.0	0.0	0.0	100
Construction	0.0	3.2	0.0	96.8	0.0	100
Up to 199 employees	0.0	0.0	0.0	100.0	0.0	100
200-999 employees	0.0	0.0	0.0	100.0	0.0	100
>999 employees	0.0	100.0	0.0	0.0	0.0	100
Retail	19.0	28.5	23.8	7.7	21.0	100
Up to 199 employees	19.6	28.1	23.1	8.1	21.1	100
200-999 employees	12.1	26.0	34.2	5.6	22.2	100
>999 employees	21.1	57.8	7.8	0.0	13.3	100
Other services	4.3	21.1	34.1	27.6	12.9	100
Up to 199 employees	2.8	22.4	34.6	29.0	11.2	100
200-999 employees	7.8	11.6	35.4	23.8	21.4	100
>999 employees	25.1	30.9	18.4	11.3	14.3	100

Notes: For the significance of sectoral differences, see Appendix C.

Table 5 - On the domestic market, could you indicate the number of your competitors?						
	None	<5	Between 5 and 20	>20	Don't know/ no answer	Total
Total	0.1	17.4	39.3	28.4	14.8	100
Manufacturing excl. food	0.2	18.0	47.0	23.8	11.0	100
Food	0.0	5.0	23.5	50.4	21.1	100
Construction	0.0	0.0	0.0	100.0	0.0	100
Retail	0.0	15.2	30.3	25.0	29.5	100
Other services	0.1	26.6	35.4	27.3	10.6	100

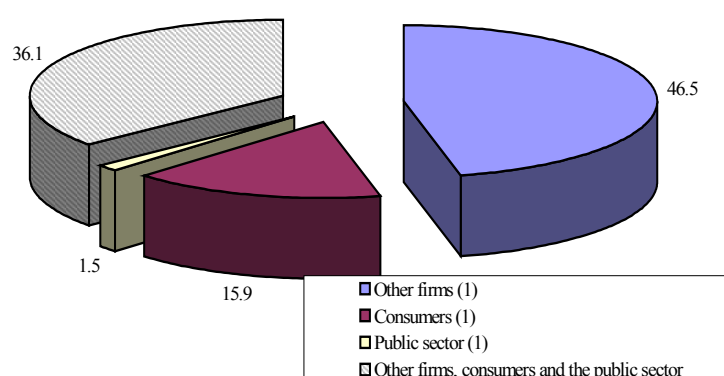
Notes: For the significance of sectoral differences, see Appendix C.

As for the relationship between the firm and its customers, the firm was first asked to evaluate the relative importance of its customers in terms of turnover, distinguishing between firms, consumers – considering the various channels through which goods (or services) are sold – and the public sector (question A8).

⁹ A simple correlation analysis, provided by questions A6 and A7, to test the robustness of the information on the degree of competition showed a positive and quite high correlation between the two.

Around 47% of our respondents sell their main product principally to other firms (Figure 1) while around 16% deal mainly with consumers; firms whose main customer is the public sector only account for 1.5% of the sample. This suggests that the pricing strategies we are investigating refer mostly to producer or wholesale prices; conversely, we are likely to capture less accurately price-setting behaviour at the consumer stage.

Figure 1 - Firms' main customers
(percentage of firms)



Notes: ⁽¹⁾ More than 60% of the firm's main product turnover is related to sales to this type of customer.

We then investigated whether the relationship between the firm and its main customers is long-standing or only occasional (question A9). It is often argued that the existence of a long-standing relationship might act as an “implicit” contract, hence leading the firm to postpone price changes or to smooth them over a period of time. Clearly, the extent to which this strategy is actually feasible also depends on the number of competitors: the larger this is, the more convenient it is for the firm to try to establish long-standing relationships. This aspect might also impact on the frequency of price changes, although the evidence is mixed. Carlton (1986) finds that customers with no long-term relationships tend to prefer fixed-price contracts because they fear that companies may exploit them by changing prices; hence, prices would be more flexible if long-term relationships prevailed. On the contrary, the evidence provided by Hall *et al.* (1997) suggests that firms review their prices less frequently if they have mainly long-term clients.¹⁰

The firms included in our sample have almost exclusively long-term (i.e. longer than one year) relationships with other firms (Table 6), irrespective of the sector to which they belong.

¹⁰ Clearly, there might be differences across sectors, depending on the characteristics of the product and on whether the customer is another firm or a consumer.

Moreover, relationships with consumers are mostly of a long-term nature, although the evidence in this case is somewhat more dispersed across sectors: while more than 98% of food firms report having mostly long-term customers, in manufacturing, retail and services occasional relationships are also quite important (36.5, 29.5 and 42.4%, respectively). Formal statistical tests (Table C6 in Appendix C) confirm these sectoral differences. Overall, the picture emerging from these results is in line with that obtained by Blinder *et al.* (1998) and Hall *et al.* (1997).

Table 6 - Relationships with:						
	Firms			Consumers		
	Long-term	Occasional	N° firms ⁽¹⁾	Long-term	Occasional	N° firms ⁽²⁾
Total	97.8	2.2	316	69.8	30.2	108
Manufacturing excl. Food	99.8	0.2	177	63.5	36.5	35
Food	99.0	1.0	36	98.8	1.2	17
Construction	100.0	0.0	4	0.0	0.0	0
Retail	91.5	8.5	44	70.5	29.5	32
Other services	95.3	4.7	56	57.6	42.4	24

Notes: For the significance of sectoral differences, see Appendix C. ⁽¹⁾ Number of firms which reported having relationships with other firms, with respect to which the percentages in the previous two columns are computed. - ⁽²⁾ Number of firms which reported having relationships with consumers, with respect to which the percentages in the previous two columns are computed.

Finally, to complete the information on the market-related factors that might influence the degree of nominal rigidity in the firm's pricing behaviour, we enquired whether the firm produces under increasing, constant or decreasing marginal costs. In theory, the flatter the marginal cost curve, the more insensitive profits are to demand shocks and changes in production (with nominal prices unchanged) and hence the less likely it is that the firm might change its prices when production changes.

Table 7 - How do your unit variable costs change when there is an increase in the level of production?					
	Increase	Unchanged	Decrease	N.a ⁽¹⁾	Total
Total	48.5	21.3	27.2	2.5	100
Manufacturing excl. food	45.5	19.4	34.8	0.3	100
Food	42.1	6.5	39.4	12.0	100
Construction	44.5	0.0	55.5	0.0	100
Retail	49.0	41.9	8.3	0.8	100
Other services	64.2	19.9	10.5	5.4	100

Notes: For the significance of sectoral differences, see Appendix C. ⁽¹⁾ Firms which did not provide an answer.

Almost half of the respondents reported increasing marginal costs; the percentage is higher in the retail and service industries, lower in manufacturing and food (Table 7).¹¹ The sectoral dispersion could be related to the importance of capital equipment and to the degree of capacity utilisation. Slightly more than 25% of firms describe such these costs as decreasing. This leaves around 21% of firms reporting constant marginal costs, a much lower percentage that found by Blinder *et al.* (1998).

Summing up, the reference market of the firms covered by our survey is mostly the domestic one (local in the case of retail firms). On that market, they report having a lower number of competitors in the industrial sector (where firms are generally larger) than in the service and retail sector. Moreover, they tend to have long-term relationships with their customers, in particular when those are other firms; occasional relationships are rather important only in the retail and service sector. Finally, most firms have increasing marginal costs. In general, the analysis presented so far shows the presence of important sectoral differences.

4 Price setting

As a first piece of evidence concerning the main features of price-setting we assessed the presence of some form of price discrimination according to the type of customer and/or to the quantity of product sold (question B1).

Table 8 - The price of your main product is⁽¹⁾:					
	The same for all the customers	Differentiated according to quantity	Decided case by case	Don't know/ No answer	Total
Total	13.8	30.5	30.1	25.6	100
Manufacturing excl. Food	6.2	37.4	27.5	28.9	100
Food	18.7	29.9	22.3	29.1	100
Construction	0.0	0.0	65.1	34.9	100
Retail	37.9	16.6	14.7	30.8	100
Other services	16.1	21.1	56.0	6.8	100

Notes: For the significance of sectoral differences, see Appendix C. ⁽¹⁾ As firms were allowed to tick up to two answers, the total number of answers exceeds the number of firms. The percentages reported in the table are computed with respect to the total number of answers.

As expected, the resulting evidence is well dispersed across sectors (Table 8): in the retail industry the price is mostly the same for all customers; in manufacturing and services it tends either to differ according to the quantity sold or to be decided case by case. In particular,

¹¹ See Table C7 in Appendix C.

service firms tend to set their price on the basis of a certain degree of direct negotiation, which includes aspects that go beyond quantity (e.g. after sales assistance, etc.). In construction, not surprisingly, the price is mostly decided case by case. Quantity influences significantly firms' pricing decisions only in the manufacturing and food sectors (37.4 and 29.9% of firms, respectively).

Companies were then asked to indicate how they set the price of their main product (question B2). We distinguished between mark-up – either fixed or variable – pricing, regulated prices and other strategies, allowing the firm to specify. Mark-up price-setting behaviour dominates in all sectors (on average, more than 60% of our firms use this rule; Table 9), thus confirming results found in other studies. Around 13% of total respondents reported their price as being regulated; the percentage rises to 36.7% and 16.6% in the retail and in the service sector, respectively. The former could be due to the fact that, for some goods, retailers tend not to have a high degree of freedom, their price often being set by producers; the latter, instead, could derive from the strict regulatory framework in certain sectors.

Table 9 - How do you normally set the price of your main product?					
	A mark-up is applied to unit variable costs	The price is regulated	Other	Don't know/ no answer	Total
Total	63.1	13.3	7.3	16.3	100
Manufacturing excl. food	68.6	8.6	5.4	17.4	100
Food	67.7	0.7	16.3	15.3	100
Construction	100.0	0.0	0.0	0.0	100
Retail	49.7	36.7	7.1	6.5	100
Other services	52.3	16.6	8.5	22.6	100

Notes: For the significance of sectoral differences, see Appendix C.

As a complement to the above information, we tried to assess the influence of competitive pressures on price-setting by asking firms how different would the price of their main product be if they had no competitors on their reference market (question B3). Overall, companies seem to be rather conscious of rival pricing strategies (Table 10): prices would be either “very different” or “fairly different” for more than half of the respondents; they would be only “slightly different” for a further 36.9% of them. There is statistical evidence of significant sectoral differences (Table C10 in Appendix C): competitors' prices are particularly important in the industrial sector (where the number of competitors is smaller), while around 20% of retail and service firms would leave their price unchanged even if they did not have any rivals. This might be due, on the one hand, to the fact that they mostly operate on local domestic

markets and, on the other hand, to the presence of quite a stringent price regulation in these industries, as reported in Table 8.

In the manufacturing sector, we found through a simple correlation analysis that firms in extremely concentrated markets (with less than 5 rivals) or with a large number of competitors (more than 20 rivals; question A7 in the previous section) tend to be less affected by rival prices than firms in oligopolistic markets.

Table 10 – How different would the price of your main product be if you did not have any competitors on your market?						
	Unchanged	Slightly different	Fairly different	Very different	N.a. ⁽¹⁾	Total
Total	10.1	36.9	29.4	21.3	2.4	100
Manufacturing excl. food	6.4	40.1	24.9	26.6	2.0	100
Food	1.7	50.5	36.1	11.7	0.0	100
Construction	0.0	0.0	95.2	4.8	0.0	100
Retail	17.9	31.6	34.3	10.0	6.2	100
Other services	20.8	24.8	30.5	21.9	2.0	100

Notes: For the significance of sectoral differences, see Appendix C. ⁽¹⁾ Firms which did not provide an answer.

Finally, in order to gauge the relevance of market conditions on firms' pricing behaviour, we asked them to estimate by what percentage would the demand for their main product fall were they to raise the price by 10% (question B4). This was quite a difficult question for many firms, as around half of them were not able (or did not want) to give an evaluation of the perceived demand price elasticity.

Table 11 - By what percentage would the demand for your main product fall if you increased its price by 10%?						
% demand reduction	Manufacturing excl. food	Food	Construction	Retail	Other services	Total
1-20	19.2	7.1	0.0	5.5	5.0	13.1
21-40	9.0	10.4	0.0	14.1	8.8	9.8
41-60	12.0	4.1	0.0	17.6	6.9	10.9
61-80	6.3	12.5	55.5	0.0	0.7	5.6
81-100	5.5	4.3	8.0	0.4	10.0	5.4
Don't know/no answer	48.0	61.6	36.5	63.0	68.7	55.3
Mean = 4.5 Median = 4						

Notes: For the significance of sectoral differences, see Appendix C.

Table 11 shows the distribution of the responses of the 150 firms or so that provided a quantitative answer. Most companies said that they would face a reduction in the demand for their main product of between 1 and 20%, thus implicitly estimating the elasticity of demand to be between 0.1 and 2. The estimated mean elasticity is 4.5 and the median is 4.0. Compared to

Blinder *et al.* (1998), who find that 40% of the firms answering a similar question believe their demand is totally insensitive to prices, our result seems to be quite high, especially in retailing. As for the US, this evidence should be interpreted with a certain caution.

Overall, there seem to be sectoral differences as regards price discrimination across customers. Firms typically set their price on the basis of a mark-up rule on costs and are rather conscious of rival pricing behaviour, particularly in the industrial sector. Retail and service firms, instead, are less likely to look at competitors' prices when setting their own, possibly because of the higher degree of price regulation.

5 Price adjustment

In the third section of the questionnaire we focused directly on price adjustments. As widely discussed in the literature, different factors might lie behind the fact that firms find it optimal to adjust their prices only infrequently, and we explored to what extent the alternative theories of sticky prices are relevant in practice.

In principle, price adjustment takes place in two stages: the overall assessment of whether the current price needs to be changed or not and the actual price change, once the price review has indicated it would be appropriate to do so. The two actions do not necessarily coincide and sticky behaviour can arise at both stages.

At the two extremes, firms might review their pricing policy only at very long discrete time intervals, but once they have done so they change their price at once, or they might review their prices continuously, but then the actual change takes place only with a long time lag. In practice, we expect price stickiness to be a combination of these two sources.

5.1 The frequency of price reviews and changes

According to economic theory, there are two broad classes of price-adjustment strategy: time-dependent rules, in which prices are reviewed periodically at given intervals, and state-dependent rules, in which prices are adjusted when the deviation between the current price and the optimal one becomes large enough to make the gain in profit from adjustment outweigh the related cost (for example, the (s, S) type of adjustment rule).

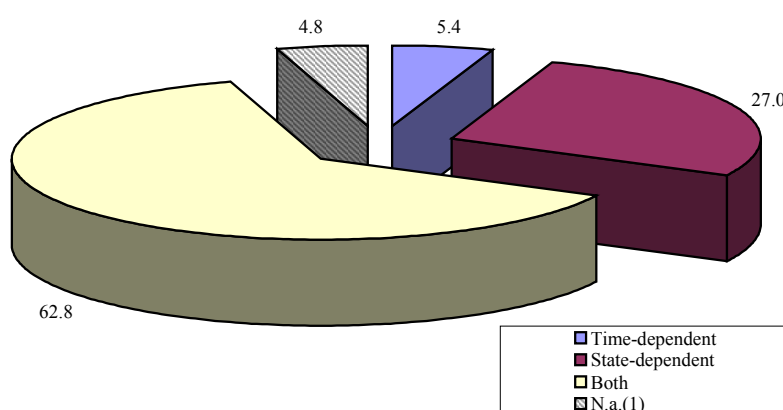
Although both strategies imply that prices remain unchanged for periods of time, they have quite different implications for monetary policy. Under time-dependent rules, the higher the level of inflation the shorter is the time interval between revisions (in the extreme case, in

an hyperinflation framework prices are re-considered almost continuously, due to the very high cost of inaction). On the contrary, under state-dependent rules what matters most is likely to be the nature and the relevance of the shock that changes the economic situation rather than the level of inflation.

In order to discriminate between the two rules, firms were asked whether they normally review their prices at a particular frequency and/or they do so only in response to particular events (question C1).¹²

Around one quarter of the respondents normally review their prices only in response to particular events, as against around 5% which do it only periodically (Figure 2). The majority of firms, 63%, adopts both state and time-dependent pricing strategies. This evidence is not in line with the results of Blinder *et al.* (1998) and Hall *et al.* (2000), where 60% and 79%, respectively, of the firms interviewed reported mainly following time-dependent pricing rules.

Figure 2 - Time-dependent vs. state-dependent pricing rules
(percentages)



Notes: ⁽¹⁾ Firms which did not provide an answer.

Table 12 – Under normal conditions, the price of your main product is reviewed:										
	In response to specific events				Periodically					
	Change in costs	Change in demand	Other	Total	Daily	Weekly	Monthly	Quarterly	Yearly	Total
Total	69.3	26.6	4.1	100	6.9	7.7	13.9	14.6	56.7	100
Manufacturing excl. food	75.8	20.4	3.8	100	5.1	4.4	20.3	14.0	56.2	100
Food	69.7	28.5	1.8	100	0.8	30.1	1.6	17.5	50.0	100
Construction	44.5	0.0	55.4	100	0.0	0.0	0.0	0.0	100.0	100
Retail	51.2	48.2	0.6	100	7.6	8.5	15.4	19.2	49.4	100
Other services	64.8	29.5	5.7	100	17.1	0.0	3.3	11.3	68.4	100

Notes: For the significance of sectoral differences, see Appendix C. Firms were allowed to indicate both types.

¹² The formulation of question was in line with the one proposed by *Apel et al* (2001) in their survey of Swedish companies.

The firms that normally revise their price in response to specific events are more affected by cost changes than by variations in demand conditions; this broadly holds across all economic sectors, although prices are very sensitive to demand shocks for retail firms (Table 12 and Table C12 in Appendix C for the significance tests). More than half of the firms which adopt time-dependent rules review their price only once a year, and around 15% at quarterly intervals. In the food, retail and service sectors price reviews tend to take place more frequently: around one third of firms in the food producing industry and 8.5% of those in retailing evaluate their prices every week, while around 17% of service firms report a daily frequency of price reviews.

Having assessed how and how often firms review their pricing policies, we asked them how many times they actually changed the price of their main product in 2001 and in 2002 (question C6).¹³ Results point to a certain degree of stickiness in all sectors (differences are not statistically significant, as shown in Table C13 in Appendix C): the majority of respondents apparently changed their price only once, around 10% twice (Table 13). Less than 10% changed their price more than every two months. It is worth noting that 12% of respondents report no price change in 2002, the percentage being higher in the food producing and service sectors.

However, a note of caution is needed regarding the implications that can be deduced from the answers to this question, since around 40% of the firms did not provide an answer at all. A very high non-response rate was recorded in the construction, service and retail industries.

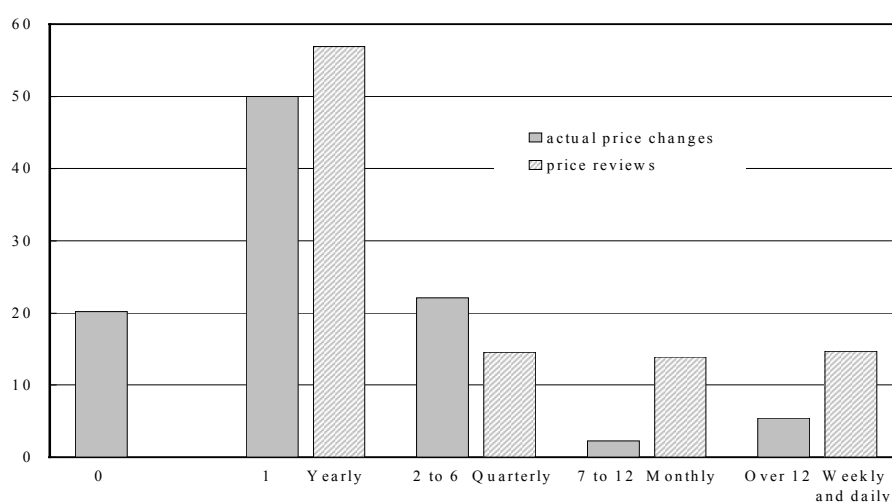
Table 13 - How many times did you actually change the price of your main product in 2002?								
	0	1	2	3 to 6	7 to 12	Over 12	Do not know/ no answer	Total
Total	12.0	29.8	9.8	3.4	1.4	3.2	40.3	100
Manufacturing excl. food	12.3	36.9	12.4	3.4	1.1	3.7	31.2	100
Food	15.6	19.2	4.3	0.5	8.5	8.4	43.5	100
Construction	4.8	0.0	0.0	36.5	0.0	0.0	58.7	100
Retail	7.3	20.6	13.8	7.2	0.0	2.6	48.5	100
Other services	13.5	24.1	2.3	0.3	1.6	0.0	58.3	100

Notes: For the significance of sectoral differences, see Appendix C.

If one takes into account only the companies that provided information concerning both the frequency of price reviews and the number of price changes, the evidence suggests that actual changes tend to be slightly less frequent than reviews (Figure 3): almost 60% of the respondents typically review their price once a year, while about 50% of them actually change it with that frequency. The median frequency of price reviews – once a year – is the same as the median frequency of price changes (the 5th and 95th percentiles were, respectively, 0 and 30 changes).

These results, showing a rather high degree of price stickiness in Italy, are in line with those obtained for the UK by Hall *et al.* (2000), for the US by Blinder *et al.* (1998) and for Sweden by Apel *et al.* (2001).

Figure 3 – Number of price changes in a year and frequency of price reviews (percentages)



Notes: The figure is based on the answers to questions C1.2 and C6.

If firms have not experienced any major shock during the two-year period over which we asked them to provide information on the actual number of price changes, it might be misleading to interpret the reported low frequency of actual price adjustments only in terms of nominal price rigidity. A complementary piece of information is whether, and for how long, firms are willing to sustain a price that is not optimal. Hence, firms were asked whether they

¹³ We also asked about 2001 in order to try to account for the temporary deviation from usual pricing policies in 2002 due to the euro cash changeover. The answers for the two years were very similar. Though in theory firms' pricing policies could have been affected by the euro cash changeover also in 2001, in which case answers for that year would not represent a reliable crosscheck for the robustness of results on the frequency of price changes, we have some piece of evidence that this was not the case. In fact, in the survey of price expectations conducted in September 2001, the majority of the interviewed firms (around 74%)

would accept, temporarily, their price being below unit variable costs (question C3) and, if so, for how long (questions C4).

Table 14 - Is it possible that the price of your main product is below your unit variable costs?				
	Yes	No	N.a. ⁽¹⁾	Total
Total	26.0	67.8	6.2	100
Manufacturing excl. food	19.4	71.8	8.8	100
Food	34.9	65.1	0.0	100
Constructions	8.0	92.0	0.0	100
Retail	26.7	69.1	4.2	100
Other services	41.5	54.7	3.9	100

Notes: For the significance of sectoral differences, see Appendix C. ⁽¹⁾ Firms which did not provide an answer.

For the majority of respondents (around 70%) prices cannot fall below unit variable costs (Table 14). Of those that allow their prices to be lower than unit variable costs (around 25%), more than half do so for up to six months and around 10% for a period from six months to one year (Table 15).

Table 15 - If the answer to the previous question is "yes", for how many months would you be willing to accept a price level below unit variable costs?		
Months:	n° firms	%
0	4	4.7
1	8	9.3
2	10	11.6
3	20	23.3
5	0	0.0
6	6	7.0
12	3	3.5
Don't know	35	40.7
Total	86	100

5.2 Why are prices sticky?

In testing alternative theoretical explanations which may lead a firm to temporarily deviate from its profit-maximising price, we followed the approach of Blinder *et al.* (1998), Hall *et al.* (2000) and Apel *et al.* (2001). In order to assess the relative importance of different theories of price stickiness, we asked firms to rank according to importance a number of factors

reported that their selling prices would have not been affected by the euro cash changeover. Only half of the remaining 26% reported having changed their pricing policies in 2001.

that might delay the actual implementation of a price revision (question C2).¹⁴ We considered the following explanations¹⁵:

- Co-ordination failure - a firm does not change its price fearing that it will trigger a price war. According to the literature on tacit collusive behaviour, no firm would want to be the first to change prices, even when there are the conditions for doing so, in order to avoid setting off a process at the end of which all market participants would be worse-off. In practice, the importance of this behaviour might change in relation to the sector and to the nature of the shocks affecting the firm's optimal price, in particular whether they are perceived as "global" or "firm-specific". Our survey allows us to draw some conclusions about the former aspect (type of sector) but not the latter (type of shock).
- Temporary shocks – a firm might not find it optimal to change its price if it believes that it will soon have to change it in the opposite direction.
- Explicit contracts – the transactions between a firm and its customers involve explicit contracts which, acting as insurance against uncertain market conditions, are designed to maintaining stable prices, at least until re-negotiation.
- Pricing thresholds – a firm might fix its prices at attractive thresholds. This implies a discontinuous relationship between price and demand: for instance, in order to increase the price to a new threshold the firm must suffer a greater fall in demand compared with the case in which attractive prices are not relevant. The evidence available for the euro area, based on the analysis of consumer prices, suggests that this pricing behaviour is actually quite widespread (for Italy see Mostacci and Sabbatini, 2003).
- Menu costs – a firm might be reluctant to adjust its prices immediately in response to a demand or supply shock because of the physical and information costs involved in the adjustment process.
- Bureaucratic reasons – the process of changing prices might be very time and resource consuming for bureaucratic reasons.

¹⁴ The firms interviewed were asked to rank these factors on a scale from 1 ("unimportant") to 4 ("very important").

¹⁵ In formalising the list of alternative theoretical explanations of price rigidity, we selected a smaller number of theories with respect to the mentioned studies, in order to simplify the ranking process on the firms' side. However, the relevance of other theories often outlined in the literature as potential causes of price stickiness was assessed in other parts of the questionnaire through separate questions (for example the role of marginal costs, price as a signal for quality, stock adjustment, delivery time).

According to the answers provided by our respondents, nominal contracts are an important factor underlying a firm's decision to postpone price adjustments (Table 16). In rank terms, explicit contracts turned out to be the most important reason, as in the survey conducted by the Bank of England.¹⁶ As expected, there is some variation in the importance of this aspect across economic sectors: the rank is quite high in the service sector and much lower in retailing (see Table C16 in Appendix C).

The theory which received, overall, the second highest rank is co-ordination failure (the same result as in Blinder's survey). This evidence is consistent with the importance that companies attribute to rival prices as emerged earlier in the analysis. In principle, collusive behaviour between companies should be less likely either in very competitive markets, where firms are by definition price-takers and so do not engage in price-wars with their rivals, or, at the other extreme, in very concentrated markets, where co-ordination is relatively easy. Therefore, one would expect this explanation of price stickiness to be considered more important by firms operating in industries with a degree of competition between these two extremes. We found only a moderate difference across firms facing different level of competition.

The third explanation of the inertial behaviour of prices, in terms of ranking assigned by our respondents, is the fact that firms do not adjust their price in response to a shock because of the perceived temporary nature of the shock itself. In particular, this factor was considered important or very important by about 30% of the firms in the retail and food industries.

As in the surveys conducted by Blinder and his associates and by the Bank of England, some of the factors often indicated in the literature as important causes of price stickiness do not seem to be considered such by firms. In particular, price-setting at attractive thresholds and menu costs, as well as bureaucratic rigidities, were overall ranked quite low by firms (1.4, 1.6 and 1.3, respectively).

As expected, however, both pricing thresholds and menu costs were, overall, recognised more widely in retailing than in the other sectors.¹⁷ In the case of pricing thresholds, in particular, around 33% of respondents in the retail industry considered this aspect important or

¹⁶ In Blinder's study this theory ranked fourth.

¹⁷ The low ranking of pricing thresholds somehow contrasts with the evidence provided by other studies based on Italian micro consumer prices, which show instead that this pricing behaviour is extremely widespread (Mostacci and Sabbatini, 2003). However, the two pieces of evidence can be reconciled considering that the prices analysed in our survey are presumably "producer prices" and so it is quite reasonable that attractive thresholds play a limited role at the early stage of the distribution chain.

very important, as against 11.2% for manufacturing, 31.6% for food and 8.7% for other services.

Table 16 – Which of the factors listed below might lead to a delay in the actual price change?						
	Total	Manufacturing excl. food	Food	Construction	Retail	Other services
The fear that competing firms will not adjust their selling price						
Unimportant	10.6	10.9	12.5	-	1.1	17.0
Of minor importance	30.0	28.8	24.9	-	35.6	34.2
Important	38.4	38.2	44.3	95.2	42.0	28.4
Very important	13.3	14.4	18.3	4.8	10.4	9.4
N.a. ⁽¹⁾	7.8	7.6	-	-	10.9	11.1
Mean score	2.59	2.61	2.68	3.05	2.69	2.34
The fear that subsequently you will need to modify the price in the opposite direction						
Unimportant	30.0	28.9	33.7	58.6	25.8	32.8
Of minor importance	34.7	38.2	29.1	-	35.7	28.5
Important	18.9	19.8	15.1	4.8	23.7	15.5
Very important	4.2	1.7	16.7	-	3.5	4.9
N.a. ⁽¹⁾	12.2	11.4	5.4	36.6	11.4	18.3
Mean score	1.97	1.93	2.16	1.15	2.01	1.91
The presence of a <u>contract</u> which states conditions that can be changed only when the contract is re-negotiated						
Unimportant	18.2	14.6	18.5	-	39.2	12.1
Of minor importance	14.5	15.6	6.9	36.5	22.5	7.2
Important	37.1	37.3	49.3	-	33.5	34.2
Very important	19.0	17.5	25.2	63.5	0.2	33.3
N.a. ⁽¹⁾	11.2	14.9	-	-	4.7	13.2
Mean score	2.64	2.68	2.81	3.27	1.94	3.02
The price is set at "attractive" thresholds and is changed only when it is convenient to move to a new one						
Unimportant	63.5	68.6	53.3	63.5	45.9	69.4
Of minor importance	13.0	14.5	11.6	36.5	10.2	10.0
Important	8.6	1.9	26.1	-	21.2	8.1
Very important	2.6	0.1	5.5	-	11.5	0.7
N.a. ⁽¹⁾	12.3	14.8	3.6	-	11.2	11.8
Mean score	1.43	1.22	1.83	1.36	1.98	1.32
The presence of high costs of changing prices						
Unimportant	54.1	55.3	51.7	95.2	47.2	55.1
Of minor importance	23.5	24.7	33.9	-	19.9	17.3
Important	9.8	9.3	5.2	4.8	12.1	12.5
Very important	3.2	0.0	9.1	-	9.8	4.1
N.a. ⁽¹⁾	9.5	10.7	-	-	10.9	11.0
Mean score	1.58	1.48	1.72	1.09	1.83	1.61
Bureaucratic rigidities						
Unimportant	64.6	67.6	48.4	95.2	56.8	70.4
Of minor importance	19.8	18.5	34.3	-	28.4	8.4
Important	2.7	1.4	8.4	-	3.6	2.8
Very important	0.3	-	-	4.8	-	1.4
N.a. ⁽¹⁾	12.6	12.5	8.9	-	11.2	17.1
Mean score	1.30	1.24	1.56	1.14	1.40	1.22

Notes: For the significance of sectoral differences, see Appendix C. Two-sided t-tests were computed, for the whole sample of firms, for each pair of explanatory theories in order to assess whether the mean scores were significantly different. The results indicate that the null hypothesis of pairwise equality across mean scores can always be rejected with the exception of the following pairs: a) collusive behaviour and explicit contracts, b) attractive thresholds and menu costs.

All in all, the evidence reported in this section suggests that prices are indeed quite rigid, the median firm reviewing and changing its price only once a year. Firms seem to follow mostly state-dependent pricing rules for adjusting their price, or a mixture of time and state-

dependent rules. Notably, the theories of price rigidity – nominal contracts and co-ordination failure – ranked by our respondents among the most important are the same singled out in similar studies for the US, the UK and Sweden. As regard sectoral behaviour, significant differences emerge between manufacturing and retail firms and, interestingly enough, between retail and other services firms.

6 Asymmetries in price adjustment: how do firms respond to shocks?

The last section of the questionnaire focuses on whether firms, facing a shock, behave symmetrically irrespective of the source of the shock or whether prices have to be increased or decreased.

Table 17 - Which factors would be likely to cause an <u>increase/decrease</u> in the price of your main product?		
	INCREASE	DECREASE
An increase/decrease in the cost of labour		
Unimportant	4.6	18.7
Of minor importance	22.4	32.0
Important	51.6	27.0
Very important	18.5	14.1
N.a. ⁽¹⁾	2.9	8.3
Mean score	2.9	2.4
An increase/decrease in the cost of raw materials		
Unimportant	4.9	10.4
Of minor importance	7.2	15.4
Important	40.2	38.3
Very important	42.6	26.2
N.a. ⁽¹⁾	5.1	9.7
Mean score	3.3	2.9
An increase/decrease in financial costs		
Unimportant	14.3	21.9
Of minor importance	45.6	42.7
Important	25.4	19.2
Very important	9.2	5.1
N.a. ⁽¹⁾	5.6	11.2
Mean score	2.3	2.1
A rise/fall in demand		
Unimportant	13.0	8.0
Of minor importance	38.1	23.3
Important	34.1	41.8
Very important	8.2	17.5
N.a. ⁽¹⁾	6.6	9.4
Mean score	2.4	2.8
Price increase/decrease by one or more competitors		
Unimportant	10.5	8.1
Of minor importance	30.2	25.8
Important	41.9	35.9
Very important	10.4	22.4
N.a. ⁽¹⁾	7.0	7.9
Mean score	2.6	2.8

Notes: Two-sided t-tests were computed for each pair of explanatory factor in order to assess whether the mean scores were significantly different. The results indicate that the null hypothesis of pairwise equality across mean scores can always be rejected with the exception of the following factors driving a decrease in prices: costs of raw materials, demand changes and price changes by competitors.

Firms were asked to evaluate the relevance of a number of factors (cost of labour and of raw materials, financial costs, demand conditions, competitors' strategies) as driving forces behind upwards (question D1) or downwards (question D3) price movements.

Overall, firms judge cost shocks (of labour and other inputs) to be rather important in driving their prices upwards or downwards (Table 17). The impact, however, is relatively more important when prices have to be increased than when they have to be reduced.

As for changes in demand conditions, only around 42% of firms reported this factor as being "important" or "very important" in determining price increases. Demand shocks affect price changes asymmetrically, since they seem to exert much stronger pressure on prices when these have to be decreased.

The influence of competitors' behaviour on price adjustments, which already emerged in the previous sections, although generally quite high, seems to be slightly stronger in driving prices downwards than upwards. On the contrary, financial costs do not appear among the major sources of adjustments in prices, particularly downwards.

Having ascertained the main sources of price increases and decreases, we investigated the significance of particular factors in preventing a prompt adjustment in both directions.

Concerning upward adjustments, we asked firms whether, facing a positive demand shock, they first act on non-price elements, such as delivery times or the level of stocks, instead of increasing their price (Question D2). Most firms, irrespective of economic sector, would not consider extending the delivery time in the presence of a demand increase (51.6% on average; Table 18). They are more willing to change the level of stocks, with the expected exception of firms in the service sector.

Table 18 - If demand for your main product increased, before you raised the price level, would you first consider

	An extension in delivery time				Changing the level of stocks			
	Yes	No	N.a. ⁽¹⁾	Total	Yes	No	N.a. ⁽¹⁾	Total
Total	28.5	51.6	19.9	100	38.0	42.5	19.5	100
Manufacturing excl. food	35.4	51.2	13.4	100	46.0	40.9	13.1	100
Food	23.1	66.6	10.3	100	41.7	51.7	6.6	100
Construction	0.0	100.0	0.0	100	96.8	3.2	0.0	100
Retail	27.1	38.3	34.6	100	36.9	37.2	25.9	100
Other services	13.9	51.6	34.5	100	8.5	48.5	43.0	100

Notes: For the significance of sectoral differences, see Appendix C. ⁽¹⁾ Firms which did not provide an answer.

As for downward adjustments, we asked firms if they fear that customers would perceive a price reduction as a fall in the quality of the goods or services (question D4). Overall, as found in other studies, the results suggest this is not an important factor in preventing firms from reducing their prices (Table 19).

Table 19 - If you were about to reduce the price of your main product, would you fear that customers might assume you had reduced its quality?				
	Yes	No	Do not know/ no answer	Total
Total	11.8	73.3	14.9	100
Manufacturing excl. food	9.4	77.4	13.2	100
Food	26.5	67.5	6.0	100
Construction	55.5	45.5	0.0	100
Retail	4.3	73.8	21.9	100
Other services	13.6	65.5	20.8	100

Notes: For the significance of sectoral differences, see Appendix C.

In the remainder of this section we explore, through an empirical exercise, the factors likely to affect the response of prices to shocks, focusing in particular on the presence of some form of asymmetry in price adjustment. For a given demand or cost shock firms might, in fact, react differently if they have to adjust their price upwards or downwards in relation to the direction of the shock. Moreover, irrespective of its direction, they might respond differently to demand and cost shocks.¹⁸ Our approach follows the analysis presented in Small and Yates (1999), allowing a direct comparison with their results.

The variable we used to capture the relative stickiness of prices in response to different shocks is based on firms' answers concerning the factors underlying negative and positive price changes (described in Table 17). Specifically, we created four dummy variables, which describe the probability of firms increasing their price in response to a increase in demand or costs (*pud* and *puc*, respectively) and lowering their price in response to a fall in demand or costs (*pld* and *plc*, respectively).

¹⁸ For example, Rotemberg and Saloner (1997) show that in a duopoly the incentives for competitors to adjust the price level to a shock in costs are greater than in a monopoly. The underlying idea is that the cost in terms of profit losses of a competitor not raising (reducing) its price when costs increase (decrease) is very high: at the outside, it will end up supplying all the market but incurring losses on every unit of output if there is a cost increase, or losing all its market share if it remains inactive in the presence of a fall in costs. By contrast, the incentives to inaction in the presence of a demand shock are greater in a monopoly than in a duopoly.

Since the dependent variables are defined as zero-one dummies, we estimated a probit model of the form:¹⁹

$$y_j = b_1x_{1j} + \dots + b_mx_{mj} + u_j$$

where y_j denotes the probability of observing a change in firm j 's price in response to a demand or a cost shock (pud , puc , pld , plc) and x_{ij} represents a set of i explanatory variables for firm j , which might influence the way in which prices react to shocks. For the latter we considered a number of propositions advanced in the theoretical literature on price stickiness.

First, we explored the possibility that, as Ball and Romer (1990) argue, nominal prices are stickier in a market where firms' profits do not change much in the face of shocks – in other words, that real rigidity magnifies nominal rigidity. According to this concept, the more sensitive profits are to shocks (with prices unchanged), the more likely it is that firms will react by changing prices. In order to test this proposition, we considered several factors determining the degree of real rigidity.

The first is the degree of market competition. In principle, the more competitive the market, the more likely it is that a firm will adjust its price in response to shocks in order to avoid a fall in profits. Hence, for a given nominal rigidity (due for instance to the presence of menu costs), stronger competition should induce a greater responsiveness of prices to cost and demand shocks (Martin, 1993; Small and Yates, 1999). On the basis of our survey we constructed a number of variables capturing the degree of market competition: the firm's reported market share (*mkt_shr*); the number of its competitors (*rivals*); how the firm would set its prices if it had no rivals (*comp_press*).

A further feature affecting the degree of real rigidity is the nature of the relationship between the firm and its customers. A firm can sell its main product to other firms or directly to final consumers. In the first case it is likely that lower search costs are sustained by customers to collect the information needed to act optimally. Therefore, the probability that the firm adjusts its price in response to shocks is greater than in the case in which the firm deals mainly with final consumers, which face higher search costs. Similarly, the existence of a long-term relationship between the firm and its customers is likely to generate a resistance to change prices continuously in order not to disappoint them. This line of reasoning is similar to that followed by Small and Yates (1999), who refer in their analysis to the concept of "customer markets" introduced by Okun (1981). In order to capture the nature of the firm's relationship

¹⁹ See Maddala (1983).

with its customers we constructed a dummy variable reflecting the fact that the firm deals mainly with other firms (*customer*) and one that identifies whether the firm discriminates the price depending on the customer (*price_discr*). We also created a dummy allowing for the possibility that the price is subject to some form of regulation (*price_reg*).

The last proxy for real rigidity is a variable that records whether the firm's marginal cost curve is flat (*MC*). As Hall (1986) recognises, variable marginal costs should make price adjustments more likely in the face of a shock.

An additional reason why a firm might not adjust its prices in response to shocks is that it mainly sells its products abroad and therefore adopts a form of "pricing-to market". We constructed two types of variable to investigate the validity of the pricing-to-market model: a dummy that identifies whether the firm's share of turnover due to exports is above 40% (*exp_share*); and a dummy that records whether the firm identifies the foreign market as being the principal one for its main product (*ext_mkt*). It has to be borne in mind, however, that these two measures could also partly capture the degree of competition faced by the firm.

Finally, we constructed a set of dummy variables to control for the type of economic activity, the size of the firm and the geographical area in which it is based, which also help to account for unobserved characteristics of the firm that might impact on price behaviour but are not captured by the previous explanatory variables.²⁰

To gauge the presence of some form of asymmetry in the firm's pricing behaviour when prices have to be adjusted upwards or downwards, we estimated the above model separately for demand and cost shocks (Tables 20 and 21, respectively). For each type of shock we carried out separate regressions for upward and downward shocks. The first and third column in each table contain the results obtained including all the variables in the regression; the second and fourth column present instead restricted versions of the model, including only the variables that turned out to be significant or to significantly affect the overall equation.

As far as demand shocks are concerned, Table 20 shows that market structure, as captured by the degree of competitive pressure perceived by the firm (*comp_press*), significantly affects the probability of price adjustments in face of a shock, whether positive or negative: as expected, prices tend to change more promptly in a more competitive environment. We also find, as expected, that the probability of raising prices faced with a positive demand

shock is significantly lower for firms with a flat marginal cost function (*MC*), while this feature does not have an impact in the case of a negative shock. Similarly, the fact that the firm's customers incur lower search costs (*customer*) is positively correlated with the responsiveness of prices to a demand increase, although it has no significant effect in the case of a demand decrease.²¹ There is no evidence supporting what theoretically postulated by pricing-to-market models.

Table 20 - Price adjustment in response to a demand shock
(Probit estimates)

	Reduce price in response to a fall in demand (PLD)				Raise price in response to a rise in demand (PUD)			
	(1)		(2)		(3)		(4)	
Constant	2.33	(0.98)	1.95	(0.85)	-0.33	(1.00)	-0.99	(1.02)
Mkt_shr1	-0.36	(0.78)			-1.23 **	(0.46)		
Mkt_shr4	-0.04	(0.38)			-0.49	(0.39)		
Mkt_shr10	0.14	(0.29)			-0.60	(0.40)		
Comp_press	0.66 **	(0.20)	0.79 **	(0.26)	0.62 **	(0.29)	0.78 **	(0.24)
MC	-0.30	(0.36)	-0.17	(0.33)	-0.64 *	(0.37)	-0.58 **	(0.30)
Customer	0.005	(0.31)			0.68 **	(0.30)	0.94 **	(0.24)
Price_discr	-0.24	(0.44)			-0.33	(0.41)		
Exp_share	0.53 *	(0.40)	0.39	(0.35)	0.20	(0.39)	0.13	(0.30)
Price_reg	-0.63	(0.42)	-0.58	(0.39)	-0.41	(0.43)		
Manufacturing	-0.55	(0.74)	-0.58	(0.70)	-1.14	(0.95)	0.56	(1.01)
Retail	-0.55	(0.86)	0.72	(0.74)	-1.60	(1.03)	1.13	(1.05)
Other services	-1.23	(0.80)	-1.12	(0.73)	0.49	(1.01)	0.21	(1.03)
Food	-0.59	(0.85)	-0.17	(0.78)	1.33	(0.99)	1.55	(1.04)
North-west	-0.49	(0.34)	-1.40 **	(0.46)	-0.53	(0.45)	-0.47	(0.37)
North-east	-1.48 **	(0.49)	-1.13 **	(0.48)	-0.31	(0.45)	-0.25	(0.39)
Centre	-1.02 **	(0.51)	-0.86 *	(0.49)	-0.40	(0.47)	-0.17	(0.43)
Up to 199 employees	-0.96 *	(0.53)	-0.27	(0.29)	-0.55 *	(0.33)	-0.34 *	(0.25)
200-999 employees	-0.48	(0.37)	-0.05	(0.29)	-0.77 **	(0.33)	-0.99	(1.03)
Number of observations	201		236		205		268	
LogL	-110.8		-130.2		-115.6		-151.97	
Pseudo R ²	0.189		0.172		0.17		0.17	
χ ² (dof)	35.8 (18) [0.007]		33.7 (13) [0.001]		29.3 (18) [0.044]		43.7 (13) [0.00]	

Notes: Weighted estimates. ** and * indicate statistical significance at the 5% and 10% significance level, respectively. Values in round brackets are the estimated standard errors. Values in square brackets are the estimated p-values of the test statistics. Columns (1) and (3) present results obtained including all the variables in the regression; columns (2) and (4) present those obtained with only the significant ones.

As for the reaction of prices to cost changes, Table 21 shows that the probability of lowering prices in response to a decrease in costs is significantly and inversely correlated with the degree of market power (*mkt_shr1*) while it not affected by search costs (*customer*).²² The same effects appear also in the case of cost increases. The latter seem also to be more easily translated into prices when there is some form of price regulation. Firms mainly operating on

²⁰ The full set of variables is listed in detail in Appendix C. Note that some variables which could have been of considerable interest, e.g., the elasticity of demand (question B4), and the possibility of the price being below unit variable costs (questions C3 and C4) have not been included in the above list owing to the large percentage of missing values.

²¹ This result contrasts with that obtained by Small and Yates (1999) in a similar exercise, as they find search costs to be significant only in the case of cost shocks.

²² Small and Yates (1999) find similar results for search costs but no significant effect for market competition.

foreign markets (*extmkt*) seem to have a significantly lower price responsiveness to both positive and negative cost shocks, hence supporting the hypothesis of some form of nominal rigidity due to pricing-to-market behaviour.

Table 21 - Price adjustment in response to a cost shock
(*Probit estimates*)

	Reduce price in response to a fall in costs (PLC)				Raise price in response to a rise in costs (PUC)			
	(1)		(2)		(3)		(4)	
Constant	2.55	(0.99)	1.91	(0.77)	1.56	(0.88)	1.26	(0.87)
Mkt_shr1	-1.33 **	(0.46)	-1.41 **	(0.45)	-1.19 *	(0.65)	-1.06 **	(0.53)
Mkt_shr4	-0.49	(0.47)	-0.29	(0.42)	-0.24	(0.39)	-0.14	(0.41)
Mkt_shr10	-0.57	(0.40)	-0.42	(0.37)	1.14 *	(0.69)	1.17 *	(0.66)
Comp_press	-0.41	(0.33)			-0.22	(0.45)		
Customer	0.26	(0.30)	0.21	(0.21)	-0.22	(0.42)	-0.18	(0.44)
Price_discr	0.89 **	(0.33)	1.18	(0.36)	0.53	(0.48)	-0.61	(0.56)
Extmkt	-1.22 **	(0.38)	-1.08 **	(0.36)	-1.11 **	(0.47)	-1.09 **	(0.47)
Price_reg	-0.32	(0.40)			0.89 *	(0.54)	0.96 *	(0.51)
Manufacturing	-0.05	(0.73)	0.05	(0.69)				
Retail	-0.08	(0.84)	-0.03	(0.80)				
Other services	-0.62	(0.79)	-0.54	(0.74)				
Food	-1.26	(0.83)	-1.11	(0.76)				
North-west	-0.19	(0.45)	-0.26	(0.42)	0.55	(0.64)	0.56	(0.63)
North-east	-0.56	(0.46)	-0.46	(0.44)	0.31	(0.64)	0.31	(0.62)
Centre	-0.76	(0.52)	-0.51	(0.46)	1.79	(0.79)	1.18	(0.76)
Up to 199 employees	-0.22	(0.41)	-0.10	(0.38)	0.34	(0.52)	0.41	(0.49)
200-999 employees	0.04	(0.39)	-0.09	(0.38)	1.45 **	(0.73)	1.44 **	(0.71)
Number of observations	221		244		224		226	
LogL	-88.7		-98.9		-25.6		-25.6	
Pseudo R ²	0.21		0.22		0.34		0.34	
χ^2 (dof)	48.45 (17)	[0.000]	51.9 (14)	[0.000]	47.6 (12)	[0.000]	48.1 (11)	[0.000]

Notes: Weighted estimates. ** and * indicate statistical significance at the 5% and 10% significance level, respectively. Values in round brackets are the estimated standard errors. Values in square brackets are the estimated p-values of the test statistics. Columns (1) and (3) present results obtained including all the variables in the regression; columns (2) and (4) present those obtained with only the significant ones.

As a final piece of evidence we pooled together the increases and decreases and estimated two separate regressions for demand and cost shocks, testing the significance of the “increase” dummies in both cases (Table 22). This exercise highlights an important form of asymmetry in the responsiveness of prices to changes in cost and demand: while a demand increase is less likely to induce a price change than a demand decrease, a cost increase is much more likely to prompt a price change than a cost decrease.²³

Summarising, the results point to the existence of interesting forms of asymmetry in the adjustment of prices to positive and negative shocks, in particular on the demand side. First, real rigidities, as captured by a flat marginal cost curve, on the one hand, and by the fact that customers incur high search costs, on the other hand, reduce the responsiveness of nominal prices to a positive change in demand but not to a negative one. Second, both market structure, as measured by the firm’s degree of market power, and some form of pricing-to-market rigidity

seem to enhance nominal price stickiness in response to cost shocks. Third, price responsiveness to changes in costs is greater when the changes are positive than when they are negative, while in the case of demand changes prices seem to be more rigid upwards than downwards.

Table 22 - Price adjustment: pooling positive and negative shocks
(Probit estimates)

	Change price in response to a change in demand	Change price in response to a change in costs
	(1)	(2)
Constant	1.40 (0.63)	1.64 (0.65)
Demand_up/Cost_up	-0.51 ** (0.18)	1.02 ** (0.25)
Mkt_shr1	-0.64 ** (0.31)	-1.43 ** (0.37)
Mkt_shr4	-0.34 (0.26)	-0.14 (0.33)
Mkt_shr10	-0.45 * (0.26)	-0.24 (0.32)
Customer	0.46 ** (0.20)	
Price_discr		1.09 ** (0.33)
MC	-0.38 * (0.24)	
Exp_share	0.26 (0.26)	
Ext_mkt		-1.05 ** (0.29)
Price_reg	-0.63 ** (0.29)	
Manufacturing	0.11 (0.66)	-0.02 (0.63)
Retail	0.39 (0.70)	-0.09 (0.70)
Other services	-0.30 (0.68)	-0.34 (0.67)
Food	0.61 (0.68)	-1.10 * (0.67)
North-west	-0.72 ** (0.29)	-0.29 (0.34)
North-east	-0.51 * (0.31)	-0.31 (0.36)
Centre	-0.57 * (0.32)	-0.11 (0.38)
Up to 199 employees	-0.48 ** (0.21)	0.06 (0.31)
200-999 employees	-0.40 ** (0.21)	0.43 (0.31)
Number of observations	433	503
LogL	-264.5	-140.8
Pseudo R ²	0.12	0.27
χ^2 (dof)	48.1 (15) [0.000]	74.8 (15) [0.000]

Notes: Weighted estimates. ** and * indicate statistical significance at the 5% and 10% significance level, respectively. Values in round brackets are the estimated standard errors. Values in square brackets are the estimated p-values of the test statistics.

7 Conclusions

The evidence of the nature and causes of price stickiness based on a recent Bank of Italy survey of price-setting behaviour in Italy is consistent in many respects with that emerging from similar analyses for the US, the UK and Sweden.

As in previous studies, our results suggest the presence of a considerable degree of nominal stickiness, which emerges both at the stage in which firms evaluate their pricing strategies and the stage in which they actually have to implement the price change. Indeed, price changes are only slightly less frequent than price reviews.

Among the alternative explanations advocated by the theoretical literature to explain nominal price rigidity, three are ranked highest by the firms interviewed: explicit contracts, tacit collusive behaviour²⁴ and the perception of the temporary nature of the shock.²⁵

In reviewing their prices firms mostly follow state-dependent rules or a combination of time and state-dependent ones. This evidence differs from that found for the US and the UK, where time-dependent rules prevail.

Prices respond asymmetrically to shocks, depending on the direction of the adjustment (positive *vs* negative) and the source of the shock (demand *vs* supply). This asymmetry is affected by variety of factors, some of which are related to the degree of real rigidity – i.e. the competitive structure of the market, the relationships with customers, the shape of the firm's marginal cost curve. Cost shocks impact more when prices have to be raised than when they have to be reduced, while demand decreases are more likely to induce a price change than demand increases.

²⁴ This is consistent with the importance firms attribute to rival prices in their price-setting strategies, especially industrial firms.

²⁵ The same theories were ranked in the top five places in terms of importance in the surveys conducted in the US, the UK and Sweden.

Appendix A - The questionnaire

Preliminary remarks

- The answers must refer to year 2002
- If your firm produces (or sells) more goods or services, the answers, where explicitly stated, must refer to the "main product (or service)". For instance, if the firm produces (or sells) several types of hats and shoes, by "product" we mean "hats" and "shoes" (irrespective of the specific type), whereas by "main product" we mean the one which in 2002 generated the highest turnover.

SECTION A - GENERAL INFORMATION ON THE MARKET IN WHICH THE FIRM OPERATES	
A1. How many products does your firm produce (or sell)?..... _____	
A2. What is your "main product"?..... _____	
A3. What is the percentage of turnover due to your "main product"?..... __ __ __ %	
A4. What is the most important market (in terms of turnover) for your "main product"? (please tick only one answer)	<ul style="list-style-type: none"> • Italian market: <ul style="list-style-type: none"> "Local" market <input type="checkbox"/> "National" market <input type="checkbox"/> • Other euro area countries <input type="checkbox"/> • Countries outside the euro area..... <input type="checkbox"/>
A5. If you sell your "main product" abroad, what is the percentage of your turnover due to exports?	<ul style="list-style-type: none"> • __ __ __ % • I do not know, I do not want to answer <input type="checkbox"/>
A6. With reference to your "main product" and the <u>Italian</u> market, your firm is, in terms of market share (if you sell your "main product" only on the "local" market, please refer the answer to it): (please tick only one answer)	<ul style="list-style-type: none"> • The first firm <input type="checkbox"/> • One of the first 4 firms <input type="checkbox"/> • One of the first 10 firms <input type="checkbox"/> • Not among the first 10 firms..... <input type="checkbox"/> • I do not know, I do not want to answer <input type="checkbox"/>
A7. With reference to your "main product" and the <u>Italian</u> market, could you indicate the <u>number of your competitors</u> (if you sell your main product only on the "local" market, please refer the answer to it)? (please tick only one answer)	<ul style="list-style-type: none"> • None..... <input type="checkbox"/> • < 5 <input type="checkbox"/> • Between 5 and 20 <input type="checkbox"/> • > 20..... <input type="checkbox"/> • I do not know, I do not want to answer <input type="checkbox"/>

A8. In what percentage the turnover generated by your "main product" is due to sales to:	
i) Other firms	<input type="text"/> %
ii) Consumers, through large retailers.....	<input type="text"/> %
iii) Consumers, through your own distribution network or through a network under your control	<input type="text"/> %
iv) Consumers, through small retailers.....	<input type="text"/> %
v) Consumers through other channels (e.g. catalogues, internet, etc.)	<input type="text"/> %
vi) Public Administration.....	<input type="text"/> %
Total <input type="text"/> %	
A9. With reference to your "main product", are the relationships with your customers mostly of a long-term nature (i.e. longer than 1 year) or occasional? (please tick only 1 answer for <u>each</u> type of customer)	
• Other firms (including those belonging to the retail sector):	
i) Long-term	<input type="checkbox"/>
ii) Occasional.....	<input type="checkbox"/>
• Consumers (only for firms which sell their products directly to the public):	
iii) Long-term	<input type="checkbox"/>
iv) Occasional	<input type="checkbox"/>
A10. With reference to your "main product" and moving from a normal level of production, how do your unit variable costs (costs of labour and of other inputs) change when there is an increase in the level of production? (please tick only 1 answer)	
• Large increase.....	<input type="checkbox"/>
• Moderate increase.....	<input type="checkbox"/>
• Unchanged.....	<input type="checkbox"/>
• Moderate decrease.....	<input type="checkbox"/>
• Large decrease	<input type="checkbox"/>

SECTION B - THE DETERMINANTS OF THE PRICE LEVEL	
B1. The actual price of your "main product" is: (please tick at most 2 answers)	
• The same for all customers.....	<input type="checkbox"/>
• Differentiated according to the quantity which is sold	<input type="checkbox"/>
• Decided case by case	<input type="checkbox"/>
• I do not know, I do not want to answer	<input type="checkbox"/>
B2. How do you normally set the price of your "main product"?	
• A mark-up is applied to unit variable costs (cost of labour and cost of the other inputs).....	<input type="checkbox"/>
• The price is regulated.....	<input type="checkbox"/>
• Other (please specify)	<input type="checkbox"/>
• I do not know, I do not want to answer	<input type="checkbox"/>
B3. How different would the price of your "main product" be if you did not have any competitor on your market?	
• Unchanged.....	<input type="checkbox"/>
• Slightly different.....	<input type="checkbox"/>
• Fairly different.....	<input type="checkbox"/>
• Very different	<input type="checkbox"/>
B4. If you decided to increase the price of your "main product" by 10%, <i>ceteris paribus</i> (in particular assuming that the prices set by your competitors remain unchanged) by what percentage would the demand for your "main product" fall?	
<input type="text"/> %	
<input type="checkbox"/> I do not know	

SECTION C - PRICE ADJUSTMENTS

C.1 Under normal conditions the price of your "main product" is reviewed (without necessarily being changed):

In response to "specific events "

- Changes in costs ☐
- Changes in demand..... ☐
- Other (please specify)..... ☐

Periodically

- Daily ☐
- Weekly ☐
- Monthly ☐
- Quarterly ☐
- Yearly..... ☐

C.2 Once you have decided that it is necessary to change the price of your "main product", which of the factors listed below might lead to a delay in the actual price change?

(please attribute the degree of importance to each answer by choosing one of the following four options:

1 = unimportant; 2 = of minor importance; 3 = important; 4 = very important)

C2.1 The fear that competing firms will not adjust their price..... ☐

C2.2 The fear that subsequently you will need to modify the price in the opposite direction..... ☐

C2.3 The presence of a contract which states conditions (including price) that can be changed only when the contract is re-negotiated..... ☐

C2.4 The price is set at "attractive" thresholds (e.g. 4.99 euro instead of 5.00) and it is changed only when it is convenient to move to a new attractive threshold..... ☐

C2.5 The presence of high costs of changing prices (printing new catalogues, physical costs of adjusting price tags, etc)..... ☐

C2.6 Bureaucratic rigidities (e.g., the need to inform trade associations of the new price) ☐

C2.7 Other (please specify if possible) ☐

C.3 Is it possible that the price of your "main product" is below your unit variable costs?

Yes.... ☐

No... ☐

C.4 If the answer to the previous question is "yes", for how many months would you be willing to accept a price level below unit variable costs?

__ Months

☐ I do not know

C.5 In 2001 how many times did you actually change the price of your "main product"?

__ times

☐ I do not know

C.6 And in 2002?

__ times

☐ I do not know

SECTION D – THE ASYMMETRIES

D.1 Which factors would be likely to cause an increase in the price of your "main product"?

(please attribute the degree of importance to each answer by choosing one of the following four options:

1 = unimportant; 2 = of minor importance;
3 = important; 4 = very important)

- An increase in the cost of labour ☐
- An increase in the cost of raw materials... ☐
- An increase in financial costs ☐
- A rise in demand..... ☐
- Price increase by one or more competitors..... ☐
- Other (please specify)..... ☐

D.2 If demand for your "main product" increased, before you had raised the price level, would you first consider:

- An extension in delivery time
Yes.... ☐
No... ☐
- Changing the level of stocks
Yes.... ☐
No... ☐

D.3 Which factors would be likely to cause a decrease in the price of your "main product"?

(please attribute the degree of importance to each answer by choosing one of the following four options:

1 = unimportant; 2 = of minor importance;
3 = important; 4 = very important)

- A decrease in the cost of labour ☐
- A decrease in the cost of raw materials... ☐
- A decrease in financial costs ☐
- A decrease in demand..... ☐
- Price decrease by one or more competitors..... ☐
- Other (please specify)..... ☐

D.4 If you were about to decrease the price of your "main product", would you fear that customers might assume that you had reduced its quality?

(please tick only 1 answer)

- Yes.... ☐
No... ☐
I do not know... ☐

Appendix B – The survey: some details

The survey was carried out by a private firm (Questlab S.r.l.) from 30 January to 26 March 2003. The initial sample provided by the Bank of Italy was composed of 729 firms, which were extracted from the list of firms used by the Bank for the quarterly survey of inflation expectations. The sample was stratified according to firm size and geographical area, as described in Table B1.

Table B1 - The sample

	Population	Respondents	Weights
Stratum			
North-west, < 199 employees	6409	37	3.80
North-west, 200-999 employees	1434	67	0.47
North-west, > 999 employees	229	27	0.19
North-east, < 199 employees	3500	35	2.20
North-east, 200-999 employees	546	38	0.32
North-east, > 999 employees	69	14	0.11
Centre, < 199 employees	2125	19	2.46
Centre, 200-999 employees	424	30	0.31
Centre, > 999 employees	77	12	0.14
South-islands, < 199 employees	1620	22	1.62
South-islands, 200-999 employees	271	28	0.21
South-islands, > 999 employees	34	4	0.19
Total	16745	333	1

Most companies (89% of the initial sample) were contacted by e-mail (the rest by fax; Table B2); on that occasion firms received a login and a password to compile the questionnaire directly on a web-site (www.questlab.it). The firms that did not have an e-mail address were contacted by fax. A “call centre” was available to firms requiring additional information on how to complete the questionnaire. Firms were also contacted by telephone to make sure they would participate in the survey.

Table B2 – Actions

	<i>Total</i>	<i>Average for firm (1)</i>
E-mails sent	2113	3.2
Faxes sent	127	1.6
Phone-calls	2927	4.0

Notes: ⁽¹⁾ Computed with reference to the initial number of firms (729).

Table B3 – Firms contacted and respondents

	<i>N° firms</i>	<i>Percentages</i>
Respondents	333	45.7
Non-respondents	396	54.3
<i>Not suitable for this type of questionnaire</i>	46	6.2
<i>Not available to provide an answer now, but willing to do so in the future</i>	132	18.1
<i>Explicit refusal</i>	21	2.9
<i>Firms that did not answer at all</i>	197	27.0
Firms contacted	729	100.0

A few weeks before the start of the survey, the questionnaire was pre-tested on a pilot sample of around 20 firms. This step provided useful indications on how to carry out the survey and how to adjust a few questions.

The number of firms that agreed to complete the questionnaire was 333, 45.7% of the initial sample. This response rate is not high, but it can be considered acceptable for such a complex survey. Analysing the characteristics of the firms that agreed to participate, we note that the questionnaire was better suited for manufacturing firms, particularly those operating in the food and energy sectors (for these sectors the response rate increases to around 50%); by contrast, the questionnaire was not so suitable for companies in the service sector. We believe that the main reason is that it was less easy for these firms to identify their main product and define the pricing strategy related to it. The response rate decreases to around 40% for firms operating in retail and services. On the basis of the comments sent by firms which chose not to participate in the survey and the questions that were raised, we noticed that compiling the questionnaire caused some difficulties in the following cases:

- ❑ Retail firms: difficulties identifying the main product. It would have been better to refer to categories of products;
- ❑ Service firms: difficulties identifying the main service;
- ❑ Firms producing several goods, which had difficulty identifying the main product on the basis of turnover;
- ❑ Firms with one customer, which do not have their own pricing strategy;
- ❑ Branches of foreign firms, which do not have their own pricing strategy;
- ❑ Firms subject to price controls (example: water, gas and electricity), which do not have their own autonomous pricing strategy;
- ❑ Firms selling their products/services by public tender: the rules followed to fix prices are different from market pricing strategies.

Not all the above situations were considered in detail when the sample was constructed. The consequences were:

- Large self-selection by firms, confirmed by the number of firms that were “not suitable” (46 events/cases) or “not available” for this questionnaire (132 events/cases; Table B3). This last figure is higher than in other surveys.
- Some firms answered only partially.

To avoid these problems it would have been better to add an initial section on the firm’s activity to check whether it had its own pricing strategy. On the basis of this assessment, the firm could then have decided whether or not to fill in the questionnaire.

Treatment of missing answers

Since the questionnaires proposed via web and via fax have the same characteristics, no automatic filter was inserted for compilation.

If all the answers to one question were blank or the answer presented some degree of uncertainty, the respondents were contacted by telephone, but if only one answer was missing no action was taken. In general, few corrections were made *ex post* because usually the respondents occupied a high position in their firms.

Appendix C – Significance tests of sectoral differences

The following tables report results of tests for the significance of pairwise sectoral differences. The figures contained in the tables are the p-values related to the null hypothesis H0: sectoral differences are not significant (those outlined in bold are rejections).

The tests were performed by regressing the dependent variable on five sectoral dummies (without constant) and subsequently testing, on a pairwise basis, the hypothesis of equality of the coefficients of such dummies.

Table C3 - What is the most important market (in terms of turnover) for your “main product”?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.00	0.79	0.02
Retail		-	0.09	0.82	0.11
Other services			-	1.00	0.54
Construction				-	1.00
Food					-

Table C4 – On the domestic market your firm is:					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.22	0.01	0.00	0.29
Retail		-	0.01	0.00	0.18
Other services			-	0.00	0.40
Construction				-	0.00
Food					-

Table C5 – On the domestic market, could you indicate the number of your competitors?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.34	1.00	0.00
Retail		-	0.00	1.00	0.04
Other services			-	1.00	0.00
Construction				-	1.00
Food					-

Table C6 – Relationships with <u>firms</u>:					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.03	0.07	0.00	0.49
Retail		-	0.45	0.00	0.21
Other services			-	0.00	0.38
Construction				-	0.00
Food					-

Table C6 – Relationships with <u>consumers</u>:					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl. Food	-	0.55	0.65	n.a.	0.09
Retail		-	0.32	n.a.	0.12
Other services			-	n.a.	0.07
Construction				-	
Food					-

Table C7 – How do your unit variable costs change when there is an increase in the level of production?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.02	0.95	0.24
Retail		-	0.11	0.56	0.00
Other services			-	0.37	0.01
Construction				-	0.98
Food					-

Table C8 – The price of your “main product” is:					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.00	0.00	0.02
Retail		-	0.00	0.00	0.05
Other services			-	0.00	0.03
Construction				-	0.00
Food					-

Table C9 – How do you normally set the price of your “main product”?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.07	1.00	0.05
Retail		-	0.17	1.00	0.07
Other services			-	1.00	0.18
Construction				-	1.00
Food					-

Table C10 – How different would the price of your “main product” be if you did not have any competitor on your market?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.01	0.00	0.13
Retail		-	0.41	0.00	0.20
Other services			-	0.00	0.03
Construction				-	0.00
Food					-

Table C11 – By what percentage would the demand for your main product fall if you increased its price by 10%?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.55	0.13	0.11	0.33
Retail		-	0.10	0.08	0.23
Other services			-	0.33	0.75
Construction				-	0.26
Food					-

Table C12 – Under normal conditions, the price of your "main product" is reviewed:					
In response to “specific events”					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.31	0.02	0.53
Retail		-	0.14	0.12	0.21
Other services			-	0.10	0.69
Construction				-	0.07
Food					-
Periodically					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.74	0.05	1.00	0.00
Retail		-	0.26	1.00	0.14
Other services			-	1.00	0.49
Construction				-	0.00
Food					-

Table C13 – How many times did you actually change the price of your “main product” in 2002?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.97	0.45	0.98	0.18
Retail		-	0.57	0.97	0.27
Other services			-	0.82	0.10
Construction				-	0.13
Food					-

Table C14 – Is it possible that the price of your “main product” is below your unit variable costs?					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.34	0.00	0.56	0.08
Retail		-	0.10	0.44	0.48
Other services			-	0.26	0.43
Construction				-	0.35
Food					-

Table C16 – Which of the factors listed below might lead to a delay in the actual price change?					
The fear that competing firms will not adjust their selling price					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.70	0.05	0.33	n.a.
Retail		-	0.06	0.42	n.a.
Other services			-	0.11	n.a.
Construction				-	n.a.
Food					-
The fear that subsequently you will need to modify the price in the opposite direction					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.44	0.65	0.22	n.a.
Retail		-	0.33	0.19	n.a.
Other services			-	0.25	n.a.
Construction				-	n.a.
Food					-
The presence of a contract which states conditions that can be changed only when the contract is re-negotiated					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.01	n.a.	0.37
Retail		-	0.00	n.a.	0.00
Other services			-	n.a.	0.25
Construction				-	n.a.
Food					-
The price is set at “attractive” threshold and it is changed only when it is convenient to move to a new one					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.00	0.62	0.50	n.a.
Retail		-	0.00	0.35	n.a.
Other services			-	0.63	n.a.
Construction				-	n.a.
Food					-
The presence of high costs of changing prices contract is re-negotiated					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.08	0.66	n.a.	0.21
Retail		-	0.29	n.a.	0.74
Other services			-	n.a.	0.49
Construction				-	n.a.
Food					-
Bureaucratic rigidities					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.07	0.31	n.a.	0.00
Retail		-	0.03	n.a.	0.28
Other services			-	n.a.	0.00
Construction				-	n.a.
Food					-

Table C18 – If demand for “your main product” increased, before you raise the price the price level, would you first consider

An extension in delivery time					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.95	0.03	1.00	0.11
Retail		-	0.07	1.00	0.19
Other services			-	1.00	0.66
Construction				-	1.00
Food					-
Changing the level of stocks					
	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl. Food	-	0.74	0.00	0.28	0.40
Retail		-	0.00	0.27	0.67
Other services			-	0.10	0.01
Construction				-	0.24
Food					-

Table C19 – If you were about to decrease the price of your “main product”, would you fear that customers might assume that you had reduced its quality?

	Manufacturing	Retail	Other services	Construction	Food
Manufacturing excl.food	-	0.32	0.24	0.03	0.01
Retail		-	0.11	0.01	0.01
Other services			-	0.11	0.23
Construction				-	0.30
Food					-

Appendix D – Variables used in the econometric exercise

Dependent variables	
<i>Pud</i>	= 1 if an increase in demand has an impact on price that is either “important” or “very important” = 0 elsewhere
<i>Pld</i>	= 1 if a decrease in demand has an impact on price that is either “important” or “very important” = 0 elsewhere
<i>Puc</i>	= 1 if an increase in costs (cost of labour and cost of raw materials) has an impact on price that is either “important” or “very important” = 0 elsewhere
<i>Plc</i>	= 1 if a decrease in costs (cost of labour and cost of raw materials) has an impact on price that is either “important” or “very important” = 0 elsewhere
Independent variables	
Foreign market	
<i>Exp_share</i>	= 1 if the firm’s percentage turnover due to exports is > 40% (question A5) = 0 elsewhere
<i>Ext_mkt</i>	= 1 if the foreign market is the most important for the firm (question A4) = 0 elsewhere
Competitive pressure	
<i>Mkt_shr</i>	4 dummies that capture whether the firm, on the domestic market, is the first, one of the first 4, one of the first 10, not among the first 10 firms (question A6).
<i>Rivals</i>	4 dummies which capture the reported number of the firm’s competitors: none, less than 5, between 5 and 20, more than 20 (question A7).
<i>Comp_press</i>	dummy equal to 1 if the firm reports that its price would be rather different or very different if there were no competitors on its market (question B3), 0 otherwise
Relationships with customers	
<i>Customer</i>	= 1 if more than 60% of turnover generated by the main product is sold to other firms (question A8) = 0 elsewhere
<i>Price_discr</i>	= 1 if the price is the same for all customers (question B1) = 0 elsewhere
<i>Price_reg</i>	= 1 if the price is regulated (question B2) = 0 elsewhere
Marginal costs	
<i>MC</i>	= 1 if marginal costs are constant (question A10) = 0 elsewhere
Control variables	
<i>Area</i>	4 dummies that capture whether the firm is located in the North-west (<i>North-west</i>), in the North-east (<i>North-east</i>), in Centre (<i>Centre</i>) or in the South (<i>South</i>).
<i>Size</i>	3 dummies that capture whether the firm has up to 199 employees, between 200 and 999 employees, or more than 999 employees.
<i>Sector</i>	5 dummies that capture whether the firm’s activity is classified as manufacturing, retail, other services, food or construction industry.

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