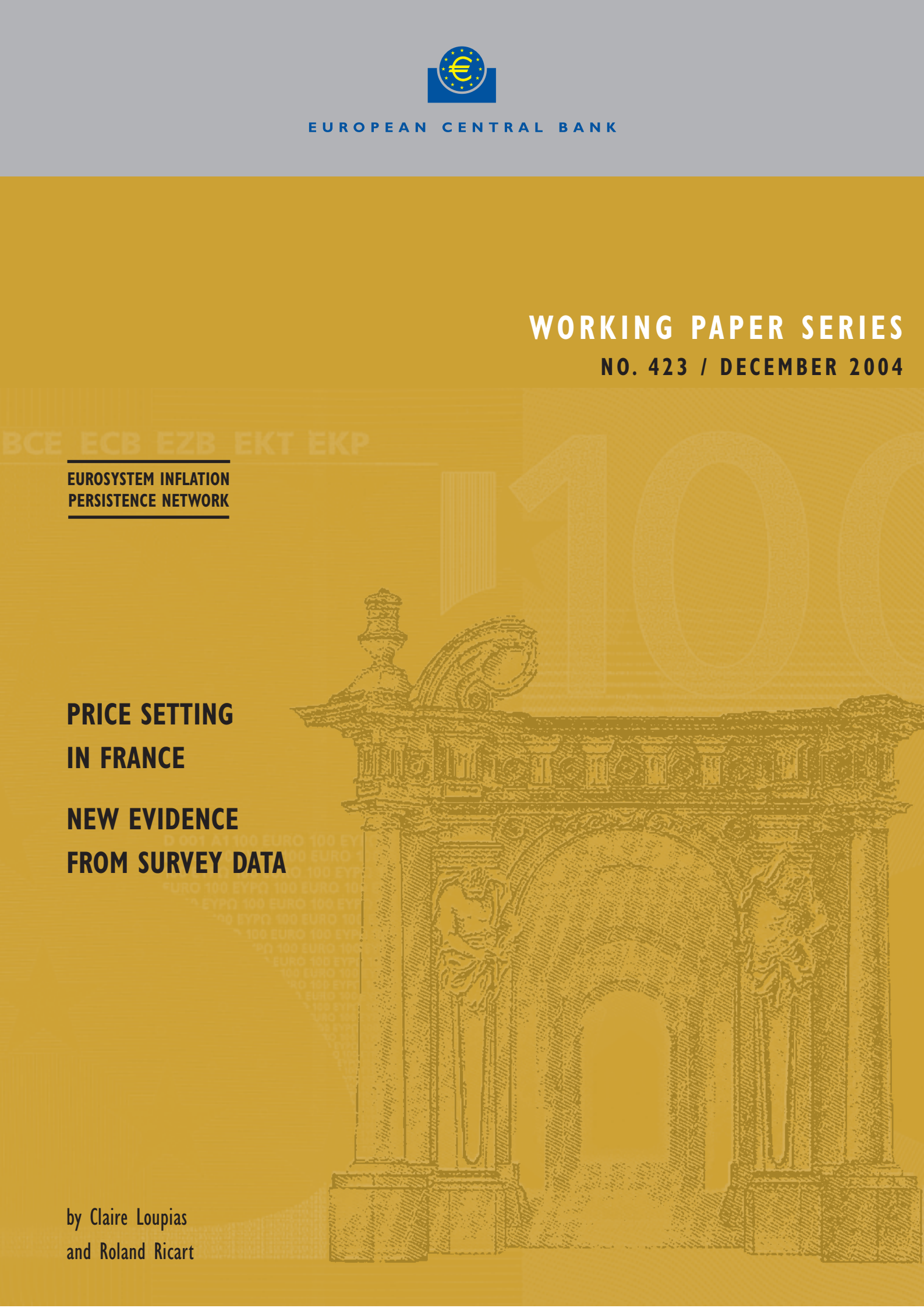

EUROPEAN CENTRAL BANK

WORKING PAPER SERIES
NO. 423 / DECEMBER 2004

EUROSYSTEM INFLATION PERSISTENCE NETWORK

PRICE SETTING IN FRANCE

NEW EVIDENCE FROM SURVEY DATA

by Claire Loupias
and Roland Ricart

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NEW EVIDENCE FROM SURVEY DATA [1]

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and Roland Ricart [3]

In 2004 all publications will carry a motif taken from the €100 banknote.

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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; Stephen Cecchetti (Brandeis University), 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), Stephen Cecchetti, Silvia Fabiani, 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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CONTENTS

Abstract 4
Non-technical summary 5
1 Introduction 7
2 The survey 8
3 Market structure, type of customers, and costs 9
3.1 Market structure 10
3.2 Type of customers 10
3.3 Marginal cost function shape 11
4 Price setting 12
5 Price adjustment 13
5.1 Price reviews are more frequent than price changes 14
5.2 Price responses to shocks 15
5.2.a Different answers to shocks 16
5.2.b Response to shocks and frequency of price reviews 17
5.3 Time-dependent versus state-dependent pricing rules 19
5.3.a Relative proportions of time-dependent and state-dependent pricing rules 19
5.3.b The endogeneity of time-pricing rules 21
5.4 Individual price changes are quite huge 22
6 Why are prices sticky? Ratings of the theories by decision makers 24
7 Asymmetries 25
7.1 Percentage of firms changing their price in 2003 and magnitude in price changes 25
7.2 Asymmetries in responses to shocks 26
7.2.a Asymmetries in the answers to shocks 27
7.2.b Asymmetries in the speed of adjustment 28
7.3 Asymmetries in the ratings of the theories 28
7.4 Why do firms change their prices? More details 29
8 Conclusions 32
Appendices 33
References 41
Tables 43
European Central Bank working paper series 64

Abstract

This paper reports the results of a survey conducted by the Banque de France during Winter 2003-2004 to investigate the price-setting behavior of French manufacturing companies.

Prices are found to adjust infrequently; the median firm modifies its price only once a year. Price reviews are more frequent than price changes; the median firm reviews its price quarterly. Firms are found to follow either time-dependent, state-dependent or both pricing rules. Moreover, the chosen interval of price reviews depends on the probability that changes in the firms' environment occur.

Coordination failure and nominal contracts (either written or implicit) are the most important sources of price stickiness, while pricing thresholds and physical menu costs appear to be totally unimportant.

Asymmetries in price stickiness are found to be different for cost shocks compared to demand shocks: prices are more rigid downward than upward for cost shocks, while the reverse is true for demand shocks.

Keywords: price rigidity, price-setting behavior, inflation persistence, survey data.

JEL classification: E31, D40, L11.

Non-technical summary

This paper reports the results of a survey conducted by the Banque de France during Winter 2003-2004 to investigate the price-setting behavior of French manufacturing companies.

Prices are found to adjust infrequently; the first quartile and the median firms modify their price only once a year. The third quartile twice. Price reviews are more frequent than price changes. Among firms reviewing their price on a regular basis, the first quartile firm reviews its price monthly, the median firm quarterly and the third quartile firm yearly.

10 to 20% of the firms have not faced at least one of the four shocks considered (increased/decreased demand/cost shocks) within the last two years. 17% to 28% of the firms facing one of these shocks are not able at all to modify their price. The global ability to respond to shocks, that is independently of the speed of adjustment, does not seem to depend on the frequency of price reviews. When firms respond to shocks, price adjustment speed increases with the frequency of price reviews.

Our attempt to compute the proportion of firms following either time-dependent, state-dependent, or both pricing rules leads to the following figures : 39% of the firms follow time-dependent pricing rules, whereas 6% use state-dependent rules, and 55% use both. To classify firms between those following time-dependent and those following state-dependent pricing rules was a hard task, because more than half of them seem to use both rules, even thus the previous mentioned rules could appear to be contradictory from a simple theoretical point of view. In fact, it seems that the time length between price reviews is endogenous to the variability of the firms' environment. Time-dependent rules can than be viewed as the result of the optimization of a state-dependent rule under a predictable environment.

Three theories of price stickiness have a high ranking: cost-based pricing, coordination failure and nominal contracts. In the middle comes a group of four theories that earn "average" grades: implicit contracts, temporary shocks, demand shocks, and the number of competitors as an indicator of competitive pressures. Three theories are in the bottom group: pricing thresholds, the explanation that mix inventories and delivery delays, and costly price adjustment (mainly seen as menu costs). These results are broadly in line of those obtained by other surveys.

Individual price changes over the year 2003 are huge compared to the aggregate IPPI increase: -5% (+3%) for the median decrease (increase), as against 0.3% for the IPPI. Price increases are more likely (70%) than price decreases (30%) among price changes. The magnitude of positive price changes over the year 2003 (+3% for the median increase) is lower than the one of negative price changes (-5%). Thus, the IPPI growth rate observed in manufacturing reflects the higher frequency of price increases compared to price decreases, and not the higher magnitude of price increases compared to price decreases.

Asymmetries are found to be different for cost shocks compared to demand shocks: prices are more rigid downward than upward for cost shocks, while the reverse is true for demand shocks (prices are more rigid upward than downward).

1 Introduction

The interest in building better micro foundations to macroeconomic behavior in general, and price stickiness in particular, has dramatically increased recently (see Taylor (1999) and Woodford (2003) for a synthesis, and among others, Whelan (2004) and Mash (2004), as examples of recent attempts).

However, the microeconomic evidence on pricing behavior has been rather limited thus far—mainly due to a lack of data, despite the need to establish the form of pricing rules supported by the micro data. Given the very few studies using data on individual companies, Blinder et al. (1998) investigated price-setting by asking directly to decision makers why they do not change their prices more often. Other recent survey research on pricing has been conducted by Hall et al. (2000) for the U.K., and Apel et al. (2001) for Sweden.

Many economists are reluctant to use the interview method mainly for two reasons. First, responses may be terribly sensitive to the precise wording of the questions, and second, interviewees may have no incentive to respond truthfully or thoughtfully. But it is very uneasy to test theories of price rigidities with traditional econometric tools. Indeed, these theories all predict that prices adjust less rapidly than some unmeasured Walrasian benchmark and often rely on variables that are unmeasurable themselves. So it is quite impossible to distinguish among price stickiness theories with traditional methods. The survey approach has the advantage to allow to ask directly to decision makers why they do not adjust their price faster in response to shocks, and thus to provide a useful complement to more traditional tools.

Following this approach, the eurosystem has decided to devote a large part of its « Inflation Persistence Network » research program to investigate price-setting behavior in most of the euro-area countries (Austria, Belgium, France, Germany, Italy, Luxembourg, The Netherlands, Portugal, and Spain). Each country has designed and conducted a survey on a national basis, but with a large degree of comparability with other euro-area countries. Survey results are already available for Austria in Kwapil et al (2004), Italy in Fabiani et al (2004), and the Netherlands in Hoeberichts and Stokman (2004).

This paper reports the results of the survey conducted by the branches of the Banque de France during Winter 2003-2004 to investigate the price-setting behavior of French manufacturing companies.[4] It drew on the surveys already available in September 2003.[5] The paper is organized as follows. Section 2 presents the survey. In section 3, we present results regarding the market structure, the type of customers, and the type of costs faced by manufacturing firms. Section 4 and 5 examine respectively price setting and price adjustment behaviors. Section 6 is devoted to the ratings of price stickiness theories by decision makers. Section 7 examines the role of asymmetries. Section 8 concludes.

2 The survey

The survey was carried out by the Survey Division of the Banque de France, with the collaboration of local branches, during Winter 2003-2004.

The population belonging to the original sample was the same as that listed by the Banque de France for the manufacturing monthly business survey (around 4300 firms). This population mostly consists of firms with more than 20 employees, from all over France and all types of manufacture. Firms were allowed to answer either by phone, in face-to-face interviews, or by phone and mail, depending on their preferences and the organization of the local Banque de France's branch which was collecting the answers. More than 10% of the firms answered the questionnaire during a face-to-face interview as against less than 25% during a phone interview. For a given questionnaire, the proportion of questions with no answer is significantly lower when a face-to-face interview is conducted compared to a phone or mixed procedure. Questionnaires were mainly answered by CEO or CFO. 1662 firms answered the questionnaire, thus the global response rate was around 40%. Details by manufacture, size and geographical area are given in table 2.1. Differences in the response rate were quite limited but it is worth noticing that the response rate declines with the size of firms. At the local level, relationship between medium size firms and Banque de France's branches are closer than with larger firms.

[4] Other results for France for other aspects of the IPN research program can be found in Baudry et al. (2004) and Bilke (2004).

[5] Blinder et al. (1998), Hall et al. (2000), Appel et al. (2001), and Fabiani et al. (2004).

All statistics computed are weighted following the two steps procedure applied for the monthly business survey. At the first step, individual answers are aggregated around 250 product groups of the four-digit Nace industry code using number of employees by firms as weight. For the second step, product groups are aggregated using value added as weight. Usually, individual firms behavior have a mild impact on results for total industry. Nevertheless, when we study below the break down of total industry, biggest firms can play an important role. In this respect, results for motor vehicles must be analyzed with caution.

As in Blinder et al., the questionnaire (see Appendix A) includes a variety of factual information about the company, such as its size, how often it changes prices, to whom it sells, and so on (Questions 1 to 8, 12 and 17). Contrary to Blinder et al., we do not take it for granted that almost all firms in the manufacturing industry are price makers rather than price takers (Question 9). Special emphasis is devoted to the issues of price reviews and price adjustments (Questions 10, 11, 15 and 16). Ten theories of sticky prices were selected for testing (Questions 13 and 14).

The survey refers to the firms' "main product", defined as the one that generated the highest turnover in 2003. The decision to focus on the main product is in the line of what has been done by Apel et al. (2001) for Sweden and by Fabiani et al. (2004) for Italy. For 70% of the responding firms the share of the main product is quite large: more than 40% of turnover (see table 2.2). Therefore, despite a very few exceptions, the main product was easy to identify.

3 Market structure, type of customers, and costs

If one wants to know more about price stickiness one has to compare « stickiness » to some price adjustment process within a Walrasian benchmark world. In the usual textbook model, firms are supposed to act in a purely competitive market and to produce with an increasing marginal cost technology. When some of these assumptions are not verified anymore, real rigidities get involved in the price adjustment process. We examine below the answers to questions about market structure, the type of customers, and the marginal cost function shape.

3.1 Market structure

In a purely competitive world, firms are supposed to be atomistic and to have no market power. For this to be true, the number of competitors must be large enough on the national market as well as on the foreign market. That is why firms were asked whether or not they were selling their main product mainly in France, and to how many competitors they were confronted to on the French market.

Firms participating in the survey sell their product mainly in France, with the exception of the motor-vehicle industry for which the most important market is the euro area (see table 3.1.a, for more details). As regards to competition, 8% of the firms have no competitor at all, 13% of them have one or two, 24% three or four, 30% five to ten, 9% eleven to 20, and 11% more than 20. Some discrepancies exist across types of goods. More than 70% of firms in the motor-vehicle industry have 5 to 10 competitors, as against around 25% for other sectors ; almost 15% of the firms have no competitors at all in the capital goods sector (see table 3.1.b. for more details).

These figures are not consistent at all with the assumption of atomistic firms, as more than ¾ of them have less than 10 competitors. So firms have plenty of opportunities to use some kind of market power (depending on the market structure: monopoly, oligopoly, or monopolistic competition).

3.2 Type of customers

When considering continuously price adjustment, one has in mind auction markets for commodities or financial instruments. To distinguish markets with infrequent price changes from the previous ones, Okun (1981) used the term “Customer markets”. In this case, continuous price adjustment for market-clearing leaves place to long term relationships with customers. For example, firms may trade off the gains from charging monopoly premia against the benefits of encouraging repeat purchases. These relationships are supposed to depend on the type of customers. That is why firms were asked to whom they are mainly selling their products. Most sales are made to other businesses rather than to consumers. 55%

of firms sell their product mainly to other firms (15% working as subcontractors and 40% selling their product on an usual way), as against 25% to consumers (see table 3.2 for more details). Discrepancies exist among sectors. Of course, the sector with the fewer direct sales to consumers is the intermediate good sector with 12% of the sales to consumers. Apart motor vehicles coming far before others with 65% of sales directly to consumers[6] the type of good the most sold directly to consumers is food.

3.3 Marginal cost function shape

In the usual theoretical framework, marginal costs are supposed to be increasing. This is a necessary condition to get increasing supply curves under the assumption of profit maximization. If marginal costs are constant, the firms' supply curves are constant too, and the supply elasticity to prices is infinite. Thus, shifts in demand are supposed to lead to variations in the quantity produced but not in prices. Constant marginal costs are thus, another source of price rigidity. That is why we tried to learn more about firms' costs. Unfortunately, it is very hard to question firms about their marginal costs. First, this concept is too complicated to be explained in layman's words, and second it is quite hard to compute. Thus, firms were asked about their unit variable costs. The question was "How do your unit variable costs change when there is an increase in the level of production?". 36% of firms answered that their unit variable cost is constant, thus indirectly that their marginal cost is constant. Surprisingly, there is almost no discrepancies among sectors, if one except the "motor vehicles" line, which must be analyzed with caution due to the concentration of this sector, and the weak response rate for larger firms to the whole questionnaire in general and to this question in particular (see table 3.3 for more details).

Keeping these elements in mind, we turn now to the description of the price-setting process.

[6] Remember that this sector is very concentrated, so this line must be taken with cautious, and that the share of individual cars in value added is very important.

4 Price setting

Price-setting is analyzed from three points of view: the way firms take into account price market competition in setting their price (question 9), the way they use price discrimination (question 6), and the proportion of them that incorporate expectations when setting their current price (question 11).

The underpinning idea of the proposed answers to question 9 was that a firm using a mark-up rule should have some market power and not set its price at its marginal cost. Regarding market power no clear-cut answer emerges from the survey at the first sight. The proportion of firms applying a mark-up rule upon unit variable cost reaches 37%, as against 35% for firms saying that they are price takers (see table 4.1). The analyze of the answer 'other'—17% of the firms—and comments provided show first that a large proportion of 'other' is related either to price-setter or price-taker behavior. Second, comments point to a large range of practices including: price is fully set by customers (negotiated annually or decided on a case by case basis); price is fixed for several years with an indexation rule; price is the result of an open market procedure; price is defined as an internal sale price to firms that belong to the same group; price depends on marketing or strategic policy.

If a rule exists for setting price it is only a guide line, because most of the firms have a rather pragmatic behavior regarding commercial transactions. Indeed, only 19% of the firms charge the same price to all the customers (see table 4.2), and the bulk of firms decide their price on case-by-case basis (49%). Nevertheless, 26% of the firms discriminate prices according to a quantity rule.

Against this background it is worth noticing that, when setting their price, more than 60% of the firms take into account that the next price adjustment can only occur after a certain period of time.

5 Price adjustment

In this section we try to assess how firms adjust their price in responses to shocks. The theoretical literature mainly considers two types of behaviors: time-dependent and state-dependent pricing rules. Time-dependent models, either with deterministic, Taylor (1980), or stochastic, Calvo (1983), process of price change, assume that firms can not freely modify their prices at anytime in response to shocks, contrary to state-dependent models in which firms are allowed to change their prices as soon as necessary.[7]

Thus, as long as information gathering and price changes are costless, state-dependent pricing models assume that firms continuously review their prices in order to modify them instantaneously in response to shocks. In a world with some information gathering costs, continuous price reviews become "frequent" price reviews. And if price changes are costly, price changes are not instantaneous any more but happen only when prices get sufficiently "out of line". Nevertheless, as in a state-dependent pricing rule world firms want to be aware of shocks, in order to react as fast as possible, price reviews must be a lot more frequent than price changes. Schematically, on the opposite, in a time-dependent pricing rule world, firms only change their price infrequently, but on a periodic basis, as they are not able to change their prices as soon as they would need to respond to shocks. As a consequence, state-dependent pricing rules are supposed to lead to frequent small price changes, and time-dependent pricing rules to periodic infrequent large price changes. How frequent price changes are in a state-dependent model is supposed to depend on the shape of the adjustment cost function. Lump-sum costs (menu costs) are supposed to lead to not so frequent and not so small price changes as convex cost (Rotemberg (1982)) functions.

The four next sub-sections try to add some empirical evidence to this classification. We first compare frequency of price reviews and changes. Second, we report results about the ability of firms to respond to shocks. Third, we try to infer from the first two sub-sections whether or not firms are following state-dependent pricing rules. Some comments about the magnitude of price changes are given in sub-section 4.

[7] See for instance, Sheshinski and Weiss (1977).

5.1 price reviews are more frequent than price changes

Prices are found to adjust infrequently; the first quartile and the median firms modify the price of their main product only once a year, and the third quartile twice. Price reviews are more frequent than price changes. Among firms reviewing their price on a regular basis, the first quartile firm reviews its price monthly, the median firm quarterly and the third quartile firm yearly. Details are given below.

Most of the firms have reported reviewing the price of their main product on a regular basis (see table 5.1.1): only 8% of them have no usual frequency to review their prices. 80% of the firms review their price at least once a year, 43% at least quarterly, 47% at least twice a year, and 25% at least monthly.[8] Among the firms reviewing their price on a regular basis, the median firm reviews its price quarterly in France. This is also the case in Austria and in the Netherlands.[9]

Despite these quite frequent reviews, price changes are not that numerous (see table 5.1.2). If one discards the 25% non available answers, around 20% of firms did not change their price in 2003, around 45% changed it once and 20% twice. So the median French manufacturing firm changed its price only once in 2003. This was also the case for the median firm in Austria, Belgium, Italy and the Netherlands.[10] On average French firms changed their price 1.7 time in 2003, thus the implicit duration of price was 7 months.[11]

Price reviews then appear to be more frequent than price changes.

[8] These figures are reported on the line « Cumulative total ».

[9] In Italy and Belgium the median firm reviews its price only once a year.

[10] The reference year is not exactly 2003 for all countries.

[11] This figure is simply the inverse of 1.7 multiplied by 12. One can not compute the average of implicit duration by firm as a lot of number of price changes are equal to zero. These 7 months are not strictly comparable to the 5 months obtained by Baudry et al. (2004) from the consumption price index for two reasons: the period is not the same and the survey on price-setting behavior includes manufacturing producer prices.

The cross table between price reviews and price changes is given in table 5.1.3. 55% of the firms reviewing their price yearly have changed their price once, 22% have kept their price unchanged, and unexpectedly 7% have changed it twice. 44% of those reviewing their price twice a year have changed their price twice, 37% once, and 8% have not modified their price at all. Only 11% of the firms reviewing their price four times a year have changed it between 3 and 6 times during the year. And only 7% of the firms reviewing their price monthly have changed it more than 7 times[12]. 17% of the firms (at least[13]) that review their price daily have changed their price only once in 2003.

Another interesting feature is that firms that have no usual frequency of price review do not change their price more often than the average (see table 5.1.3). One could have thought that if they report to have no usual frequency, it was because they were reviewing their price on a more state dependent basis.[14] It seems that this is not the case (see below). On the contrary, firms answering "other" to question 10 on frequency of price reviews change their price more often than the average, and specify that they are reviewing their price on a case by case basis. So it seems that they review their price on a state-dependent basis.

5.2 Price responses to shocks

10 to 20% of the firms have not faced at least one of the four shocks considered (increased/decreased demand/cost shocks) within the last two years. 17% to 28% of the firms facing one of these shocks are not able at all to modify their price. The global ability to respond to shocks, that is independently of the speed of adjustment, does not seem to depend on the frequency of price reviews. When firms respond to shocks, price adjustment speed increases with the frequency of price reviews. The context and some explanations about these facts are given below.

[12] Note that the frequency of the non available answers is 25% in this last case.

[13] Remember that 27.9% of the firms did not answer, but probably those who did not answer are the one with quite a lot of price changes.

[14] This is the assumption made by Blinder et al. (1998).

As price reviews are more frequent than price changes, firms are gathering a lot of information, which does not necessarily induce a price change.[15] This is consistent with one of the two following facts: either nothing significant happens or firms can not change their price as often as they want to. To document these points, we examine responses to question 15 and 16. Question 15 (resp. 16) is "Usually, in the event of a major and lasting change in your environment (resp. unit variable production costs), do you modify the price of your main product? ». The answering alternatives to questions 15 and 16 were mutually exclusive. Firms were asked to tick either 'yes' (in this case they should provided the reaction delay either 'shorter than 1 month', 'within 1 and 3 months' or 'more than 3 months'), 'only partly' (in this case the reaction delay was not specified), 'no', or 'this situation has not arisen during the last two years'. The exact wording on the questionnaire was not 'only partly', but 'with difficulty'; but it was clear from the accompanying note to the questionnaire that firms should tick this answer only if they *could not* respond *fully* to shocks. The first next sub-section examines the different proportions of each answers to question 15 and 16.

As firms do not have always the possibility to modify their price in the case of a major and lasting change in their environment or their unit variable costs, we try in the second sub-section to establish whether or not the probability to change prices and the speed of adjustment are independent of the timing of price reviews. To get an idea, responses to questions about the possibility to modify prices (questions 15 and 16) are crossed with questions on the timing of price reviews (question 10).

5.2.a Different answers to shocks

To respond to shocks, one has to face shocks

One can infer from tables 5.2.a.1 and 5.2.a.2, that nothing significant has happened to roughly 10 to 20% of the firms[16], depending on the nature of the shock, within the last two years.[17]

[15] Zbaracki et al. (2003) find that information gathering costs account for 7.8% of the total cost of price adjustment.

[16] Discarding the non available answers.

[17] We do not have any other information about the frequency of demand or cost shocks in the survey.

Not all firms are able to respond to shocks

If one assumes that firms face significant shocks, 17% to 28%[18] of them, depending on the nature of the shock, do not modify their prices (see tables 5.2.a.1 and 5.2.a.2).[19] We are then left with 72% to 83% of firms that are able to change their price at some point, but often with a delay.

Heterogeneity in the speed of adjustment

When firms fully respond to shocks, around 30% of the firms do it with a delay longer than three months in the case of a demand shock. More than 50% of the firms respond with a delay longer than three months in the case of a cost shock.[20]

5.2.b Response to shocks and frequency of price reviews

Answers to question 15 and 16 examined in paragraph 5.2.a.1 and 5.2.a.2 are now crossed with the frequency of price reviews, obtained from question 10, in tables 5.2.b.1 and 5.2.b.2. We examine the crossed answers in the same order than the direct answers in paragraph 5.2.a.

The frequency of price reviews increases with the probability that shocks occur

Our comments focus on the line "This situation has not arisen during the last two years", that is on firms for which the examined type of shocks has not occurred in a recent past. The frequency of price reviews is found to decrease with the probability that no shocks occur. For instance, in the case of "lower demand or increased competition", 23% of the firms reviewing their price once a year have not faced this kind of shock within the last two years, as against respectively 13, 11, 6 and 2% for the firms reviewing their price twice a year, quarterly, monthly, and weekly (see table 5.2.b.1). This phenomenon is also true for increased demand

[18] This figures are computed discarding N.A. and 'this situation has not arisen during the last two years'.

[19] Kwapil et al. (2004) report that the fraction of Austrian firms holding their price constant, depending on the nature of the shock, is included between 8% (for large cost-push shock) and 63% (for large positive demand shocks).

[20] In the case of Austria, Kwapil et al (2004) report that the mean lag to respond to shocks is roughly 4 months. Details on asymmetries are discussed below.

and cost shocks (see table 5.2.b.2). As the percentage of firms not facing shocks decreases with the frequency of price reviews, one can infer that the percentage of firms facing the considered shocks increases with the frequency of price reviews. As the relation we are interested in is the other way round, we have also computed the repartition of the frequency of price reviews among those answering that the situation has not arisen during the last two years by type of shock (see table 5.2.b.3).

Despite the lack of further information on the shocks faced by firms, we can argue that the chosen interval of price reviews depends on the probability that changes in the firms' environment occur. [21] In other words, the length of time interval between price reviews is partly chosen accounting for the variability of the state of the economy the firms are confronted to. Thus, it is partly endogenous.

Final response to shocks does not depend on the frequency of price reviews

We focus on the percentage of firms answering they do not respond to shocks at all, that is the line "no" in tables 5.2.b.1 and 5.2.b.2). For instance, in the case of "lower demand or increased competition", the proportion of firms answering "no" conditionally on the fact that they are reviewing their price weekly, monthly, quarterly or twice a year are 2.2, 19.8, 6.3, and 31.3. So there is no monotone relation between the frequency of price reviews and the probability to change prices.[22] The fact that the probability to respond to shocks (regardless of the delay) does not depend on the frequency of price reviews sounds reasonable ; firms have to react at some point, otherwise they go bankrupt.

Price adjustment speed increases with the frequency of price reviews

The probability of a firm to adjust its price quickly increases with the frequency of price reviews. For instance, in the case of "lower demand or increased competition", only 4% of firms reviewing their price twice a year are able to modify their price within a month, as

[21] For instance, the firm could have to face a demand or cost shock.

[22] We thus implicitly assumed that the line "only partly » could be added to the line « Yes». One can not find any monotone relation either when adding this line to the line « No ». Dropping the column « twice a year » that has been created ex-post, do not change anything either.

against respectively 4, 15, and 62% for the firms reviewing their price quarterly, monthly, and weekly (see table 5.2.b.1). This phenomena is also true for increased demand and cost shocks (see table 5.2.b.2).

Unexpectedly, 4 to 11% of the firms change their price faster than they review their price in response to a major and lasting change in their environment[23], depending on the type of shock.

As far as the firms that do not report reviewing their price on a periodic basis are concerned, it seems that the firms answering "no usual frequency" have more difficulty to change their price than the average. They react less than the average, and thus are not state-dependent. But firms answering "other" change their price quite easily, which is consistent with the fact that they specify setting their price on a case-by-case basis, and thus are state-dependent.

5.3 Time-dependent versus state-dependent pricing rules

This sub-section has two goals. First, we try to classify firms in three categories: the one following both time and state-dependent pricing rules, those following mainly state-dependent rules, and those following time-dependent pricing rules only. Second, we try to understand whether or not there exists a link between time and state-dependent pricing rules.

5.3.a Relative proportions of time-dependent and state-dependent pricing rules

Our attempt to compute the proportion of firms following either time-dependent, state-dependent, or both pricing rules leads to the following figures : 39% of the firms follow time-dependent pricing rules, whereas 6% use state-dependent rules, and 55% use both. Fabiani et al. (2004) report that 40% of the Italian firms adopt time-dependent rules, as against 14% which use state-dependent rules, and 46% which use both state and time-dependent pricing strategies. Kwapil et al. (2004) report respectively the following shares for Austria, 41%, 27%, and 32%. The shares reported for Belgium in Aucremanne and Druant (2004) are respectively 26%, 34%, and 40%, and the ones for the Netherlands reported in Hoeberichts and Stokman (2004) are 36%, 46%, and 18%. Hall et al (1997) obtain that in the U.K. time-dependent pricing is more common than state dependent pricing, with 79% of the respondents reporting that they review their prices at a specific frequency, as against 11% of companies

[23] These figures are computed by adding the number of firms reviewing their price quarterly and reacting with a delay shorter than one month, and those reviewing their price either twice a year, yearly, or over one year and reacting with a delay shorter than 3 months.

that review their prices 'in response to a particular event' and 10% that operate both time and state-dependent pricing.

Computing theses figures for France was very uneasy, because our questionnaire was not asking directly to firms whether, under normal conditions, they were reviewing their price on a regular basis or in response to specific events. They were asked, question 10, "In general, how often do you review the price of your main product (without necessarily changing it)?", and question 15 (and 16), "Usually, in the event of a major and lasting change in your environment (unit variable production costs), do you have the possibility of altering the price of your main product?". We used the crossed tables 5.2.b.1 and 5.2.b.2 to construct the above mentioned figures.

It is generally admitted that state-dependent firms are supposed to review their price continuously or at least very frequently. Blinder et al. (1998) argue that firms that change prices less often than every fourth price review should be viewed as pursuing state-dependent pricing strategies instead of time-dependent rules. Apel et al. (2001) argue that firms reviewing their prices daily check their prices often enough to be considered as state-dependent. If one looks at table 5.2.b.1 in the case of a lower demand for instance, one can notice that 37% to 78% of the firms reviewing their price at least quarterly are able to change their price within 3 months in responses to lower demand shocks, as against only 17% to 19% of firms reviewing their price at most twice a year. As things are quite similar for the three other types of shocks, we will consider the firms reviewing their price at least quarterly as both time and state-dependent.[24] Firms reviewing their price at most twice a year are considered as time-dependent only, except when they report being able to modify their price within 3 months in the event of a major and lasting change in their environment.
Firms answering "other" to question 10, are considered as purely state-dependent as they mostly set their price on a case-by-case basis.

Firms answering "no usual frequency" to question 10, are discarded along with the "non available answers" to this question. Indeed, contrary to what was assumed by Blinder et al. (1998), these firms are not state-dependent. As they do not review their price on a regular basis either, we do not know anything about them.

[24] As we have seen in section 5.2.b price adjustment speed increases with the frequency of price reviews.

Applying this "methodology", the share of firms considered as purely time-dependent drops to 39%[25] (from 81% of the firms reporting reviewing their price on a regular basis). In Blinder et al. (1998), the fraction with meaningful periodic price reviews declines from 60% to 40% of the total when they remove firms that change prices less often than every fourth review and those reporting that they change prices more often than they have price reviews. Applying Blinder's "methodology" instead of ours would have given a share of 50% of "pure" time dependent firms instead of 39%.

5.3.b The endogeneity of time-pricing rules

In the previous paragraph, we have tried to classify firms between those following time-dependent and those following state-dependent pricing rules. It was a hard task, because more than half of them seem to use both rules, even thus the previous mentioned rules could appear to be contradictory from a simple theoretical point of view. In this paragraph, we use the results from paragraph 5.2.b to asses that the two rules are linked together. In fact, it seems that the time length between price reviews is endogenous to the variability of their environment. Time-dependent rules can than be viewed as the result of the optimization of a state-dependent rule under a predictable environment.[26] Details are given below.

It has been pointed at in paragraph 5.2.b that the length of time interval between price reviews is partly chosen accounting for the variability of the state of the economy the firms are confronted to, and thus is partly endogenous. This statement on the length of time interval between price reviews is consistent with the following two facts observed by Apel et al. (2001) in Sweden. First, Swedish firms report that one major explanation for not reviewing prices more often is that "factors influencing the price do not change often enough to motivate more frequent price reviews".[27] Second, under normal conditions, state and time-dependent price setting rules are of more or less equal importance in Sweden, but when significant events occur, 21% of the firms that normally follow a time-dependent pricing rule shift to state-dependent pricing, making in this case state-dependent pricing rules a lot more common than time dependent rules (69% against 23%) . The results obtained for Sweden are consistent

[25] This is the average figure computed from the four figures obtained from the four types of shocks. The differences among the shocks are quite small.

[26] Sheshinski and Weiss (1977) and Sheshinski and Weiss (1983) provide examples of state dependent optimization under inflation that results in fixed intervals of constant duration during which the nominal price is fixed.

[27] The other main explanation they report is that « price could not change more often without disturbing customer relations ».

with the fact that the time length between time reviews is optimized on a state-dependent basis conditional on the fact that the state of the economy is "normal".

5.4 Individual price changes are quite huge

Individual price changes over the year 2003 are huge compared to the aggregate IPPI increase: -5% (+3%) for the median decrease (increase), as against 0.3% for the IPPI.

Table 5.4.1 reports the percentage of firms changing their price and the magnitude of price changes over the year 2003. As the magnitude is known only between the beginning and the end of the year, we consider only the price change between January and December 2003. The last column documents the evolution of the French Industrial Production Price Index by type of good in 2003 for reference purposes.

Discrepancies exist among types of goods: the magnitude is the highest for capital goods and the lowest for motor vehicles.

The total price change over the year increases with the number of price changes but not smoothly (see table 5.4.2): the total magnitude of price changes is higher for one price change compared to 2, but lower for 1 or 2 price changes compared to 3 to 12.

If one assumes that all the price changes within a year for one firm are of the same sign, one can compute the average magnitude of price changes per firm in 2003 (see the last row in table 5.4.2). The first (third) quartile of the average magnitude of price increases (decreases) is +1% (-2%). Obviously, these figures are smaller than the total price changes, but their magnitude is still sizable compared to the average inflation rate for 2003 (+0.3%).

There is a considerable degree of heterogeneity in the price-setting behavior depending on the type of good (see table 5.4.1). This applies both to the decisions to change prices and the magnitude of price changes. This contrasts with the considerable homogeneity in the rates of

price changes by type of product obtained by Dias et al. (2004) for Portugal. As far as decisions to change prices are concerned, prices for intermediate goods change more frequently in France than those for consumer goods, contrary to what is observed for Portugal by Dias et al. (2004). This might be due to the fact that intermediate goods are sold to firms and not to households. Firms are probably less afraid to 'antagonize' other firms with price variations as they can explain to them why these variations are justified.[28] Zbaracki et al. (2003) studying managerial and customer costs of price adjustment using data from a large U.S. industrial manufacturer and its customers offer qualitative evidence of customer 'antagonization' cost. This is consistent with the fact that price changes at intermediate level are not passed on to customers.

This large magnitude of price changes would argue in favor of menu cost (such as, Mankiw (1985)) against quadratic adjustment costs (such as, Rotemberg (1982)). However, we'll see below that the menu cost theory is not supported at all by decision makers. Zbaracki et al. (2003) studying a 8000-product manufacturing firm find that cost adjustments are the sum of three types of costs: menu, managerial, and customer costs. Their relative weights in total price adjustment are respectively 4%, 23% and 73% ; menu costs are not found to be convex, while many components of managerial and customer costs are. This should lead to small and numerous price changes. But the firm they studied follows a once-a-year price adjustment policy despite ample opportunities to change prices at other times during the year. The firms' managers report that pricing activities are deeply embedded in existing social structure, and that customers would not stand more than one price change per year.[29] It seems thus, that this firm has to deal with convex costs under a once-a-year price adjustment constraint. This would be consistent with our data: large infrequent changes despite a very bad grade to the menu cost theory.

We turn now to more theoretical explanations of price stickiness.

[28] Rotemberg (2002) develops a model were consumers care about the fairness of prices and react negatively only when they become convinced that prices are unfair.

[29] In Blinder et al. (1998), the first reason given by respondents for not changing prices more frequently than what they do is that 'it would antagonize or cause difficulties for their customers'.

6 Why are prices sticky? Ratings of the theories by decision makers

The main goal of the survey is to find out which theories of price stickiness are validated by decision makers. We started from Blinder's list.[30] A few adjustments were made. Following Blinder (1994), six theories were chosen directly out of his twelve theories list, namely, nominal contracts, implicit contracts, pricing points, cost-based pricing, costs of price adjustment, and coordination failure. Two others were examined but in the same package: inventories and delivery lags. Four theories of the one listed by Blinder were discarded: hierarchical delays, judging quality by price, procyclical elasticity, and constant marginal cost. The first one was discarded in order to save time and because we did not feel it was really important. The second one was not kept because the survey department thought it was unfair to ask firms whether price reductions were due to a reduction in quality. The third one was discarded because it was deemed too complicated to explain in short plain French and so was the last one because firms were asked about their marginal cost[31] elsewhere in the survey. Despite the survey was not asking directly about procyclical elasticity, a question was added about the consequences of a shock in demand. Along the same lines, another question was added about the consequences of a variation in the number of competitors. The latter was supposed to capture the degree of market competitiveness and the consequence of a shock in the aggregate supply.

These ten theories were embodied in two set of questions: Q13 and Q14, which were phrased in two different ways. The first one asked whether several of the theories would induce a price change and the second one whether other theories[32] would deter a price change. Respondents were asked to code the responses on the following four-point scale:

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

This scale is roughly the same as that used in Blinder et al. (1998).

[30] See Blinder (1994), Blinder et al. (1998), and Hall et al. (1997) for a brief description of these theories.

[31] It turns out in the end that firms answered on the basis of their average unit variable cost and not on the basis of their marginal cost.

[32] The question about coordination failure was an exception and phrased twice.

Following Blinder et al. (1998) we compare the average ratings accorded to each of the ten tested theories.[33]

Table 6.1 ranks the theories by mean scores. Three theories have a high ranking: cost-based pricing, coordination failure and nominal contracts. In the middle comes a group of four theories that earn "average" grades: implicit contracts, temporary shocks, demand shocks, and the number of competitors as an indicator of competitive pressures. Three theories are in the bottom group: pricing thresholds, the explanation that mix inventories and delivery delays, and costly price adjustment (mainly seen as menu costs). These results are broadly in line of those obtained by other surveys (see table 6.2).

Differences in the rating of the theories by type of goods, while occasionally present, are typically not large and thus are not reported. Asymmetries in the rating of the theories are discussed below (§ 7.3).

7 Asymmetries

Asymmetries are studied from four points of view: first, the percentage of firms changing their price in 2003 and magnitude in price changes, second, the opportunity to change prices in response to four types of shocks—increase/decrease in demand/costs, third, reasons of these changes (ratings of the theories) and fourth, the differences induced by firms' characteristics, market structure and so on in the responses to shocks.

7.1 Percentage of firms changing their price in 2003 and magnitude in price changes

Price increases are more likely than price decreases: price increases account for around 70 % of total changes (see table 5.4.2). The magnitude of positive price changes is lower than the one of negative price changes: +3% for the median increase and –5% for the median decrease

[33] As pointed by Blinder one has to keep in mind that a plausible standard of excellence would be an average rating of 3.0—which is equivalent to half the firms rating the theory as "of minor importance" and half rating it as "very important". On the low end, an average score of 1.0 would mean that every single respondent totally rejected the theory. So it is perhaps more useful to think of the likely range of survey results not as going from 4.0 to 1.0, but rather from a top score of 3.0 for a wonderful theory to 1.5 for a disastrous one.

all over the year 2003. Thus, the IPPI growth rate observed in manufacturing reflects the higher frequency of price increases compared to price decreases, and not the higher magnitude of price increases compared to price decreases.

Hoeberichts and Stokman (2004) report that in the Netherlands price increases are also more frequent than price decreases (price increases account for 65% of total changes in manufacturing as against 35% for price decreases), and that the median decrease (-10%) is twice as large as the median increase (+5%) for manufacturing in 2003.

The results for France even obtained by a different technique (survey instead of IPPI), on a different period (2003 instead of 1995:1-2001:1) may also be compared to those obtained by Dias et al. (2004) for Portugal[34]. In their case, the 70%-30% rule of positive-negative price changes turns to a 60%-40% rule[35], and the magnitudes of positive and negative price changes are the same. Inflation is thus also the result of more frequent, positive price changes compared to negative ones.

The figures from the 2003 French survey on price-setting in manufacturing can also be compared to the figures obtained by Baudry et al. (2004) from the price records used for computing the French CPI from 1994:7 to 2003:2. Increases account for 60% of total changes, as against 40% for decreases. The magnitude of the median increase (+4%) is also smaller than the one of the median decrease (-5%).

7.2 Asymmetries in responses to shocks

Survey respondents were also asked to specify whether or not they were able to change their price in the case of a major and lasting event, and if yes how long after the shock. Prices are found to be more rigid downward than upward in the case of cost shocks. The opposite is true, for demand shocks (prices are more rigid upward than downward). When firms respond to shocks, they react faster to a demand decrease compared to an increase. There is no evidence that firms respond faster to positive cost shocks than to negative ones. Firms are found to react faster to *demand* shocks compared to *cost* shocks. Details are given below.

[34] Their computations are on a monthly basis and not on annual basis.

[35] The gap for consumer goods and intermediate goods is smaller as the ratios of price increases computed from the French survey data are respectively 63 and 64%.

7.2.a Asymmetries in the answers to shocks

To allow comparisons in the frequency of price changes, we restrict our analysis to the firms who have faced the four type of shocks considered (increase/decrease in demand/costs) during the last two years, in order to have the same sample of firms in each case.

We are left with 963 observations (see table 7.2.a). Our comments first focus on the line "Yes, changes are reported on prices". It seems more necessary to change prices when demand is lowering than increasing: more firms change their prices when they face a decrease compared to an increase in demand (+1.2 points).[36] This is the other way round for costs. It seems a lot more frequent to change prices when costs are increasing: many more firms change their prices when they face higher costs compared to lower costs (+8.4 points). Comparison among types of shocks is uneasy. It seems that the share of firms that modify their price in response to shocks is the highest for increasing cost shocks (82% of the firms respond at least partly), and the lowest for decreasing cost shocks (73% of the firms respond). In the middle come the share of firms that modify their price in response to negative (78% of response) and positive (77% of response) demand shocks.[37] Kwapil et al. (2004) report that 63% and 52% of the firms hold their price constant in response to respectively large positive and negative demand shocks (thus, 37% and 48% of the firms respond to demand shocks). Furthermore, 8% and 38% of Austrian firms hold their prices constant in the case of large increasing and decreasing cost shocks (thus, 92% and 62% respond to cost shocks). So, Austrian firms react more to cost shocks than to demand shocks.

It is hard to comment on the amplitude of answers to shocks. When they respond to shocks firms seem to respond more fully in the case of lower demand (80 % of full responses in the total of responses), than in the case of increased demand (72%). Things are the same for cost shocks, firms respond more fully in the case of negative cost shocks (72%) as against positive cost shocks (59%).

[36] The equality of the two coefficients is statistically rejected at the 5% level.
[37] The equality of all these coefficients on apair-wise basis is statistically rejected at the 5% level.

7.2.b Asymmetries in the speed of adjustment

To allow comparisons between the speed of adjustment, we restrict our analysis to the firms that answered that they were able to change prices in response to the four type of shocks.

Unfortunately, we are left with only 335 firms, and they cover only 55 % of the manufacturing sector.[38] Results are given in Table 7.2.b. Firms react faster to a decrease in demand (37.2% of the firms react within one month) than to an increase (34.7%).[39] There is no evidence that firms react faster to an increase in cost than to a decrease.[40] Contrarily to us, Kwapil et al. (2004) find no evidence that in the case of large demand shocks Austrian firms react faster to a decrease in demand than to an increase.[41] However, they find evidence that Austrian firms react faster to an increase in costs than to a decrease.[42]

Blinder (1994) does not find any evidence, on the U.S., that firms respond more rapidly to cost shocks than to demand shocks. This is also the case in Kwapil et al. (2004) for Austria.[43] In France, manufacturing firms are found to respond more rapidly to *demand* shocks than to *cost* shocks. If one considers shocks that lead to an increase in prices, 68% of the firms react within three months, as long as they react, for an increased demand, as against 61 % for a higher cost. These figures are respectively 72% and 61% in the case of negative shocks that lead to a decrease in price.

7.3 Asymmetries in the ratings of the theories

Two of the upper grade theories, despite the fact that they perform very well both to explain rigidity upwards and downwards, offer asymmetries in their rating (see table 6.1). Cost-based pricing theories (as far as intermediate commodity prices and labor costs are concerned) offer

[38] This is not quite unexpected, since one can expect that a lot of manufactures are not subject to contradictory lasting changes in their environment/production costs within two years.

[39] The equality of these two coefficients is statistically rejected at the 1% level.

[40] The equality of coefficients on a pair-wise basis is not statistically rejected.

[41] Differences in the mean lags are not significant.

[42] In this case the equality of the mean lags is rejected at the 1% level.

[43] In fact, they find that firms react significantly faster to cost increases than to demand increases, and significantly faster to demand decreases than to cost decreases.

even better explanations of price increases than price decreases.[44] As far as productivity is concerned, an increase in productivity is more likely to lead to a decrease in prices than a decrease in productivity might explain a price increase.

Asymmetries in the ratings of coordination failures are mostly due to the phrasing of the questionnaire. When firms are asked "Does an increase/decrease in the price offered by your competitors would induce you to raise/lower the price of your main product?", the answer is yes with an higher grade in the case of price decreases. When firms are asked "Is the risk that your competitors will not adjust their price might deter you from adjusting your price?", the answer is yes with an higher grade in the case of price increases compared to decreases. One can notice also the higher grade in the case of a price decrease (2.3) compared to an increase (2.0) for the line "demand shocks". Here appears again a recurrent result of this survey: prices are more rigid downwards than upwards for cost shocks, whereas it is the other way round for demand shocks.

7.4 Why do firms change their prices? More details.

In this section we try to determine which factors might increase the probability to change prices in reaction to a demand or labor cost shock. The empirical model is very simple, and directly follows the analysis presented in Small and Yates (1999) and Fabiani et al. (2004). Kwapil et al. (2004) also present similar estimations for Austria.

The model tries to explain why firms consider that an increase (decrease) in labor cost or demand is a reason to raise (lower) the price of their main product. Four dummies (0,1) are created (from question 13) to capture the probability that firms would raise or lower prices in response to a change in demand or labor costs (*pud*, *pld*, *puc*, *plc*). See appendix B for more details.

Five kinds of explanations are considered: the degree of market competition, the type of customer relationship, the cost structure, the existence of public price regulation schemes and the exposition to foreign markets. The degree of market competition is measured by 4 dummies: *Rivals_none*, *Rivals_5*, *Rivals_20*, and *Rivals_more_than_20*, constructed from question 3, and measuring the fact that the firm has no competitors at all, less than 5, between

[44] The phrasing of these theories was rather tautological as firms were not asked about lags.

5 and 20, or more than 20. Relationships with customers are summarized by 2 dummies: *Customer_firms* and *Price_no_discr*. The first one measures whether or not more than 60% of the turnover generated by the main product is sold to other firms (question 4), and the second one if the price is the same for all customers (question 6). Regulation of market price is measured by *Price_reg* which is equal to 1 if the price is regulated (question 9). The dummy for cost structure, *MC*, captures whether or not the marginal cost is constant (question 8). The impact of "pricing to market" on price stickiness is measured by two different measures of the exposition to foreign market: *Ext_mkt* and *Exp_share*. The first dummy equals 1 if foreign markets are the most important for the firm and the second one if the firm's export turnover is higher than 40%. These two almost tautological variables come from two different parts of the questionnaire (preliminary requirements and question 2) and so do not integrate exactly the same information.

Finally, we decided to control for the type of manufacture (5 dummies), the size (6 dummies constructed from the number of employees) and the geographical area (5 dummies) of the firm.

Six regressions are run. One for each of the four explained variables mentioned above: price response to a positive/negative demand/cost shocks, and two pooled regressions (with either negative or positive shocks) on demand and costs. In these last two cases, a dummy is introduced to identify whether or not the shock is positive. In order to get comparative results we run our regressions on a common sample. Due to missing values we are left with only 882 observations. Probit estimates are given in tables 7.4.a to 7.4.c.

Our main results are the following. First, market structure affects price stickiness. The variable measuring that a firm is in competition with less than 5 firms (*Rivals_5*) significantly reduces the likelihood that prices will rise (decrease) in response to an increase (decrease) in demand. This result also holds, as expected, when demand shocks are pooled. This result is consistent with the results obtained by Small and Yates (1999) for the U.K. and by Fabiani et al (2004) for Italy[45], and Kwapil et al (2004) for Austria.[46] If we look at the regressions

[45] In their case, the significant variable is *comp_press*: a dummy which equals to 1 if the firm reports that its price would be rather different or very different if there were no competitors on its market.

[46] In their case the variable comp: a dummy that takes on the value unity if a firm has at least five competitors is significantly positive.

concerning the responsiveness of prices to a change in costs, we find that market structure matters only in the case of a positive shock (*Rivals_5* and *Rivals_20* are both significant). It was not significant or 'wrongly' signed in the case of the U.K., and not significant either in the case of Austria. In Italy, to be the leader on the market decreases the probability to change prices in response to a cost shock (either positive or negative).

Second, the variable indicating whether firms consider their marginal cost is flat (MC) does not significantly affect the likelihood that prices will rise (decrease) in response to an increase (decrease) in demand. This is also the case in Austria for large demand shocks. It was significantly negatively signed for an increase in demand in U.K. and Italy.

Third, the type of customers and the pricing strategy by type of customers modify price stickiness in the following way. In France, non-price discrimination (dummy *Price_no_discr*) decreases the probability to change prices in response to a demand shock (either positive or negative) but the type of customer (dummy *Customer_firms*) has no impact on price changes. In Italy, the variable *Price_no_discr* is not significant, while the variable *Customer_firms* increases the probability to change price in response to an increase in demand. As far as cost shocks (either positive or negative) are concerned, the fact that customers are mainly firms (dummy *Customer_firms*) decreases the probability to change prices in France. In Italy, *Price_no_discr* increases the probability to change prices only in the case of a negative cost shock. This variable is not included in the Austrian estimations.

Fourth, Price regulation (*Price_reg*) decreases the probability to change prices in response to a cost shock (either positive or negative), and price regulation has no impact in the case of a demand shock (the dummy *Price_reg* is not significant).

Fifth, "pricing to market" has an impact on price stickiness. To have its main market on foreign markets (*Ext_mkt*) increases the probability to raise prices in response to a rise in demand, but not when demand falls (neither *Ext_mkt* nor *Exp_share* is significant). It is significant at the 1% level for an increased demand in the case of Austria and at the 10% level in the case of a decrease. This phenomenon is not significant for both demand shocks in Italy. The fact that the firm's export turnover is more than 40% (*Exp_share)* increases the

probability to change prices in response to a cost shock (either positive or negative). This is the opposite of what is obtained for U.K., where the share of exportations decreases the probability to change prices in response to a rise or a decrease in costs. The dummy *Ext_mkt* is not significant in the case of a fall in costs but significantly negative when costs rise. So this last effect probably offsets part of the previous one. The dummy *Ext_mkt* is significantly negative for both cost shocks in Italy and not significant in Austria.

Results obtained with the pooled regressions confirm descriptive statistics given in section 7.2.a.: whereas a demand increase is significantly less likely to induce a price response than a demand decrease, a cost increase is significantly more likely to induce a price change than a cost decrease. These results are consistent with those obtained for U.K. and Italy.

8. Conclusions

This paper reports the results of a survey conducted by the Banque de France during Winter 2003-2004 to investigate the price-setting behavior of French manufacturing companies.

Prices are found to adjust infrequently; the median firm modifies its price only once a year. Price reviews are more frequent than price changes; among firms reviewing their price on a regular basis, the median firm reviews its price quarterly. Firms are found to follow either time-dependent, state-dependent or both pricing rules. Moreover, the chosen interval of price reviews depends on the probability that changes in the firms' environment occur. Thus, it is partly endogenous.

Coordination failure and nominal contracts (either written or implicit) are the most important sources of price stickiness, while pricing thresholds and physical menu costs appear to be totally unimportant.

Asymmetries in price stickiness are found to be different for cost shocks compared to demand shocks: prices are more rigid downward than upward for cost shocks, while the reverse is true for demand shocks.

This paper has provided some useful qualitative and quantitative information about the microeconomic behavior of decision makers. Despite the fact that survey respondents were asked only about their own behavior and not about their macroeconomic consequences, this should lead to a better understanding of macroeconomic phenomena since this study improves the knowledge of microfoundations of macroeconomic price adjustments. For instance, the

fact that 60 to 70% of the firms that adjust their price in response to cost or demand shocks do it within 3 months, suggest that a simple macroeconomic model with a one-quarter lag in price-setting may serve as a baseline case.

The results from this survey have also allowed us to built a unique dataset for France, which leaves plenty of opportunities for further econometric investigations. For instance, the score of each price-stickiness theory (e.g. explicit or implicit contracts) could be explained by firms' characteristics.

Appendix A – The questionnaire

Cf. next page

|_|_|_|_|_____
Branch number and name

BANQUE DE FRANCE
EUROSYSTÈME

(To be returned to the BDF by January the 12th at the latest)

COMPANY NAME |_____

FUNCTION OF RESPONDENT |_____

TURN OVER OUT OF TAX (thousands of euros) |_|_|_|_|_|_|_|_|_|,0

SHARE OF EXPORTS IN TURNOVER (in %) |_|_|_|,0 %

SIREN IDENTIFICATION NO. |_|_|_|_|_|_|_|_|_| If possible ESTABLISHMENT NO. |_|_|_|_|_| APE CODE |_|_|_|_|
1993 Nomenclature (NAF)

MAIN PRODUCT (in full) |_____

This questionnaire has been answered by: phone face to face interview other

1. What percentage of your turnover out of tax is accounted for by your main product?…… …… … ……|_|_|_|,0%		
	• *I do not know /I do not wish to answer … ……..*	*(9)*
2. What percentage of your turnover out of tax is generated?	• In France (incl. French overseas departments and territories)	|_|_|_|%
	• In the euro area (excl. France) ……..	|_|_|_|%
	• Outside the euro area ……..……..	|_|_|_|%
	Total	1|0|0%
	• *I do not know /I do not wish to answer ……*	*(9)*
3. On the French market and for your main product, with how many companies are you in competition? (*tick only one answer)*	• none.……..……	(1)
	• 1 to 2.……..……	(2)
	• 3 to 4.. ……..……..	(3)
	• 5 to 10……..……..……	(4)
	• 11 to 20.……..……..	(5)
	• More than 20…….	(6)
	• *I do not know /I do not wish to answer ……..*	*(9)*
4. On the French market and for your main product, what percentage of your turnover is accounted for by:	• Firms that subcontract work……..	|_|_|_|%
	• Other firms……..…….	*/_/_/_/%*
	• Consumers (via your own distribution network, retailers …)……;……	|_|_|_|%
	• General government, local authorities …..	|_|_|_|%
	• Others (Specify)…….	|_|_|_|%
	Total	1|0|0%
	• *I do not know /I do not wish to answer ……..*	*(9)*

Question 4bis. If your firm works as a subcontractor on the French market for your main product, on who's behalf is it?

(tick only one answer)

- *One firm…….* (1)
- *Between 2 and 4 firms…..* (2)
- *Between 5 and 10 firms……* (3)
- *More than 10 firms……..* (4)
- *I do not know /I do not wish to answer ……* (9)

5. What percentage of your turnover out of tax generated by your main product on the French market is derived from a long-term business relationship *(e.g. existence of a written contract)* ?

Long-term relationship with **firms**

- Share of turnover……. |_|_|_|,0% (1)
- Inapplicable to our firm……
- *I do not know /I do not wish to answer ……* (9)

(tick only one answer)

Long-term relationship with **households**

- Share of turnover…… |_|_|_|,0% (1)
- Inapplicable to our firm……..
- *I do not know /I do not wish to answer…* (9)

(tick only one answer)

6. In general, the purchase price (the price actually charged) of your main product is

(maximum two answers)

- The same for all customers……. (1)
- Differentiated according to the quantity which is sold…… (2)
- Decided case by case ……. (3)
- *I do not know /I do not wish to answer ……* (9)

7. On the French market and for your main product, what is the share, in percentage of your total cost of

(tick only one answer)

- Labor cost…… |_|_|_|,0%
- Intermediate consumption cost…… |_|_|_|,0%
- Fixed cost …… |_|_|_|,0%

Total 1|0|0%

- *I do not know /I do not wish to answer ……* (9)

8. How do your unit variable costs (costs of labor and of other inputs by unit of production) change when there is an increase in the level of production?

(tick only one answer)

- Increase…… (1)
- Unchanged…… (2)
- Decrease …… (3)
- *I do not know /I do not wish to answer ……* (9)

9. How do you usually set the price of your main product on the French market?

If several situations arise, answer for the most significant.

(tick only one answer)

- A mark-up is applied to unit variable production costs (your price is different from the price of your competitors)... (1)
- The market is very competitive and your price is the same as the one of your competitors (2)
- The price is regulated (e.g. medicines…)… (3)
- Other (please specify)……. (4)

  _____
- *I do not know /I do not wish to answer ……* (9)

10. In general, how often do you review the price of your main product (without necessarily changing it)?

The exam must be complete enough to possibly lead to a modification of price.

(tick only one answer)

- Daily…….. (1)
- Weekly…….. (2)
- Monthly…….. (3)
- Quarterly …….. (4)
- Yearly…….. (5)
- Over one year …….. (6)
- Other (specify) (7)
- No usual frequency…….. (8)
- *I do not know /I do not wish to answer … ……* *(9)*

11. In general, when you change your price, do you take into account the fact that the next price adjustment can only occur after a certain period of time?

(tick only one answer)

- Yes…….. (1)
- No…. ……... (2)
- *I do not know /I do not wish to answer …….* (9)

12. On the French market, do customers sometimes benefit from discount prices on your main product?

(several possible answers for yes)

Firms		Households	
• Yes, depending on the quantity bought	(1)	• Yes, depending on the quantity bought	(1)
• Yes, depending on the market situation	(2)	• Yes, depending on the market situation	(2)
• Yes, at certain times of the year	(3)	• Yes, at certain times of the year	(3)
• Yes, other (please specify)	(4)	• Yes, other (please specify)	(4)
• No	(5)	• No	(5)
• *I do not know /I do not wish to answer ……..*	(9)	• *I do not know /I do not wish to answer ……..*	(9)

13. Which factors, among the ones listed below, would cause you to raise/lower the price of your main product on the French market? For **each factor**, quote the relevant importance: *(1) = unimportant; (2) =of minor importance; (3) = important ; (4) = very important; (5) =this situation has not arisen during the last two years ; (9) = I do not know /I do not wish to answer;*

The quotation for each factor might be different from one column to the other.

Reasons to raise the price of your main product	Reasons to lower the price of your main product
• An increase in labor costs	• A decrease in labor costs
• An increase in intermediate commodity prices	• A decrease in intermediate commodity prices
• A decrease in productivity	• An increase in productivity
• An increase in demand	• A decrease in demand
• A stock decrease or an increase in delivery delay	• A stock increase or a decrease in delivery delay
• An increase in the price offered by your competitor(s)	• A decrease in the price offered by your competitor(s)
• A decrease in the number of your competitors	• An increase in the number of your competitors
• Other (please specify)	• Other (please specify)

14. Which factors, among the ones listed below, might deter you from adjusting the price of your main product on the French market? For **each factor**, quote the relevant importance: *(1) = unimportant; (2) =of minor importance; (3) = important ; (4) = very important; (5) =this situation has not arisen during the last two years ; (9) = I do not know /I do not wish to answer;*

The quotation for each factor might be different from one column to the other.

Reasons to decide not to raise the price of your main product

- The risk that your competitors will not adjust their price
- The risk that you will subsequently have to readjust your price in the opposite direction
- The existence of a written contract specifying that price can only be adjusted when the contract is renegotiated
- The existence of an implicit contract (regular contact with a customer without any written contract)
- A preference for maintaining price at a psychological threshold (e.g. 499 € instead of 502 €).....
- The costs generated by price adjustments (menu costs, IT costs…)……..……..
- Other (specify)

Reasons to decide not to lower the price of your main product

- The risk that your competitors will not adjust their price
- The risk that you will subsequently have to readjust your price in the opposite direction
- The existence of a written contract specifying that price can only be adjusted when the contract is renegotiated
- The existence of an implicit contract (regular contact with a customer without any written contract)
- A preference for maintaining price at a psychological threshold (e.g. 499 € instead of 494 €).....
- The costs generated by price adjustments (menu costs, IT costs…)……..……..
- Other (specify)

15. Usually, in the event of a major and lasting change in your environment (change in demand, competitive environment, etc…), do you modify the price of your main product?

Increased demand and/or lower competition

- Yes, with a delay shorter than 1 month (1)
- Yes, with a delay between 1 and 3 months (2)
- Yes, with a delay longer than 3 months (3)
- With difficulty (4)
- No (5)
- This situation has not arisen during the last two years (6)
- *I do not know /I do not wish to answer …..* *(9)*

(tick only one answer)

Lower demand and/or increased competition

- Yes, with a delay shorter than 1 month (1)
- Yes, with a delay between 1 and 3 months (2)
- Yes, with a delay longer than 3 months (3)
- With difficulty (4)
- No (5)
- This situation has not arisen during the last two years (6)
- *I do not know /I do not wish to answer ……..* *(9)*

(tick only one answer)

16. Usually, in the event of a major and lasting change in your unit variable production costs (costs of labor and of other inputs) on the French market, do you modify the price of your main product?

Lower unit production costs

- Yes, with a delay shorter than 1 month (1)
- Yes, with a delay between 1 and 3 months (2)
- Yes, with a delay longer than 3 months (3)
- With difficulty (4)
- No (5)
- This situation has not arisen during the last two years (6)
- *I do not know /I do not wish to answer ……..* *(9)*

(tick only one answer)

Higher unit production costs

- Yes, with a delay shorter than 1 month (1)
- Yes, with a delay between 1 and 3 months (2)
- Yes, with a delay longer than 3 months (3)
- With difficulty (4)
- No (5)
- This situation has not arisen during the last two years (6)
- *I do not know /I do not wish to answer ……..* *(9)*

(tick only one answer)

17. In 2003, how many times did you change the price of your main product? **Take as reference the price actually charged for a representative transaction** • *I do not know /I do not wish to answer …….. ……*	|_|_|_| times *(9)*
17bis. Between January 2003 and December 2003, what has been (will be) the variation, in percent, of the price of your main product on the French market? **Take as reference the price actually charged for a representative transaction** • *I do not know /I do not wish to answer …….. ……*	|_|_|_|,|_|% *(9)*

Appendix B – Variables used in the econometric exercise

Dependent variables

Pud	= 1	if an increase in demand has an impact on price which is either "important" or "very important"
	= 0	elsewhere
Pld	= 1	if a decrease in demand has an impact on price which is either "important" or "very important"
	= 0	elsewhere
Puc	= 1	if an increase in costs (cost of labor) has an impact on price which is either "important" or "very important"
	= 0	elsewhere
Plc	= 1	if a decrease in costs (cost of labor) has an impact on price which is either "important" or "very important"
	= 0	elsewhere
Pd	= 1	if a variation in demand has an impact on price which is either "important" or "very important"
	= 0	elsewhere
Pc	= 1	if a variation in costs (cost of labor) has an impact on price which is either "important" or "very important"
	= 0	elsewhere

Independent variables

Foreign market

Exp_share	= 1	if the firm's percentage turnover due to exports is > 40%
	= 0	elsewhere
Ext_mkt	= 1	if the foreign market is the most important (in terms of turnover).
	= 0	elsewhere

Competitive pressure

Rivals	4 dummies which capture the reported number of firm's competitors: none, less than 5, between 5 and 20, more than 20.

Relationships with customers

Customer_firms	= 1	if more than 60% of turnover generated by the "main product" is sold to other firms
	= 0	elsewhere
Price_no_discr	= 1	if the price is the same for all customers
	= 0	elsewhere
Price_reg	= 1	if the price is regulated
	= 0	elsewhere

Marginal costs

MC	= 1	if marginal costs are constant
	= 0	elsewhere

Positive vs negative shocks

Demand_up	= 1	if demand is increasing
	= 0	elsewhere
Cost_up	= 1	if costs are increasing
	= 0	elsewhere

Control variables

Area	5 dummies which capture whether the firm is located in the North-west (*North-west*), in the North-east (*North-east*), in the South-west (*South-west*), in the South-east (*South-east*), or around Paris (*Paris area*).
Size	6 dummies which capture whether the firm has up to 19 employees, between 20 and 49 employees, between 50 and 99 employees, between 100 and 249 employees, between 250 and 499 employees, or more than 500 employees.
Sector	5 dummies which capture whether the firm's activity is classified in the food, consumer goods, motor vehicles, capital goods, or intermediate goods manufacture.

Appendix C – Significance tests

Table C.7.2 reports results of tests for the significance of pair-wise reaction to shocks reported in tables 7.2.a and 7.2.b. The figures contained in the table are the p-values related to the null hypothesis H0: proportion differences are not significant (those outlined in bold are rejections).

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Table 2.1 - The sample

	Firms in the initial sample	Respondents	Response rate
Economic activity			
EB. Manufacture of food products, beverages and tobacco	724	267	36.9
EC. Manufacture of consumer goods	768	295	38.4
ED. Manufacture of motor vehicles	137	48	35.0
EE. Manufacture of capital goods	810	335	41.4
EF. Manufacture of intermediate goods	1914	717	37.5
Size			
Up to 19 employees	102	40	39.2
20-49 employees	590	262	44.4
50-99 employees	789	306	38.8
100-249 employees	1380	528	38.3
250-499 employees	795	292	36.7
>500 employees	697	234	33.6
Geographical area			
Paris area	388	134	34.5
North East	1373	527	38.4
North West	1009	418	41.4
South East	916	335	36.6
South West	667	248	37.2
Total	**4353**	**1662**	**38.2**

Table 2.2 - What is the percentage turnover from your "main product"? (Quesion 1)

% turnover	Nb. of Obs.	Percent
0-20	155	9.3
21-40	211	12.7
41-60	214	12.9
61-80	196	11.8
81-100	753	45.3
N. A.(1)	133	8.0
Total	1662	100.0

(1) Firms which did not provide an answer.

Table 3.1.a - The most important market (in terms of turnover) for the main product (Question 2)

	France	Other euro area countries	Non-euro area countries	N. A.	Total	Nb. of Obs.
Total	57.8	19.7	13.2	9.3	100.0	1662
By type of good						
Food products, beverages and tobacco	83.4	5.1	5.4	6.1	100.0	194
Consumer goods	71.2	11.7	10.3	6.8	100.0	282
Motor vehicles	24.3	66.5	1.0	8.2	100.0	170
Capital goods	45.1	9.3	28.2	17.4	100.0	373
Intermediate goods	60.4	21.2	11.5	7.0	100.0	643

Table 3.1.b - The number of competitors on the French market for the main product (Question 3)

	None	1 to 2	3 to 4	5 to 10	11 to 20	>20	N. A.	Total	Nb. of Obs.
Total	7.8	12.6	24.2	30.0	8.9	11.3	5.2	100.0	1662
By type of good									
Food products, beverages and tobacco	1.3	13.4	25.0	28.7	12.0	15.7	3.8	100.0	194
Consumer goods	0.8	7.3	23.4	23.5	17.2	15.6	12.3	100.0	282
Motor vehicles	3.0	2.9	11.5	72.5	1.4	1.1	7.5	100.0	170
Capital goods	14.5	20.7	22.1	27.5	4.7	7.7	2.8	100.0	373
Intermediate goods	10.3	12.4	28.8	23.5	8.7	12.9	3.3	100.0	643

Table 3.2 - Firms' main customers for the main product (Question 4)

	Firms that subcontract work (1)	Other firms	Consumers	Public sector	Others	N. A.	Total	Nb. of Obs.
Total	14.9	39.9	25.1	3.1	6.6	10.5	100.0	1662
By type of good								
Food products, beverages and tobacco	7.4	34.6	35.9	0.6	13.7	7.9	100.0	194
Consumer goods	12.0	42.6	27.2	3.8	6.5	7.9	100.0	282
Motor vehicles	14.5	14.8	65.5	0.7	3.3	1.3	100.0	170
Capital goods	13.5	40.7	22.6	6.5	6.9	9.7	100.0	373
Intermediate goods	19.3	46.5	11.7	2.1	5.1	15.3	100.0	643

(1) The firm which answered the survey works as a subcontractor, i. e. the firm is subcontrated.

Table 3.3 - How do your unit variable costs change when there is an increase in the level of production? (Question 8)

	Increase	Unchanged	Decrease	N. A.	N° firms
Total	10.6	35.7	35.9	17.8	1662
By type of good					
Food products, beverages and tobacco	11.5	37.5	42.5	8.6	194
Consumer goods	14.9	36.6	31.7	16.8	282
Motor vehicles	3.4	18.8	14.5	63.3	170
Capital goods	6.4	40.0	44.0	9.6	373
Intermediate goods	12.9	36.7	36.6	13.8	643

Table 4.1- How do you usually set the price of your main product? (Question 9)

	A mark-up is applied to unit variable costs (your price is different from the price of your competitors)…	The market is very competitive and your price is the same as the one of your competitors	The price is regulated	Other	N. A.	N° firms
Total	36.9	35.1	4.0	17.1	6.9	1662
By type of good						
Food products, beve-rages and tobacco	54.9	28.5	0.7	10.2	5.7	194
Consumer goods	33.3	31.5	20.7	8.1	6.4	282
Motor vehicles	9.2	9.3	0.0	79.3	2.2	170
Capital goods	39.0	43.9	1.3	9.4	6.4	373
Intermediate goods	39.1	40.5	0.2	11.2	9.0	643

Table 4.2- The price of your main product is:
(Question 6)

	The same for all the customers	Differentiated according to the quantity	Decided case by case	N. A.	Total
The same for all the customers	18.9	1.6	6.7		27.2
Differentiated according to the quantity		24.1	14.8		38.9
Decided case by case			27.0		27.0
N. A.				6.9	6.9
Total	18.9	25.7	48.5	6.9	100.0

N.B. Firms were allowed to tick up to two answers (N° answers = 1662)

Table 5.1.1- How often do you review the price of your main product?
(Question 10)

	Daily	Weekly	Monthly	Quarterly	Twice a year	Yearly	Over one year	No usual frequency	Other (2)	N. A.	Total	N° firms (1)
Total	3.2	5.3	16.9	17.8	3.4	33.6	1.1	8.2	5.4	5.2	100.0	1662
Cumulative total	3.2	8.5	25.4	43.2	46.6	80.2	81.2					
By type of good												
Food products, beve-rages and tobacco	1.8	14.9	23.3	10.6	2.5	37.9	0.0	2.6	1.5	5.0	100.0	194
Consumer goods	1.7	1.7	9.2	11.0	10.9	41.2	0.1	10.3	6.0	7.9	100.0	282
Motor vehicles	0.6	1.2	20.3	62.9	1.1	7.4	0.0	2.8	2.2	1.6	100.0	170
Capital goods	2.7	11.6	11.8	16.0	1.2	32.8	0.6	11.2	8.4	3.6	100.0	373
Intermediate goods	5.1	1.5	20.4	12.0	2.4	36.3	2.3	8.8	5.3	5.9	100.0	643

(1) Firms were obliged to tick only one answer
(2) Mostly "on a case by case basis".

Table 5.1.2 - In 2003, how many times did you actually change the price of your main product in 2003? (Question 17)
(percent)

	0	1	2	3 to 6	7 to 12	over 12	Total
Total	21.1	46.3	19.9	7.7	2.1	2.9	100
By type of good							
Food products, beverages and tobacco	10.4	67.0	9.3	5.8	1.7	5.7	100
Consumer goods	34.1	50.8	11.2	2.0	1.0	1.0	100
Motor vehicles	10.6	14.2	68.8	5.6	0.7	0.1	100
Capital goods	21.3	55.5	9.1	11.2	0.4	2.4	100
Intermediate goods	21.8	42.7	16.6	10.4	4.3	4.1	100

Note: For commodity interpretation the results are reported discarding non available answers. The percentage of non available answers over total answers are respectively: 24.6% for total, 11.6, 15.5, 5.9, 38.7 and 29.4 for the different types of goods.

Table 5.1.3 - In 2003, how many times did you change the price of your main product? (Question 10 by question 17)

	0	1	2	3 to 6	7 to 12	over 12	N. A.	Total	N° firms
Total	15.9	34.9	15.0	5.8	1.6	2.2	24.7	100.0	1662
Frequency of price review									
Daily	5.7	17.1	3.5	10.5	4.8	30.5	27.9	100.0	52
Weekly	0.2	16.1	5.4	7.9	1.7	14.4	54.3	100.0	89
Monthly	10.9	36.5	7.6	12.5	6.9	0.9	24.6	100.0	281
Quaterly	6.3	24.2	47.9	10.9	0.3	0.0	10.4	100.0	295
Twice a year	8.1	37.1	43.8	0.0	0.0	0.0	11.0	100.0	57
Yearly	22.3	55.3	7.1	1.1	0.0	0.1	14.0	100.0	558
Over one year	53.3	15.2	1.0	0.0	0.0	0.0	30.5	100.0	17
No usual frequency	22.5	21.1	2.6	0.5	1.5	0.1	51.8	100.0	137
Other	21.6	16.4	11.9	9.5	0.6	4.7	35.3	100.0	89
N. A.	27.1	7.4	0.2	1.2	0.0	0.0	64.2	100.0	86

Table 5.2.a.1- Usually, in the event of a major and lasting change in your environment on the French market (change in demand, competitive environment, etc…), do you modify the price of our main product? (Question 15)

	Increased demand or lower competition				Lower demand or increased competition			
This situation has arisen during the last two years	78.5				84.6			
Yes, changes are reported on prices		78.1				81.0		
Yes, changes are fully reported on prices			73.2				81.8	
Yes, with a delay shorter than 1 month				42.8				27.4
Yes, with a delay between 1 and 3 months				25.2				41.9
Yes, with a delay longer than 3 months				32.0				30.6
Yes, changes are partly reported on prices			26.8				18.2	
No, changes are not reported on prices		21.9				19.0		
This situation has not arisen during the last two years	21.5				15.4			
Total	100	100	100	100	100	100	100	100

Note: Percentages of non available answers over the total number of firms are respectively 12.3 and 13.4 for increased and lower demand.

Table 5.2.a.2 - Usually, in the event of a major and lasting change in your unit variable production costs (costs of labor and of other inputs) on the French market, do you modify the price of our main product? (Question 16)

	Higher unit variable production costs				Lower unit variable production costs			
This situation has arisen during the last two years	90.7				85.5			
Yes, changes are reported on prices		83.3				71.8		
Yes, changes are fully reported on prices			56.7				71.3	
Yes, with a delay shorter than 1 month				16.1				13.8
Yes, with a delay between 1 and 3 months				29.0				27.3
Yes, with a delay longer than 3 months				54.8				58.9
Yes, changes are partly reported on prices			43.3				28.7	
No, changes are not reported on prices		16.7				28.2		
This situation has not arisen during the last two years	9.3				14.5			
Total	100	100	100	100	100	100	100	100

Note: Percentages of non available answers over the total number of firms are respectively 12.4 and 11.2 for higher and lower costs.

Table 5.2.b.1 - Usually, in the event of a major and lasting change in your environment on the French market (change in demand, competitive environment, etc…), do you modify the price of our main product? (Question 15 by question 10)

(to be continued)

Increased demand or lower competition	Total	Daily	Weekly	Monthly	Quarterly	Twice a year	Yearly	Over one year	No usual frequency	Other	N. A.
Yes, with a delay shorter than 1 month	16.8	52.1	58.8	11.2	39.0 (1)	4.6	4.0	2.8	14.0	9.5	0.8
Yes, with a delay between 1 and 3 months	9.9	2.9	15.7	16.7	11.7	2.6	7.8	0.0	5.0	17.0	1.2
Yes, with a delay longer than 3 months	12.6	5.1	6.2	17.7	10.2	15.7	14.3	20.8	2.5	28.4	0.6
Only partly	14.4	24.1	4.3	11.3	8.5	20.0	19.3	35.8	20.0	12.9	1.9
No	15.1	5.1	3.6	21.2	7.3	25.2	18.4	26.4	19.8	15.9	1.2
This situation has not arisen…	18.8	7.0	6.4	11.1	19.8	25.8	28.4	4.7	20.1	10.3	3.7
N. A.	12.3	3.8	5.1	10.8	3.6	6.1	7.7	9.4	18.6	6.2	90.7
N° firms	1662	52	89	281	295	57	558	18	137	89	86

(1) This odd figure is due to the weighting procedure and the impact of the concentration of the motor vehicle sector when one goes into details. The corresponding unweighted figure would have been 7.1.

Table 5.2.b.1 - Usually, in the event of a major and lasting change in your environment on the French market (change in demand, competitive environment, etc…), do you modify the price of our main product? (Question 15 by question 10)
(continued)

Lower demand or increased competition	Total	Daily	Weekly	Monthly	Quarterly	Twice a year	Yearly	Over one year	No usual frequency	Other	N. A.
Yes, with a delay shorter than 1 month	13.3	53.7	62.2	15.5	4.2	3.8	7.0	2.8	15.8	19.6	1.7
Yes, with a delay between 1 and 3 months	20.4	5.7	16.3	21.4	54.3	15.7	10.1	0.9	10.7	23.3	0.2
Yes, with a delay longer than 3 months	14.9	8.6	6.6	19.3	14.5	17.7	17.3	17.9	5.1	23.5	2.1
Only partly	10.8	17.1	6.2	6.7	5.0	11.0	16.7	40.6	14.7	3.4	1.7
No	13.9	3.2	2.2	19.8	6.3	31.3	16.6	7.5	19.5	15.7	1.2
This situation has not arisen…	13.4	6.7	2.2	6.0	10.9	12.8	23.0	20.8	14.7	7.5	1.9
N. A.	13.3	5.7	4.3	11.2	5.0	7.2	9.2	9.4	19.4	7.3	90.9
N° firms	1662	53	89	281	295	57	558	18	137	89	86

Table 5.2.b.2 - Usually, in the event of a major and lasting change in your unit variable production costs (costs of labor and of other inputs) on the French market, do you modify the price of our main product?
(Question 16 by question 10)
(to be continued)

Higher unit variable production costs	Total	Daily	Weekly	Monthly	Quarterly	Twice a year	Yearly	Over one year	No usual frequency	Other	N. A.
Yes, with a delay shorter than 1 month	6.1	43.7	13.5	8.1	2.8	0.6	3.3	1.0	4.1	10.2	0.8
Yes, with a delay between 1 and 3 months	10.9	5.7	25.1	17.8	14.6	12.5	6.1	0.0	8.0	10.6	1.2
Yes, with a delay longer than 3 months	20.6	25.0	2.1	23.3	16.9	33.2	29.5	5.7	7.6	16.6	2.5
Only partly	28.7	12.7	49.4	18.2	47.3	18.4	25.8	56.2	33.0	26.3	2.5
No	13.3	1.6	5.8	14.6	6.1	13.7	15.6	10.5	24.4	26.6	1.7
This situation has not arisen…	8.1	5.7	2.1	5.2	9.0	12.8	11.0	1.0	14.4	0.6	0.0
N. A.	12.4	5.7	2.1	12.8	3.4	8.7	8.6	25.7	8.4	9.1	91.3
N° firms	1662	53	89	281	295	57	558	17	137	89	86

Table 5.2.b.2 - Usually, in the event of a major and lasting change in your unit variable production costs (costs of labor and of other inputs) on the French market, do you modify the price of our main product?
(Question 16 by question 10)
(continued)

Lower unit variable production costs	Total	Daily	Weekly	Monthly	Quarterly	Twice a year	Yearly	Over one year	No usual frequency	Other	N. A.
Yes, with a delay shorter than 1 month	5.4	32.0	15.0	7.8	2.9	1.5	1.8	1.0	2.9	14.7	0.8
Yes, with a delay between 1 and 3 months	10.6	5.1	18.7	14.9	13.7	14.3	6.1	0.0	11.5	18.4	1.0
Yes, with a delay longer than 3 months	22.9	24.4	4.3	20.4	51.0	28.0	19.9	2.9	7.8	17.7	2.3
Only partly	15.7	7.9	44.0	11.7	10.0	4.1	18.4	29.5	25.7	9.7	1.0
No	21.4	20.3	12.0	25.6	9.9	28.0	26.6	31.4	26.2	28.1	1.9
This situation has not arisen…	12.9	5.7	3.9	10.4	10.3	16.6	19.5	4.8	18.1	3.4	1.7
N. A.	11.2	4.4	2.1	9.3	2.3	7.9	7.7	29.5	7.6	8.2	91.3
N° firms	1662	52	89	281	295	57	558	17	137	89	86

Table 5.2.b.3 - How often do firms review their price under a stable environment?

The situation below has not arisen during the last two years	Daily	Weekly	Monthly	Quaterly	Twice a year	Yearly	Over one year	No usual frequency	Other	N. A.	Total	N° firms
Increased demand or lower competition	1.2	1.8	9.9	18.6	4.7	50.7	0.3	8.8	2.9	1.0	100	313
Lower demand or increased competition	1.6	0.9	7.6	14.5	3.3	57.7	1.6	9.1	3.0	0.7	100	222
Higher unit variable production costs	2.2	1.4	10.8	19.5	5.4	45.6	0.1	14.6	0.4	0.0	100	135
Lower unit variable production costs	1.4	1.6	13.6	14.1	4.4	50.8	0.4	11.6	1.4	0.7	100	214

5.4.1 - Percentage of firms changing their price and magnitudes of producer price changes
Positive and negative price changes
Annual figures for 2003
(Question Q17bis)
(percent)

	% of firms changing their price (2)	% of firms decreasing their price (3)	% of firms increasing their price (4)	Proportion of price increases in price changes	Magnitude of negative price changes (5)			Magnitude of positive price changes (5)			IPPI increase in 2003
					1st quartile	Median	3rd quartile	1st quartile	Median	3rd quartile	
Total (1)	75.8	20.8	55.0	72.5	-10	-5	-3	2	3	6	0.3
By type of goods											
Food products, beverages and tobacco	82.1	7.3	74.7	91.0	-7	-5	-4	2	4	6	2.5
Consumer goods	61.6	22.5	39.1	63.4	-10	-7	-5	2	3	7	-0.1
Motor vehicles	86.7	9.9	76.9	88.6	-3	-2	-2	1	1	1	0.7
Capital goods	74.6	19.9	54.7	73.3	-14	-10	-3	2	5	20	-0.1
Intermediate goods	77.7	27.9	49.8	64.1	-11	-5	-2	2	3	5	0.1

(1) Total of manufacturing for the type of good below, i.e. including food and excluding energy.
(2) Percentage of firms for which the price of their main product at the end of 2003 is different than at the beginning.
(3) Percentage of firms for which the price of their main product at the end of 2003 is lower than at the beginning.
(4) Percentage of firms for which the price of their main product at the end of 2003 is higher than at the beginning.
(5) Magnitude of price change is defined as the rate of price change between the beginning and the end of 2003.

Table 5.4.2 - Frequencies and magnitudes of producer price changes
Positive and negative price changes
Annual figures for 2003
(Question Q17 by Q17bis)
(percent)

	% of firms changing their price (2)	% of firms decreasing their price (3)	% of firms increasing their price (4)	Proportion of price increases in price changes	Magnitude of negative price changes (5)			Magnitude of positive price changes (5)		
					1st quartile	Median	3rd quartile	1st quartile	Median	3rd quartile
Magnitude of price change in 2003										
Total (1)	75.8	20.8	55.0	72.5	-10	-5	-3	2	3	6
By number of price changes per firm										
1	93.1	21.4	71.7	77.0	-10	-4	-2	2	3	4
2	95.4	13.2	82.3	86.2	-8	-3	-2	1	1	3
3 to 6	93.6	63.5	30.1	32.1	-14	-12	-5	5	10	20
7 to 12	84.3	35.4	48.8	57.9	-15	-14	-1	3	5	8
over 12	91.0	39.4	51.6	56.7	-25	-15	-7	4	13	30
N. A.	90.4	31.6	58.8	65.0	-10	-5	-4	3	5	20
Average magnitude of price changes in 2003					-6	-3	-2	1	2	4

(1) Total of manufacturing for the type of good below, i.e. including food and excluding energy.
(2) Percentage of firms for which the price of their main product at the end of 2003 is different than at the beginning.
(3) Percentage of firms for which the price of their main product at the end of 2003 is lower than at the beginning.
(4) Percentage of firms for which the price of their main product at the end of 2003 is higher than at the beginning.
(5) Magnitude of price change is defined as the rate of price change between the beginning and the end of 2003.

Table 6.1 Ratings of the theories by French decision makers

		increase	decrease
1)	**"Good" grades**		
*	**Cost-based pricing**		
	* intermediate commodity prices	3.0	2.6
	* labor costs	2.5	1.9
	* productivity	1.8	2.2
*/	**Coordination failure**		
	* price offered by your competitor(s)	2.3	2.8
	competitors will not adjust their price	3.0	2.1
	Nominal contracts	2.7	2.5
2)	**"Average" grades**		
	Implicit contracts	2.2	2.0
	Temporary shocks	2.1	2.1
*	**Demand shock**	2.0	2.3
*	**Nb. of competitors**	1.8	2.0
3)	**"Bad" grades**		
	Pricing points	1.7	1.6
*	**Stock/delivery**	1.4	1.6
	Physical menu costs	1.4	1.4

Notes: (*) from question 13 (reasons for price adjustments), otherwise question 14 (reasons for price stickiness).

Equality in the mean scores on a pair-wise basis between "increase" and "decrease" for each theory are all rejected with a p-value<0.0001, except for temporary shocks (p=0.41) and physical menu costs (p=0.62) for which the scores are the same.

Within increases, equality in the mean scores are all rejected with a p-value<0.01 except when scores are equal. Within decreases, equality in the mean scores are all rejected with a p-value<0.01 except for the three following pairs: nb. of competitors vs temporary shocks (p=0.39), competitors will not adjust their price against productivity (p=0.72), nominal contracts vs intermediate commodity prices (p=0.79), and when reported scores are equal.

Table 6.2 Ratings of the theories by country

	Ratings of the Theories	Fce	Austria	Belgium	Italy	Netherlands	Sweden	U.K.	U.S.
1)	"Good" grades								
*	Cost-based pricing	G	G	G	G	-	G	G	G
	Coordination failure	G	A	A	G	A	-	G	G
	Nominal contracts	G	G	G	G	G	A	G	A
2)	"Average" grades								
	Implicit contracts	A	G	G	-	G	G	G	G
	Temporary shocks	A	B	B	A	A	-	-	-
*	Demand (shock/elasticity)	A	-	A	A	-	G	B	A
*	Nb. of competitors	A	-	-	-	-	-	-	-
3)	"Bad" grades								
	Pricing points	B	B	B	B	B	B	A	A
*	Stock/delivery	B	-	-	-	-	-	B/A	B/G
	Physical menu costs	B	B	B	B	B	B	B	A

Note: (*) from question 13 (reasons for price adjustments), otherwise question 14 (reasons for price stickiness).

Table 7.2.a Do you modify the price of your main product in reaction to a shock?

	Increased demand or lower competition		Lower demand or increased competition		Higher unit variable production costs		Lower unit variable production costs	
	(1)		(2)		(3)		(4)	
Yes, changes are reported on prices	77.1		78.3		81.7		73.3	
fully		72.1		80.4		59.3		71.6
partly		27.9		19.6		40.7		28.4
No, changes are not reported on prices	22.9		21.7		18.3		26.7	
Total	100	100	100	100	100	100	100	100
Number of observations	963		963		963		963	
Weight	0.93		0.93		0.93		0.93	

Note: For the significance of proportion differences, see appendix C.

Table 7.2.b How long does-it take to change prices in reaction to a shock?

	Increased demand or lower competition	Lower demand or increased competition	Higher unit variable production costs	Lower unit variable production costs
	(1)	(2)	(3)	(4)
a delay shorter than 1 month	34.7	37.2	33.4	31.2
a delay between 1 and 3 months	34.5	34.9	27.4	29.3
a delay longer than 3 months	30.8	28.0	39.2	39.5
Number of observations	335	335	335	335
Weight	0.55	0.55	0.55	0.55

Note: For the significance of proportion differences, see appendix C.

Table 7.4.a- Price adjustment in reponse 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	0.08	*0.72*	0.29	*0.04*	0.13	*0.56*	0.11	*0.48*
Rivals_none	0.14	*0.54*			0.05	*0.83*		
Rivals_5	-0.48	*0.001*	-0.59	*<0.0001*	-0.49	*0.00*	-0.49	*<0.0001*
Rivals_20	0.16	*0.26*			-0.02	*0.88*		
Rivals_more_than_20	ref				ref			
MC	0.12	*0.22*			0.08	*0.42*		
Customer_firms	0.05	*0.66*			-0.04	*0.69*		
Price_no_discr	-0.57	*<0.0001*	-0.62	*<0.0001*	-0.53	*<0.0001*	-0.56	*<0.0001*
Price_reg	-4.92	*0.97*			-4.39	*0.96*		
Ext_mkt	0.02	*0.90*			0.22	*0.11*	0.30	*0.0086*
Exp_share	0.02	*0.89*			0.13	*0.33*		
Food	0.00	0.99	-0.02	*0.87*	-0.20	*0.22*	-0.20	*0.21*
Consumer goods	-0.14	0.34	-0.29	*0.03*	-0.32	*0.04*	-0.47	*0.00*
Motor vehicles	0.20	*0.40*	0.26	*0.25*	0.11	*0.64*	0.20	*0.40*
Capital goods	0.43	*0.00*	0.41	*0.0008*	-0.08	*0.52*	-0.07	*0.59*
Intermediate goods	ref		ref		ref		ref	
Paris area	-0.33	*0.05*	-0.32	*0.05*	-0.67	*0.0003*	-0.62	*0.0006*
North-west	-0.51	*0.00*	-0.54	*0.00*	-0.41	*0.01*	-0.43	*0.005*
North-east	-0.20	*0.16*	-0.24	*0.07*	-0.25	*0.08*	-0.24	*0.09*
South-west	-0.33	*0.06*	-0.33	*0.05*	-0.12	*0.48*	-0.10	*0.58*
South-east	ref		ref		ref		ref	
0-19 employees	-1.21	*0.07*	-1.24	*0.06*	-1.57	*0.06*	-1.56	*0.06*
20-49 employees	0.60	*0.01*	0.59	*0.00*	-0.49	*0.06*	-0.50	*0.05*
50-99 employees	0.05	*0.79*	0.09	*0.63*	-0.37	*0.08*	-0.32	*0.11*
100-249 employees	-0.15	*0.24*	-0.10	*0.39*	-0.28	*0.04*	-0.24	*0.07*
250-499 employees	0.27	*0.04*	0.29	*0.02*	0.03	*0.82*	0.05	*0.67*
at least 500 employees	ref		ref		ref		ref	
Number of observations	882		882		882		882	
Weight	0.86		0.86		0.86		0.86	
Log L	-509.1		-518.9		-452.7		-459.9	
Pseudo R-Square	0.211		0.185		0.189		0.168	
Chi-Square (dof)	147.9 (22)	*<0.0001*	128.4 (15)	*<0.0001*	123.1 (22)	*<0.0001*	108.6 (16)	*<0.0001*

Notes: Weighted estimates. Values in italics are the estimated p-values of the test statistics. Columns (1) and (3) present results obtained including all the variables in regressions; columns (2) and (4) present those obtained with only the significant ones.

Table 7.4.b - Price adjustment in reponse 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	-0.81	*0.0004*	-0.84	*<0.0001*	-0.41	*0.05*	-0.41	*0.05*
Rivals_none	0.30	*0.22*			0.44	*0.07*	0.43	*0.07*
Rivals_5	-0.03	*0.87*			-0.32	*0.03*	-0.32	*0.02*
Rivals_20	0.00	*1.00*			-0.28	*0.05*	-0.28	*0.05*
Rivals_more_than_20	ref				ref		ref	
Customer_firms	-0.45	*<0.0001*	-0.46	*<0.0001*	-0.56	*<0.0001*	-0.56	*<0.0001*
Price_no_discr	0.03	*0.84*			-0.03	*0.83*		
Price_reg	-0.97	*0.005*	-0.93	*0.01*	-1.57	*<0.0001*	-1.58	*<0.0001*
Ext_mkt	-0.13	*0.36*			-0.24	*0.09*	-0.24	*0.09*
Exp_share	0.23	*0.08*	0.18	*0.11*	0.23	*0.07*	0.23	*0.07*
Food	0.09	*0.61*	0.10	*0.54*	0.12	*0.45*	0.11	*0.46*
Consumer goods	0.30	*0.05*	0.30	*0.05*	0.49	*0.00*	0.48	*0.00*
Motor vehicles	1.12	*<0.0001*	1.19	*<0.0001*	0.32	*0.20*	0.32	*0.20*
Capital goods	0.51	*0.0001*	0.52	*<0.0001*	0.49	*<0.0001*	0.49	*<0.0001*
Intermediate goods	ref		ref		ref		ref	
Paris area	-0.29	*0.13*	-0.26	*0.16*	-0.28	*0.11*	-0.28	*0.11*
North-west	0.26	*0.10*	0.26	*0.10*	0.34	*0.03*	0.34	*0.03*
North-east	0.01	*0.94*	0.02	*0.89*	0.35	*0.02*	0.35	*0.02*
South-west	-0.27	*0.17*	-0.24	*0.22*	0.16	*0.35*	0.16	*0.35*
South-east	ref		ref		ref		ref	
0-19 employees	-0.47	*0.53*	-0.45	*0.55*	-0.30	*0.64*	-0.30	*0.64*
20-49 employees	-0.20	*0.48*	-0.20	*0.46*	0.20	*0.39*	0.20	*0.38*
50-99 employees	0.23	*0.26*	0.27	*0.17*	0.88	*<0.0001*	0.88	*<0.0001*
100-249 employees	0.14	*0.31*	0.15	*0.27*	0.64	*<0.0001*	0.64	*<0.0001*
250-499 employees	0.14	*0.30*	0.13	*0.32*	0.46	*0.0004*	0.46	*0.0004*
at least 500 employees	ref		ref		ref		ref	
Number of observations	882		882		882		882	
Weight	0.86		0.86		0.86		0.86	
Log L	-423.7		-425.3		-500.8		-500.8	
Pseudo R-Square	0.143		0.138		0.224		0.224	
Chi-Square (dof)	86.5 (21)	*<0.0001*	83.3 (16)	*<0.0001*	157.9 (21)	*<0.0001*	157.8 (20)	*<0.0001*

Notes: Weighted estimates. Values in italics are the estimated p-values of the test statistics. Columns (1) and (3) present results obtained including all the variables in regressions; columns (2) and (4) present those obtained with only the significant ones.

Table 7.4.c- 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)		(3)		(4)	
Constant	0.27	*0.23*	0.36	*0.03*	-0.87	*<0.0001*	-0.99	*<0.0001*
Demand_up/Cost_up	-0.38	*<0.0001*	-0.71	*<0.0001*	0.52	*<0.0001*	0.51	*<0.0001*
Rivals_none	0.11	*0.64*			0.36	*0.12*		
Rivals_5	-0.46	*0.002*	-0.53	*<0.0001*	-0.19	*0.21*	-0.16	*0.11*
Rivals_20	0.08	*0.57*			-0.15	*0.31*		
Rivals_more_than_20	ref				ref			
MC	0.10	*0.32*						
Customer_firms	0.01	*0.95*			-0.51	*<0.0001*	-0.51	*<0.0001*
Price_no_discr	-0.55	*<0.0001*	-0.59	*<0.0001*	-0.004	*0.97*		
Price_reg	-4.74	*0.97*			-1.28	*0.0003*	-1.20	*0.0005*
Ext_mkt	0.12	*0.40*	0.17	*0.13*	-0.18	*0.20*		
Exp_share	0.07	*0.60*			0.23	*0.08*	0.17	*0.12*
Food	-0.09	*0.55*	-0.10	*0.50*	0.11	*0.49*	0.13	*0.42*
Consumer goods	-0.23	*0.13*	-0.38	*0.01*	0.38	*0.01*	0.37	*0.01*
Motor vehicles	0.16	*0.50*	0.24	*0.30*	0.73	*0.003*	0.84	*0.0003*
Capital goods	0.18	*0.14*	0.18	*0.15*	0.49	*0.0001*	0.52	*<0.0001*
Intermediate goods	ref		ref		ref		ref	
Paris area	-0.47	*0.01*	-0.43	*0.01*	-0.28	*0.13*	-0.24	*0.19*
North-west	-0.46	*0.003*	-0.48	*0.001*	0.31	*0.05*	0.31	*0.04*
North-east	-0.22	*0.12*	-0.24	*0.09*	0.19	*0.20*	0.20	*0.18*
South-west	-0.23	*0.18*	-0.22	*0.21*	-0.03	*0.88*	0.02	*0.91*
South-east	ref		ref		ref		ref	
0-19 employees	-1.36	*0.06*	-1.36	*0.06*	-0.39	*0.57*	-0.38	*0.58*
20-49 employees	0.15	*0.48*	0.15	*0.48*	0.02	*0.93*	0.06	*0.81*
50-99 employees	-0.14	*0.47*	-0.09	*0.63*	0.57	*0.003*	0.64	*0.001*
100-249 employees	-0.21	*0.11*	-0.16	*0.21*	0.41	*0.002*	0.42	*0.001*
250-499 employees	0.15	*0.24*	0.18	*0.16*	0.31	*0.02*	0.32	*0.02*
at least 500 employees	ref		ref		ref		ref	
Number of observations	1764		1764		1764		1764	
Weight	0.86		0.86		0.86		0.86	
Log L	-490.7		-498.8		-472.4		-476.1	
Pseudo R-Square	0.152		0.134		0.155		0.146	
Chi-Square (dof)	130.1 (23)	*<0.0001*	114.1 (17)	*<0.0001*	129.1 (22)	*<0.0001*	121.7 (18)	*<0.0001*

Notes: Weighted estimates. Values in italics are the estimated p-values of the test statistics. Columns (1) and (3) present results obtained including all the variables in regressions; columns (2) and (4) present those obtained with only the significant ones.

Table C.7.2 Significance tests of reaction to shock differences in tables 7.2.a and 7.2.b

	(1)/(2)	(3)/(4)	(1)/(3)	(1)/(4)	(2)/(3)	(2)/(4)
Significance on table 7.2.a						
Yes, fully	**0.00**	**0.01**	**0.00**	0.10	**0.00**	**0.00**
Yes, partly	**0.00**	**0.00**	**0.00**	0.66	**0.00**	**0.00**
No	**0.04**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**
Significance on table 7.2.b						
a delay shorter than 1 month	**0.01**	0.16	0.18	**0.01**	**0.00**	**0.00**
a delay between 1 and 3 months	0.67	0.54	**0.05**	0.12	**0.04**	0.08
a delay longer than 3 months	**0.01**	0.52	**0.00**	**0.00**	**0.00**	**0.00**

Note: significance tests on table 7.2.a are computed on the proportions mentionned below.

Table 7.2.a	(1)	(2)	(3)	(4)
Yes, fully	55.6	63.0	48.4	52.5
Yes, partly	21.5	15.3	33.3	20.8
No	22.9	21.7	18.3	26.7
Total	100.0	100.0	100.0	100.0

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