

ARTICLES

PRICE-SETTING BEHAVIOUR IN THE EURO AREA



This article draws on new Eurosystem research to provide a summary of recent findings on price-setting behaviour in the euro area. It is structured around three main questions: What are the typical patterns of price adjustment that can be observed in the euro area? Do price setters follow particular rules in reviewing and changing prices? Are there factors that prevent price setters from changing prices?

The main results of this research can be summarised as follows. Prices in the euro area change infrequently. Consumer prices remain unchanged for four to five quarters on average; producer prices remain unchanged for similar or somewhat shorter periods. However, the actual frequencies differ substantially across sectors and product groups. There are various reasons why prices may change infrequently. On the one hand, in a stable macroeconomic environment where agents expect prices to be stable, there is less of a need to change prices. On the other hand, there may be structural factors that prevent firms from changing prices. The evidence supports both reasons.

I INTRODUCTION

A thorough understanding of the nature of the price-setting process adopted by economic agents is important for a central bank. Price-setting behaviour is what ultimately shapes the evolution of inflation over time. Accordingly, most commonly used models of inflation dynamics rely on assumptions about the behaviour of price setters. The models' predictions about the evolution of inflation are therefore strongly dependent on these underlying assumptions, as will be the models' indications for the design and conduct of monetary policy. Understanding the nature of the price-setting process will improve these models and the ensuing policy conclusions. Furthermore, a disaggregated analysis of economic agents' price-setting behaviour can reveal important differences, such as heterogeneity across sectors in the way prices react to changes in the underlying economic conditions. This knowledge can indicate which sectors need to be monitored more closely for the purposes of monetary policy. Finally, a detailed investigation of price setting may reveal structural inefficiencies that prevent prices from changing even if price setters see, in principle, a potential need for changing them. As a consequence, prices would not be an effective signal of the relative scarcity of goods, a situation that would call for structural reforms.

This article provides a summary of recent findings on price-setting behaviour in the euro area. It draws mainly on new analyses conducted by the Eurosystem in the context of the "Inflation Persistence Network" (IPN).¹ This network was created in 2003 by the ECB and the NCBs of the euro area for the purpose of analysing the patterns, determinants and implications of inflation persistence and price-setting behaviour, as well as the link between the two in the euro area and in its member countries. To study price setting, it availed itself of an unprecedented dataset covering individual price records collected for the construction of the consumer and producer price indices, as well as information on price-setting behaviour obtained from one-off surveys on firms' pricing policies.

This article focuses on three main issues: the typical patterns of price adjustment observed in the euro area; the rules followed by price setters in reviewing and changing prices; and factors that prevent price setters from changing prices. The main results regarding each of these issues are reported in the three following sections of this article. Important features of

¹ The bulk of the papers produced by the IPN were presented at the conference entitled "Inflation Persistence in the Euro Area", hosted by the ECB in December 2004, and are available online at the "Past conferences and seminars" page of the ECB's website. A large number of papers produced by the IPN have also been published in the ECB's Working Paper Series.

the datasets that have been used in the analyses are presented in two boxes. Box 1 covers the individual price records underlying the consumer and producer price indices and Box 2 presents the surveys conducted by the IPN. The last section contains the overall conclusions.

2 STYLISED FACTS REGARDING THE PATTERNS OF PRICE ADJUSTMENT IN THE EURO AREA

Based on the individual price records collected for the construction of the consumer and producer price indices, this section reports a number of interesting patterns of price adjustment.² A first key result relates to how often prices are typically changed, or in other words, for how long prices remain unchanged on average. Tables 1 and 2 show the respective results for consumer and producer prices, highlighting the fact that prices change infrequently. On average, only 15% of prices of consumer goods and 20% of producer prices are changed each month. Calculating the average time for which prices of a given product category remain unchanged and aggregating the results for the euro area reveals that prices of consumer goods remain unchanged for about four to five quarters, while producer prices maintain their level for almost as long. Similar results are obtained when asking firms directly how often they change prices: the evidence obtained from firm surveys shows that the average firm changes prices less than once a year.

These average figures mask a substantial degree of heterogeneity, however – a point which is illustrated by the breakdown of

the figures provided in Tables 1 and 2 according to sectors. Consumer prices change most frequently for energy products and unprocessed food, while price changes are relatively infrequent for non-energy industrial goods and services in particular. Energy products, where 78% of all prices in the sample change each month, and unprocessed food products, where the corresponding figure stands at 28%, therefore show substantially more price changes than the average consumer good. Both sectors are characterised by frequent and considerable changes in the supply of and demand for their input factors and, accordingly, by frequently changing input prices. This has a bearing on the prices of consumer goods, indicating that in these sectors prices are often reset in response to changes in economic conditions. At the other end of the spectrum, it is particularly evident that the prices of services change less frequently: on average only 6% of prices change each month. Interestingly, it can also be observed that sectors in which prices change infrequently exhibit an adjustment pattern whereby price increases are typically followed by further price increases; such a pattern can be

2 For a summary of the results for consumer prices, see Dhyne, E., L. Álvarez, H. Le Bihan, G. Veronese, D. Dias, J. Hoffmann, N. Jonker, P. Lünemann, F. Rumler and J. Vilmunen (2005), “Price setting in the euro area: some stylized facts from individual consumer price data”, ECB Working Paper No 524. For a summary of the results for producer prices, see Álvarez, L., E. Dhyne, M. Hoeberichts, C. Kwapil, H. Le Bihan, P. Lünemann, F. Martins, R. Sabbatini, H. Stahl, P. Vermeulen and J. Vilmunen (2005), “Sticky prices in the euro area: evidence from individual data”, a paper presented at the 2005 Annual Congress of the European Economic Association. More detailed analyses focusing on individual countries are provided in various research papers referenced in the two papers.

Table 1 Average percentage of consumer prices changed each month

Sector	Unprocessed food	Processed food	Energy	Non-energy industrial goods	Services	Total
Percentage of price changes	28	14	78	9	6	15

Source: Dhyne et al. (2005), “Price setting in the euro area: some stylized facts from individual consumer price data”, ECB Working Paper No 524.

Note: Based on a sample of 50 products. For further details, see the footnote in Box 1.

Table 2 Average percentage of producer prices changed each month

Sector	Food	Non-durable goods (excluding food)	Durables	Intermediate products	Energy	Capital goods	Total
Percentage of price changes	26	12	10	22	70	9	20

Source: Álvarez et al. (2005), "Sticky prices in the euro area: evidence from individual data", a paper presented at the 2005 Annual Congress of the European Economic Association.

expected in an environment of small, positive inflation rates, where occasional price increases take account of the time that has elapsed since the last price change.

A very similar pattern can be observed for producer prices, as shown in Table 2. The more processed products, for which costs are less closely linked to the raw material price, show fewer price changes. Accordingly, the most frequently changing prices are again observed for energy and food products, where 70% and 26%, respectively, of all prices in the sample are changed each month. At the other extreme, prices for durables and capital goods change much less often.

It has furthermore been found that heterogeneity of price-setting behaviour is not only considerable across product categories but also within them. In other words, even though the breakdown according to sectors in Tables 1 and 2 constitutes a useful way of summarising the differences in price setting, it still masks further differences in the frequency with which prices for the various products within a sector are changed.³ Finally, there is also some heterogeneity across countries. Cross-country variation can arise as a result of differences in consumption structure, in the relative market shares of outlet types or in the relative importance of regulated prices across countries, or it can arise because of different statistical approaches to the way the data are collected (for example, because of the treatment of sales and quality adjustment by each national statistical institute). However, heterogeneity across countries is less extensive than across sectors: the ranking of sectors with

respect to the frequency of price changes, for example, is shared across the euro area countries.

Looked at in more detail, quantitative data also enable price increases to be disentangled from price decreases and the size of price changes to be analysed. Although one might expect that in the presence of a high degree of price stickiness the price changes that are observed are more likely to be price increases rather than price decreases, it turns out that price decreases are not uncommon, except in services.⁴ On average, around 40% of both consumer and producer price changes are price reductions. Looking at the breakdown of consumer prices according to sectors in the first row of Table 3, it is apparent that unprocessed food, processed food, energy and non-energy industrial goods are characterised by an almost equal share of price increases and decreases. The difference is much greater in the services sector, where only two out of ten price changes are price decreases. The pattern in the services sector may be partly related to the higher average inflation rate in services and to the fact that the share of labour in the production costs of services is particularly large, such that stickiness in wage developments can translate into price stickiness for that sector.

Looking at the magnitude of price changes, it emerges that price increases, as well as

3 See in particular the evidence provided in Aucremanne, L. and E. Dhyne (2004), "How frequently do prices change? Evidence based on the micro data underlying the Belgian CPI", ECB Working Paper No 331.

4 This result does not depend on whether price changes due to sales are included in the calculation or not.

Table 3 Share and average size of consumer price increases and decreases in percentages

Sector	Unprocessed food	Processed food	Energy	Non-energy industrial goods	Services	Total
Share of price increases	54	54	54	57	80	58
Size of price increases	15	7	3	9	7	8
Size of price decreases	16	8	2	11	9	10

Source: Dhyne et al. (2005), "Price setting in the euro area: some stylized facts from individual consumer price data", ECB Working Paper No 524.

Note: Results are based on a sample of 50 products.

decreases, are sizeable compared with the inflation rate. This discrepancy arises because, first, a large number of prices do not change in a given period, and second, the inflation rate aggregates simultaneous price increases and decreases, which partly offset each other. Price reductions and price increases have a similar order of magnitude, although price reductions are on average somewhat larger: for consumer prices, the average price increase is found to be in the order of 8% and the average price decrease slightly larger, at 10%, as shown in Table 3. In particular, for unprocessed food, price changes are not only very frequent but are also very large, at 15% and 16% for increases and decreases respectively. This finding is consistent with the notion that the pricing structure in this sector is strongly affected by the supply of goods, owing to the seasonal nature of many unprocessed food items. With respect to the average size of price changes, heterogeneity across countries is moderate, particularly when compared with sectoral heterogeneity.

In order to put the patterns found for the euro area into perspective, it is useful to provide a comparison with other economies. The economy for which most evidence on the patterns of price adjustment is available is the United States.⁵ The main difference between these two economies relates to the average time for which consumer prices remain unchanged. Whereas each month only around 15% of consumer prices change in the euro area, corresponding estimates for the United States are higher, at 26% over the period from 1995 to 1997. Whereas a typical price remains

unchanged for four to five quarters in the euro area, it changes on average every two quarters in the United States. The lower figure for the euro area cannot be explained by differences in consumption structure, as euro area consumption is characterised by a larger share of food products (the prices of which change frequently) and a smaller share of services (with infrequent price changes). Therefore, the difference in the frequency of price changes would be even greater if both economies shared the same consumption structure. However, there are several factors that can give rise to these patterns, such as differences in the behaviour of price setters, market competition, the typically applied pricing strategies which could themselves be related to differences in retail structure, or differences in regulated prices. Furthermore, comparability of the underlying data could be an issue, as well as differences in the shocks that occurred over the analysed time periods.

Other patterns of price setting are more similar across the two economies. In the United States, as in the euro area, there is a high degree of heterogeneity across sectors, with energy products and unprocessed food standing out as the sectors with the most frequent price changes; furthermore, similarly to what is observed in the euro area, 45% of all price changes are price decreases in the United States, and price changes are large in relation to the prevailing inflation rate, at 13% (or 8% when sales prices are not taken into account).

⁵ See, for example, Bills, M. and P. Klenow (2004), "Some evidence on the importance of sticky prices", *Journal of Political Economy* 112, pp. 947-985.

Box I

PRICE RECORDS UNDERLYING THE CONSUMER AND PRODUCER PRICE INDICES

A large number of results reported in this article are based on datasets comprising individual price records collected for the construction of consumer and producer price indices by the national statistical offices. Owing to national confidentiality rules, data have been made available exclusively to the NCBs. For consumer prices, the data cover ten euro area countries (Belgium, Germany, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal and Finland), spanning 96% of the euro area in terms of GDP.

Table A Coverage of national consumer price databases

Country	Percentage of CPI covered or number of product categories	Period covered
Belgium	68%	Jan. 1989 - Dec. 2001
Germany	20% (52 product categories)	Jan. 1998 - Jan. 2004
Spain	70%	Jan. 1993 - Dec. 2001
France	65%	July 1994 - Feb. 2003
Italy	20% (50 product categories)	Jan. 1996 - Dec. 2003
Luxembourg	100%	Jan. 1999 - Dec. 2004
The Netherlands	8% (49 product categories)	Nov. 1998 - April 2003
Austria	90%	Jan. 1996 - Dec. 2003
Portugal	100%	Jan. 1992 - Jan. 2001
Finland	100%	Jan. 1997 - Dec. 2003

Source: Dhyne et al. (2005), "Price setting in the euro area: some stylized facts from individual consumer price data", ECB Working Paper No 524, and references therein.

The datasets contain several million price quotes, as recorded for particular products sold in given outlets, tracked continuously over time. As shown in Table A, the time dimension of the data varies considerably across countries and can span up to 13 years. The product coverage varies across countries. While price quotes for product categories covering at least 65% of the consumption basket are available for seven countries, for another three countries a "minimum common sample" of approximately 50 product categories was obtained. This common sample was defined with the aim of enabling results to be compared, and forms the basis for the results reported in this article.¹

For producer prices, statistical information on the micro data underlying the national producer price indices has been made available to the NCBs of Belgium, Germany, Spain, Italy and Portugal, leading to a coverage of 63% of the euro area in terms of GDP. These data are, to a large extent, comparable to those described above for consumer prices. The price records relate to the ex-factory price, including all duties and taxes except VAT. The prices are actual

1 The 50 selected product categories are: four unprocessed food categories (comprising steak, one type of fresh fish, lettuce and bananas), seven processed food categories (milk, sugar, frozen spinach, mineral water, coffee, whisky and beer), three energy (oil) products (gasoline for heating purposes and two types of fuel), 17 non-energy industrial goods (socks, jeans, sports shoes, a shirt, acrylic paint, cement, a toaster, light bulb, one item of furniture, a towel, car tyre, television set, dog food, a tennis ball, Lego set, toothpaste and a suitcase) and 19 services (dry cleaning, electrician's hourly rate, plumber's hourly rate, domestic services, hourly rate of a garage mechanic, the cost of a car wash, wheel balancing, taxi ride, cinema ticket, fax machine, videotape rental, photo developing, hotel room, glass of beer in a bar, a meal in a restaurant, a hot dog, a cola in a bar and men's and ladies' hairdressing). If one product category was not available in a particular country, it was replaced by a close substitute. The period covered in each country was harmonised as much as possible, and generally started in January 1996 and ended in January 2001.

transaction prices, not list prices (with the exception of Portugal). A price collected in period t should refer to orders made during period t (the moment of order). As far as the number of product categories is concerned, these databases cover either nearly the complete set of data available to the national statistical offices or a “minimum common sample”. Although the time dimension of these datasets is generally smaller than for consumer prices, they nonetheless span up to eight years.

Table B Coverage of national producer price databases

Country	Percentage of PPI covered or number of product categories	Period covered
Belgium	100%	Jan. 2001 - Jan. 2005
Germany	100%	Jan. 1997 - Feb. 2003
Spain	99.40%	Nov. 1991 - Feb. 1999
Italy	60 product categories	Jan. 1997 - Dec. 2002
Portugal	Almost 100%	Jan. 1995 - Aug. 2002

Source: Álvarez et al. (2005), “Sticky prices in the euro area: evidence from individual data”, a paper presented at the 2005 Annual Congress of the European Economic Association, and references therein.

Finally, an alternative type of data on producer prices has been analysed in Belgium, France and Germany. Based on regular business surveys with firms, qualitative data were obtained, such as whether prices are changed during the month under review, or whether firms intend to change prices in the coming months. Although such analyses are unable to quantify price changes, they are able to link a firm’s pricing behaviour to other variables observed for this firm in the same survey – information which is generally not available for the quantitative data described above.

3 PRICE-SETTING RULES

Having analysed some of the properties of the observed price records, it is also of interest to identify the behavioural patterns of price setters that determine the evolution of prices, and which may explain the stylised facts mentioned above. This section will provide evidence of the prevalence of various price-setting rules, while the following section will highlight potential reasons for price stickiness. The first important result is that the price adjustment process takes place in two steps, namely i) a price review and ii) a price change. Surveys on firms’ price-setting behaviour conducted by the IPN show that price reviews are conducted more frequently than price changes.⁶ Most firms review prices once to three times a year, yet actually change prices only once a year. Interestingly, firms in the

services sector both review and change their prices less frequently than firms in other sectors. Furthermore, reviews and changes are generally more frequent for firms in more competitive markets.

The difference in frequency between price reviews and changes raises the question of its causes. Prices may be left unchanged after a review i) because none of the factors which the firm has considered in its review suggests a need to change them or ii) because, even though the review suggests a price change is called for,

⁶ For a summary of the results obtained from the surveys on price setting, see Fabiani, S., M. Druant, I. Hernando, C. Kwopil, B. Landau, C. Loupias, F. Martins, T. Mathä, R. Sabbatini, H. Stahl and A. Stokman (2005), “The pricing behaviour of firms in the euro area: new survey evidence”, ECB Working Paper No 535. More detailed analyses focusing on individual countries are provided in various research papers referenced therein.

there are other factors preventing an adjustment. Such factors are addressed in Section 4.

The first step in the price formation process is therefore to conduct a price review. This can be done in various ways. For example, a firm could decide to review prices periodically, at regular time intervals (so-called time-dependent pricing rules). Alternatively, prices could be reviewed whenever a firm feels that there has been a change in the underlying determinants of prices, such as input costs, demand, or competitors' prices, to name but a few (so-called state-dependent pricing rules). Finally, firms may want to follow a combination of the two strategies, namely to review prices regularly but also to allow for flexibility in reviewing prices whenever this is felt necessary due to changing circumstances.

There is clear evidence that price changes exhibit seasonal patterns. In general, they are more likely to take place during the first quarter (especially in January) or after the summer period (especially in September), and are less frequent in July and August. The greater frequency of price changes taking place in January is particularly evident in the case of services. In a similar vein, the probability that a retailer will adjust its price depends on the time that has elapsed since the last price change. The probability of a price change increases substantially if the price has remained unchanged for 12, 24 or 36 months, indicating that a fraction of firms revise their prices on an annual basis. Although this may at first glance suggest that firms generally follow pricing rules which imply a review of prices at regular time intervals, such a pattern could also be observed in the case of pricing rules whereby firms respond to changes in economic conditions, for instance if costs or demand typically change once a year.

Further testing has been carried out in order to better distinguish between the two scenarios in which prices are set either at regular time intervals or in response to changes in the

underlying determinants. For example, the relationship between inflation and the frequency of price changes has been analysed. If price setting is responsive to economic conditions, one expects there to be a link. Indeed, it is generally found that higher aggregate inflation is related to higher frequencies of price increases and lower frequencies of price decreases. The same pattern also holds for the inflation rate computed at the sector level – in particular, it has been found that the probability of observing a price change for a specific product in a specific outlet increases with the absolute value of accumulated product-specific inflation since the occurrence of the last price change for this product in the outlet.

Events that change the relevant economic conditions for price setters can also be exploited to gain a better understanding of the rules determining price-setting behaviour. If they have an impact on the frequency of price changes, this can be interpreted as evidence in favour of rules that are responsive to changes in economic conditions. There is very strong evidence in this respect: for instance, changes in indirect taxes always lead to a temporary increase in the number of price changes.

In sum, although there is some evidence in favour of pricing rules based on fixed time intervals, at the same time there is a clear pattern of firms changing their prices in response to changes in underlying economic conditions.

This finding is corroborated by the results of surveys in which euro area firms were asked about their price-setting rules. 34% review their prices at regular time intervals, a share which generally increases slightly for larger firms. Looking at a breakdown according to sectors, relatively less firms involved in industry apply this rule than firms involved in the retail and wholesale trades, which, in turn, use this rule less often than firms providing other services. 20% of firms in the euro area review prices mainly in response to changing

economic conditions, and the remaining 46% apply a combination of both approaches.

Another important question relates to how firms actually set prices, an issue addressed by the surveys on firms' price-setting behaviour. Firms were asked whether their price i) is set as a margin over costs; ii) depends on the price of their main competitor(s); or iii) is set according to other strategies. 54% of the firms polled opted for the first answer, 27% for the second and the remainder for the third. With regard to

the information that feeds into the pricing decision, around half of the participating firms take a wide range of information into account, including both past and expected economic developments; at the same time, however, 34% of the firms are not forward-looking in the sense that only information about the past and present is considered. In a similar vein, there is evidence that a substantial number of firms apply a rule of thumb (such as indexation based on the consumer price index) in the price-setting process.

Box 2

SURVEYS ON FIRMS' PRICE-SETTING BEHAVIOUR

The IPN has carried out surveys on firms' pricing policies in nine euro area countries, covering 94% of the euro area in terms of GDP. The surveys were conducted by each NCB at the national level to take advantage of the experience already acquired regarding survey and sample design and/or to adapt the list of questions, the exact wording and the technical aspects of the survey to national features and characteristics. Comparability across countries was achieved by means of coordination at the various stages of the project. In particular, a "minimum common sample" of questions was addressed in each survey and subsequently analysed.

Survey coverage

(percentages; number of respondents in brackets)

Country	Industry	Retail and wholesale	Other services	Construction	Total
Belgium	38 (753)	24 (478)	18 (364)	20 (384)	100 (1,979)
Germany	100 (1,228)	-	-	-	100 (1,228)
Spain	44 (888)	26 (515)	30 (605)	-	100 (2,008)
France	100 (1,662)	-	-	-	100 (1,662)
Italy	65 (215)	14 (46)	20 (68)	1 (4)	100 (333)
Luxembourg	20 (67)	22 (73)	37 (125)	22 (74)	100 (339)
The Netherlands	18 (219)	22 (271)	60 (756)	-	100 (1,246)
Austria	76 (661)	-	24 (212)	-	100 (873)
Portugal	84 (1,157)	-	16 (213)	-	100 (1,370)
Total	62 (6,850)	13 (1,383)	21 (2,343)	4 (462)	100 (11,038)

Source: Fabiani et al. (2005), "The pricing behaviour of firms in the euro area: new survey evidence", ECB Working Paper No 535.
Note: The table reports the breakdown of firms according to countries and sectors.

As shown in the table, more than 11,000 euro area firms and enterprises participated in the surveys, covering various sectors of the economy, although with a strong emphasis on industry, which accounts for more than 60% of all observations. Response rates differed across countries, ranging from 30% to 69%. The modalities of the survey also differed across countries: they were conducted over the telephone, using traditional mail, over the internet or in a few cases face to face. The sample of firms was generally taken from existing samples used for other regular surveys conducted by the NCBs or by external survey providers. The fact that results are very robust across countries suggests that they do not depend on the way the survey was conducted, the number of questions asked, the precise wording and the language of the questions, or the ordering of the questions and/or the possible answers.

The aim of the surveys was to gather qualitative information which could complement the results obtained on the basis of the quantitative datasets described in Box 1. Compared with these datasets, ad hoc surveys have the advantage that they can document, in qualitative terms, the underlying rationale of the observed pricing patterns. Moreover, surveys can analyse separately the two stages of the price adjustment process: the price reviewing stage and the price changing stage. However, the information provided by the surveys is mainly qualitative, and as a result it is difficult to quantify the effects of a given factor, e.g. on the size of price changes.

4 AVAILABLE EVIDENCE ON THE REASONS FOR SLUGGISH PRICE DYNAMICS

While the preceding sections have reported the typical patterns of price changes and the rules that are followed by price setters, this section focuses on potential reasons why price dynamics may be sluggish. It is apparent that prices are reviewed more often than they are changed. This may indeed be the case if the price reviews at times suggest that there is no need to actually change prices. Alternatively, however, there may be factors that prevent firms from adjusting their prices even if the review were to suggest doing so. Such factors are discussed in this section.

The surveys on firms' price-setting behaviour investigated this issue by asking firms which factors may well prevent an immediate price adjustment despite there being reasons for changing the price of their product. The list following this question offered a series of statements, expressed in simple terms, based on different economic theories, as to why prices may not be adjusted instantaneously. Some theories are more likely to apply in

situations where the intended price change would be an increase, others are more relevant for price decreases; most theories, however, cover both cases. The respondents could indicate their level of agreement with each statement by choosing one of four categories: unimportant (1), of minor importance (2), important (3) and very important (4), with the numbers in brackets indicating the scores allocated to each category. The mean scores given to the various theories by the participating firms have been used to calculate a ranking of possible reasons for price stickiness. The results are shown in Table 4.

The statement that achieved the highest average score (2.7), and is thus most important in practice, relates to the concept of "implicit contracts". This theory is based on the idea that firms establish long-term relationships with customers, for example in order to make future sales more predictable; in other words, they try to win customer loyalty simply by changing prices as little as possible. A constant price is attractive to customers because it allows them to make calculations using a stable long-term average price rather than prices

Table 4 Ranking of theories explaining price stickiness

Reasons for not changing prices	Average score
Implicit contracts	2.7
Explicit contracts	2.6
Cost-based pricing	2.6
Competitors' prices	2.4
Judging quality by price	2.1
Temporary shocks	2.0
Change of non-price factors	1.7
Menu costs	1.6
Costly information	1.6
Attractive pricing	1.6

Source: Fabiani et al. (2005), "The pricing behaviour of firms in the euro area: new survey evidence", ECB Working Paper No 535.

Note: The table shows the average ranking of the potential reasons why a firm may decide not to change its prices despite this being otherwise warranted. The ranking is based on the average response of firms from the following categories: unimportant (1), of minor importance (2), important (3) and very important (4).

that fluctuate over time. "Explicit contracts" are an alternative scenario in which firms have a contract with a customer that stipulates the price of the product to be delivered, such that it would be necessary to renegotiate the contract in order to change prices. This alternative has been found to be a significant impediment to price changes, scoring an average of 2.6. The prominence of implicit and explicit contracts is consistent with the fact that 70% of firms in the survey have some sort of long-term relationship with their customers.

Another possibility relates to "cost-based pricing", which assumes that prices do not change unless the costs actually incurred by firms change. Such a pattern implies that a change to the price of an intermediate product early in the production chain will only gradually be reflected in consumer prices, i.e. after the cost changes have been propagated throughout the entire production chain. This explanation has also proven to be very important, with the same average score of 2.6. As shown in the previous section, a large proportion of firms sets prices as a margin over costs, which may explain the importance of this factor.

Considerable weight is also attached to another possibility, with an average score of 2.4, whereby firms may prefer not to change their prices unless one of their competitors moves first ("competitors' prices"). If a firm is alone in increasing prices after changes in economic conditions, it may lose customers; on the other hand, being the first to reduce prices may spark an undesired price war. Therefore, if there is a risk that competing companies will not change prices, a firm may wish to wait for its competitors to act, and then follow suit.

Other alternatives have earned relatively lower scores and therefore seem to be less important. Among these is the possibility that consumers "judge quality by price". In such a case, firms may be reluctant to reduce prices as their customers may misinterpret this as a reduction in the quality of the product. Firms do not judge "temporary shocks" as being very important, either. The idea behind this reasoning is that a change in the underlying economic conditions that is perceived to be temporary will not induce a firm to respond with a price change, as this would then have to be readjusted in due course. Furthermore, another relatively unimportant alternative is the possibility that a firm may not adjust its price but instead "change non-price factors", such as the quality of the product, or the services offered in connection with the purchase.

Finally, the three possible reasons with the lowest score are "menu costs", "costly information" and "attractive pricing". The first is based on the possibility that the act of changing prices itself can be costly (e.g. because a restaurant would have to print a new menu), such that a firm might only change prices if the necessary change were sufficiently large to warrant paying the costs of changing it. In a similar vein, there might be other costs of changing prices, like the cost of the resources required to gather the relevant information, to decide upon and to implement price changes ("costly information"). Finally, if a product is typically sold at an "attractive price" (for example at €0.99), a firm may decide to delay a

price change until it can adjust it to a new attractive price.

The importance attached to the various possibilities differs only slightly across sectors, and is generally very similar across countries. One noticeable difference, however, relates to the retail and wholesale sectors, where explicit contracts are of minor importance while attractive prices and menu costs receive higher scores than in the other sectors. The low ranking of attractive pricing as an impediment to price changes in the producer sector in particular needs to be put into perspective, as such price-setting practices are widespread in the case of consumer prices in the euro area. As a matter of fact, analysis of the consumer price records generally finds that prices which are set at an attractive level are changed less frequently than other prices, suggesting that retailers may decide not to reset prices in response to changing conditions if the required change would result in an unattractive price.

Finally, the survey results show another marked regularity, namely an asymmetry in price adjustment. There is a general pattern whereby changes to costs are more relevant for price increases than for price decreases, while changes to market conditions matter more when prices have to be decreased. In other words, prices increase more when costs increase than they decrease when costs decrease, but on the other hand, prices decrease more when demand falls than they increase when demand rises. On the cost side, the development of labour and raw material costs in particular may lead to price increases, while financial costs are of minor importance; conversely, price decreases are mainly influenced by weakening demand or decreasing competitor prices. Firms in highly competitive markets react particularly strongly to price-decreasing factors, especially on the demand side.

To some extent, the asymmetry found in the surveys could also be verified in the analysis of the price records for consumer goods, where

input prices have been identified as an important determinant for the frequency of price increases, but not for price decreases. At the same time, the variability of input prices is an important driver of the adjustment of the final price of consumer goods: the more input prices for a product fluctuate, the more frequently its price is adjusted. The same effect is also observed for producer prices. It has been found that higher shares of labour input imply lower frequencies of price changes because input prices vary but little and, conversely, that higher shares of raw material input are related to higher frequencies of price changes because input prices are highly variable.⁷

The importance of wages for price setting has furthermore been illustrated in the case of Germany. As wage setting in Germany is highly synchronised, with trade unions organised on a sectoral basis, it is possible to analyse whether firms change their prices in a synchronised fashion during the months of negotiated wage increases. As a matter of fact, the share of firms that increase prices generally peaks in such months.⁸

The hypothesis that sluggish price dynamics are related to a low level of competitiveness in product markets was also tested using the individual price observations. Looking at producer prices, competitiveness of the markets in which firms operate is indeed important: the more competitive the environment, the more frequently prices change. For consumer prices, there is some evidence pointing in the same direction, although it is of a more indirect nature. For instance, there is substantial evidence that the frequency of consumer price changes depends on the outlet type: it is significantly higher in supermarkets and hypermarkets than in traditional corner shops. However, this can reflect differences in the degree of

⁷ See Álvarez, L., P. Burriel and I. Hernando (2005), "Price-setting behaviour in Spain: evidence from micro PPI data", ECB Working Paper No 522.

⁸ See Stahl, H. (2005), "Time-dependent or state-dependent price setting? Micro evidence from German metal-working industries", ECB Working Paper No 534.

price competition, as well as in the relative importance of the costs of changing prices or in the pricing strategies (for example “everyday low pricing” versus “high-low pricing”) in the different outlet types.

5 CONCLUSION

This article has presented an overview of recent research into price-setting behaviour in the euro area. Most of the analytical results were assembled in the course of research projects conducted jointly by the research areas of the Eurosystem central banks. They draw on an extensive and unprecedented dataset, covering quantitative individual price data underlying the construction of the consumer and producer price indices as well as qualitative information obtained from surveys with firms.

Several noteworthy findings have emerged from this research. Prices change infrequently in the euro area. A number of reasons for this pattern have been identified. First, most price setters review their prices only once to three times a year, and they tend to do so at regular time intervals. This finding supports the notion that, in general, price setters are operating in a stable macroeconomic environment characterised by price stability and thus there is little need to change prices. However, when such a need arises, some firms refrain from doing so for various reasons. The most prominent factors preventing immediate price adjustments are: i) the existence of long-term relationships with customers; ii) explicit contracts which would have to be renegotiated; and iii) pricing policies that do not lead to price changes unless the costs actually incurred by firms have changed. The first two factors in particular are of a structural nature and do not necessarily imply inefficiencies in the price-setting mechanism, but rather point to the value that is attached to stable prices by both price setters and their customers. At the same time, however, the results reported above suggest that greater competition reduces price stickiness. In that sense, structural reforms to

enhance competitiveness in product markets might be a useful step in order to reduce undesired forms of price stickiness.

A closer look at the frequency with which prices change reveals that there is strong heterogeneity across sectors, whereas differences across euro area countries are minor in comparison. The frequency of price changes in a given sector appears to depend strongly on the variability of input costs. Sectors where demand, supply and/or costs of input factors fluctuate substantially also change prices much more often, as is the case for example for energy products or unprocessed food. At the other end of the spectrum, services prices change very infrequently, which can at least partly be related to the importance of labour inputs into services, the costs for which fluctuate but little.

Finally, an interesting and perhaps surprising result obtained in this recent research is the fact that price decreases constitute a large share of all recorded price changes, with the services sector being a notable and, given its size, important exception. This pattern is most likely also related to the degree to which input costs and market conditions fluctuate. In any case, this finding suggests that there are no general impediments that prevent prices from decreasing if the underlying economic conditions warrant such a price change.