

# Price Setting in Austria – Results from the Eurosystem Inflation Persistence Network

Claudia Kwapil,  
Fabio Rumler

*This study examines price setting in Austria using micro observations of Consumer Price Index (CPI) data on the one hand and a one-time survey on firms' price-setting practices on the other hand. The analysis of the micro CPI data shows that consumer prices are adjusted roughly once a year averaged over all items in the CPI. However, there are enormous differences across sectors: The prices of energy products and unprocessed food are adjusted most often whereas the prices of nonenergy industrial goods and of services are changed less frequently. Austria ranks roughly in the middle range among euro area countries in terms of the frequency of price changes; it does not stand out for either especially rigid or especially flexible prices. Judging from the data set analyzed, the euro cash changeover did not bring about a significant inflationary effect. The supplementary company survey revealed that (producer) prices are reviewed four times as often as they are actually adjusted – about once a year. Price rigidity evidently tends to arise more at the second level of price formation, namely at the actual price-setting level. Firms state implicit (long-term customer relationships) and explicit contracts as causes for delaying price adjustments.*

JEL classification: E31, L14

Keywords: inflation persistence, nominal rigidity, price-setting.

## 1 Introduction

Price setting is an important topic for monetary policymaking. The empirical evidence indicates that prices in an economy react to a monetary policy impulse with a certain time lag, which is one reason why monetary policy has a short-term real effect. In this respect it is crucial for monetary policymakers to know about the cause and extent of price rigidities. The appropriate reaction to shocks, for example, depends among other things on the degree of price stickiness in an economy. Moreover, price rigidity partly determines how long inflation and real economic variables take to return to their initial levels after a shock.

This study attempts to answer two questions relevant to monetary policymaking: How often are prices changed at the consumer and at the producer level in Austria, and which empirical regularities can be observed in the process? Which theories of price rigidity are relevant in practice and should therefore be incorporated in econometric models? To answer this

question, it is indispensable to conduct a disaggregated analysis of price setting in Austria. For one thing, representative statements about price setting can be made only on the basis of a broad data set, and for another, a meaningful analysis of important features of pricing – such as sectoral, or idiosyncratic, differences in price-setting behavior – is possible only with a disaggregated approach. Hence, this study presents the main stylized facts about pricing in Austria on the basis of such a disaggregated approach to determine the extent and characteristics of existing price rigidities at the Austrian consumer and producer price level.

For lack of data, price setting at the micro level in Austria had not been analyzed up to now. This article is a summary of two more extensive studies conducted by the OeNB<sup>1</sup> within the framework of the Eurosystem Inflation Persistence Network, a joint research initiative of the euro area's national central banks (NCBs) and the European Central Bank (ECB) to examine inflation persistence.<sup>2</sup> These two studies

Refereed by  
Johannes Hoffmann,  
Deutsche Bundesbank.  
Research assistance:  
Wolfgang Harrer, OeNB.

<sup>1</sup> Baumgartner et al. (2005) and Kwapil et al. (2005).

<sup>2</sup> Rigid, or sticky, prices refer to prices that adjust sluggishly at the micro level to a change in economic conditions. By contrast, inflation persistence denotes the time it takes inflation at the macro level to return to its initial level after a disturbance. In this study the terms „rigid prices“ (‘‘sticky prices’’) and ‘‘flexible prices’’ are used as opposites and are thus value-free, as we have no information about price-determining factors, so that no judgment can be made about whether a price adjustment would be required or not (except in the case of the results presented in section 5).

are based on the analysis of two data sets that were made available especially for this research initiative. The analysis of consumer prices was performed using micro observations of data underlying the Austrian Consumer Price Index (CPI). To analyze producer prices and above all to shed light on the motives for price adjustments or nonadjustments, a survey of 800 Austrian companies was conducted and evaluated.

In the analysis of companies' price-setting behavior, we assumed that price-setting is the result of optimizing by companies. Optimizing refers not just to the decision whether a company should change prices or not, it covers the entire decision-making process behind price formation ranging from the collection of data on which to base the decision to the processing of these data to pricing itself. The use of micro CPI data serves to analyze the result of this decision-making process. However, it takes a different strategy to shed light on the underlying reasons and motivations, which is why we also opted for a direct survey of firms. This survey was targeted at establishing how companies arrive at their pricing decisions.

This study is structured as follows: Section 2 describes the extent and features of price rigidities on the basis of micro observations of data underlying the Austrian CPI for the average of the years 1996 to 2003. Section 3 presents price rigidities over time during this period, in particular during the euro cash changeover. The analysis of Austrian firms' price setting using survey data is discussed in section 4, and section 5 examines the applicability of various theories of price stickiness to companies' price-setting behavior.

Section 6 concludes with a summary of the main findings and draws conclusions for economic policymaking.

## **2 How Often Are Prices Adjusted? Evidence from Micro CPI Data**

### **2.1 Analysis of 3.6 Million Individual Price Observations**

Retail price dynamics in Austria are reviewed in this section: How flexible or how sticky are prices at the micro level in Austria? Are price changes more frequent in one sector than in another?

The analysis is based on monthly price quotes of all goods and services in the basket used to compute the Austrian CPI.<sup>3</sup> Statistics Austria provided the resulting data set to the Oesterreichische Nationalbank (OeNB) exclusively for this research project; it contains a total of 3.6 million price quotes of over 700 products for a 96-month period (January 1996 to December 2003). The monthly price quotes come with information about the store offering the product and the product characteristics as well as the unit (number or weight of items) to which the price relates. With the help of these data, the development of a product, e.g. a specific brand of banana in a particular store (anonymous), can be tracked over time and the frequency and extent of price adjustments of this product in this particular store can be determined.

### **2.2 On Average, 15% of All Prices Are Adjusted on a Monthly Basis**

This study uses the average frequency of price changes (here, the average frequency of all price changes of a product in the period from 1996 to 2003) to determine the degree of price rigidity.

<sup>3</sup> For confidentiality reasons, Statistics Austria excluded some products – such as cigarettes, cars and daily papers – from the data set it provided. Consequently, the data set used represented 90% coverage of the total basket of goods and services.

This measure is calculated on the basis of micro price observations, i.e. all observed price adjustments of a given product are divided by all valid price observations of this product. The frequency of price changes for a given product can then be summarized at the COICOP group<sup>4</sup> level or by product type<sup>5</sup> at the CPI level and at the aggregate CPI level to gain an insight into price stickiness in various sectors of the Austrian economy.

Table 1 provides an overview of Austrian consumer price changes broken down by the 12 COICOP groups and 5 CPI product types in comparison with changes in headline CPI. From the last line in table 1, we can conclude that on the average over all products, 15% of all prices are changed every month; this implies that Austrian consumer prices are adjusted every 14 months on the average.

Table 1

Frequency of Price Changes						
Sample period	Frequency of price changes	Average duration of price spells	Frequency of price increases	Frequency of price decreases	Average price increase	Average price decrease
January 1996 to December 2003	per month in %	months	per month in %	per month in %	%	%
<b>By COICOP group</b>						
COICOP 01: Food and nonalcoholic beverages	17.3	7.9	9.1	7.9	16.9	18.7
COICOP 02: Alcoholic beverages and tobacco	14.6	6.5	7.4	7.0	14.6	14.9
COICOP 03: Clothing and footwear	12.0	9.4	6.4	5.0	23.1	33.7
COICOP 04: Housing, water, gas and electricity	11.2	14.7	6.9	4.0	6.6	8.7
COICOP 05: Furnishings, household equipment and routine household maintenance	6.9	17.8	4.1	2.5	9.3	13.6
COICOP 06: Health care expenses	5.6	18.8	4.4	1.1	4.0	6.7
COICOP 07: Transport	36.5	11.2	18.8	17.7	8.3	8.8
COICOP 08: Communications	8.9	16.0	1.8	6.9	15.5	26.0
COICOP 09: Leisure and culture	24.2	15.8	12.3	11.2	11.1	12.3
COICOP 10: Education	4.5	23.2	4.1	0.4	4.9	0.5
COICOP 11: Hotels, cafés and restaurants	8.3	19.3	5.4	2.6	7.3	8.4
COICOP 12: Miscellaneous goods and services	7.1	18.7	4.9	2.0	7.6	11.4
<b>By product type</b>						
Unprocessed food	24.0	6.5	12.6	11.1	19.6	22.0
Processed food	12.8	8.5	6.8	5.8	14.8	16.1
Energy	40.1	8.3	20.7	19.3	5.1	4.4
Nonenergy industrial goods	10.2	13.7	5.4	4.3	13.2	18.6
Services	12.6	19.4	7.4	5.0	8.1	10.9
<b>Total</b>	<b>15.1</b>	<b>14.1</b>	<b>8.2</b>	<b>6.6</b>	<b>11.4</b>	<b>14.7</b>

Source: OeNB, Statistics Austria.

### 2.3 Price Stickiness Differs Strongly Among Sectors

Table 1 also shows that prices of unprocessed food (24%) and energy (40%) are changed more frequently than those of other products. The strong influence of supply-side factors, such as

the seasonal price fluctuations of fresh goods or the dependence of energy prices from the volatile price developments in the international oil market, on the prices of these goods explains this greater frequency. By contrast, the prices of industrial goods (10%)

<sup>4</sup> Classification Of Individual COnsumption by Purpose (COICOP).

<sup>5</sup> Unprocessed food, processed food, nonenergy industrial goods, energy, services.

and services (12%) are adjusted relatively more rarely. Above all administered prices, such as the charges and fees of central, state and local governments, which are also covered by the basket of goods and services, contribute to this low frequency of price changes. This order of the relative degree of price rigidity in the various sectors, with energy exhibiting the most flexible prices followed by unprocessed food and services showing the stickiest prices, is the same in all euro area countries with the exception of Portugal and in the U.S.A. (table 2).

#### 2.4 45% of All Price Changes Are Reductions

The examination of price changes by increases and decreases shows that prices were raised somewhat more often on average than they were cut. A separate review of price increases and decreases is important also to demonstrate that a high frequency of price adjustments does not automatically result in a higher rate of inflation, as price increases and reductions may offset each other and only a lasting change in the frequency of price adjustments should have an impact on the rate of inflation. Table 1 reveals that the average frequency of 8.2% of price increases for headline CPI contrasts with an average frequency of 6.6% of price decreases. Consequently, 45% of all price changes are price reductions, which contradicts the popular misconception of downward price rigidity. Services are an exception to this rule, above all public services as well as restaurants and ho-

tels, as the frequency of price increases of 7.4% substantially outweighs the frequency of price reductions of 5.0%. Conversely, the COICOP group communications exhibits a much higher frequency of price cuts than of price increases, most likely because the prices of consumer electronics products are frequently lowered.

The last two columns of table 1 indicate that the extent of observed price changes can deviate considerably from the inflation rate and that price reductions are somewhat larger than price increases: Average price increases over all categories came to 11.4%, average price reductions came to 14.7%. This asymmetry may be explained for the most part by sale markdowns and promotion discounts, which are larger than regular price hikes and cuts. Given rampant discounting in the COICOP category clothing and footwear, price changes are comparatively large and the asymmetry is especially pronounced in this group.

#### 2.5 The Frequency of Price Changes in Austria Corresponds to the Euro Area Average

Table 2 provides an international comparison of the frequency of price changes on the basis of a 50-item basket of goods.<sup>6</sup> The result indicates that the frequency of price changes in Austria is in the middle range – corresponding exactly to the average – of the euro area countries,<sup>7</sup> with Luxembourg topping the list at 23% and Italy exhibiting the lowest frequency of price changes at 10%.

<sup>6</sup> The restriction to 50 products is also the reason the frequency of price changes in table 2 deviates marginally from that in table 1. However, the marginal deviation also confirms that the choice of this sample is representative of the entire basket of goods.

<sup>7</sup> Studies like the above-mentioned study which analyzed price rigidities using micro data were conducted within the framework of the Inflation Persistence Network for the other euro area countries except Greece and Ireland. The results of these country studies were summarized by Dhyne et al. (2005) in a cross-country analysis for the euro area.

Table 2

International Comparison: Frequency of Price Changes by Product Type							
in %							
Frequency of price changes	Unprocessed food	Processed food	Energy (oil products)	Nonenergy industrial goods	Services	Total country weights	
Austria	37.5	15.5	72.3	8.4	7.1	15.4	
Belgium	31.5	19.1	81.6	5.9	3.0	17.6	
Germany	25.2	8.9	91.4	5.4	4.3	13.5	
Spain	50.9	17.7	x	6.1	4.6	13.3	
Finland	52.7	12.8	89.3	18.1	11.6	20.3	
France	24.7	20.3	76.9	18.0	7.4	20.9	
Italy	19.3	9.4	61.6	5.8	4.6	10.0	
Luxembourg	54.6	10.5	73.9	14.5	4.8	23.0	
Netherlands	30.8	17.3	72.6	14.2	7.9	16.2	
Portugal	55.3	24.5	15.9	14.3	13.6	21.1	
<b>Euro area</b>	<b>28.3</b>	<b>13.7</b>	<b>78.0</b>	<b>9.2</b>	<b>5.6</b>	<b>15.1</b>	
U.S.A.	47.7	27.1	74.1	22.4	15.0	24.8	

Source: Dhyne et al. (2005).

Moreover, the last line in table 2 shows that at almost 25%, the frequency of total consumer price changes in the U.S.A. is higher than that of the euro area. Apart from the different structure of the CPI basket of goods in the U.S.A. and the lack of harmonization in the calculation of the measures,<sup>8</sup> differing competitive retail structures and different idiosyncratic or macroeconomic shocks may serve to explain these discrepancies.

### 3 The Frequency and Extent of Price Changes over Time

#### 3.1 Pronounced Seasonal Peaks in January

Chart 1 shows the frequency of price changes, which were calculated for every month, from the beginning of 1996 to end-2003. A distinct seasonal pattern with annual peaks in January is observable, which reflects the common business practice of adjusting prices around the turn of the year. Moreover, the chart illustrates that

price changes became more frequent in 2000 and thereafter and that this trend – at least in the chart – coincided with the rise in the aggregate inflation rate in 2000. This could point to a positive relationship between the frequency of price changes and the aggregate inflation rate, as suggested in other studies on this topic.<sup>9</sup> In addition, the two lower lines in chart 1 attest to the absence of distinctive differing seasonal patterns and trend developments between the frequency of price increases and price reductions.

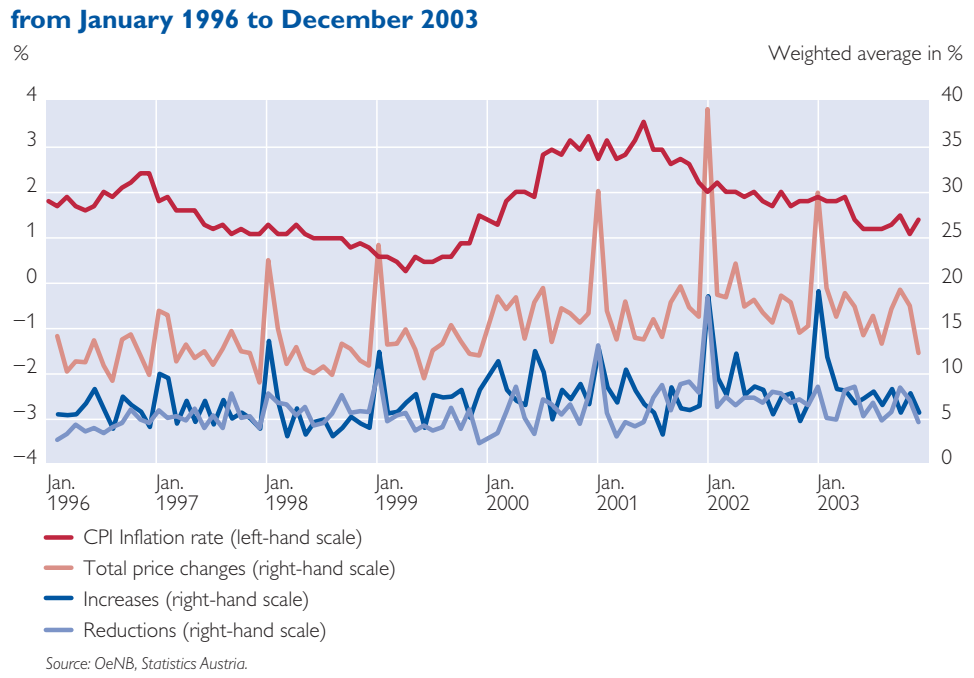
Just like the frequency of price changes, which is shown in chart 1, the average rise of all price changes over time for the entire basket of goods can be presented in a chart. Chart 2 compares absolute price changes with the rise of price increases and reductions from January 1996 through December 2003. This chart reveals that the rise of price changes also exhibits seasonal fluctuations, with peaks generally occurring in July (sometimes in August). As is evident from the break-

<sup>8</sup> The values for the U.S.A. are drawn from a study by Bils and Klenow (2004), in which above all the volume of data covered differs from that of the studies on euro area countries.

<sup>9</sup> For an overview, see Dhyne et al. (2005).

Chart 1

**Frequency of Price Changes and the Rate of Inflation**

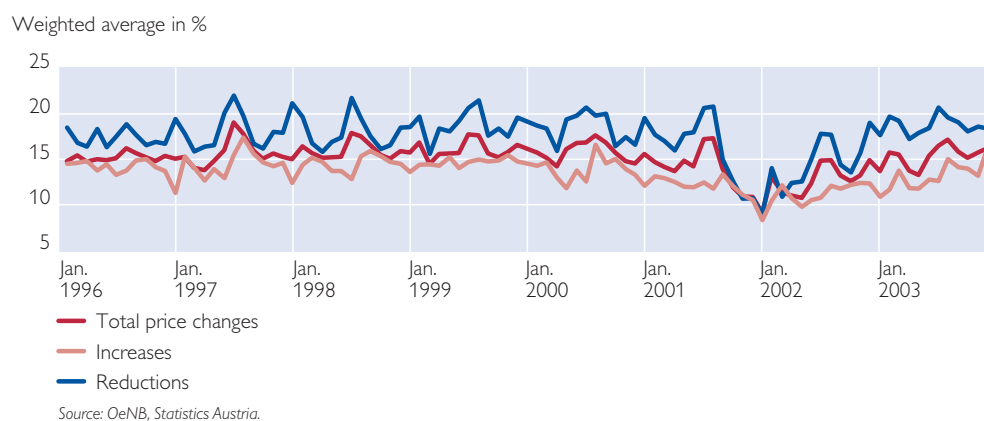


down by price cuts and price increases, the peaks result especially from huge discounts typically offered in July and August. Again, this pattern plainly reflects sale markdowns, above all on clothing, at the end of the summer season. While the downward effect of winter sales in January is fairly similar to the impact of the summer sales,

the rise of price increases in January is always below average. In other words, prices are raised more frequently in January than in other months (as shown in chart 1), but to a somewhat lesser extent than in the other months. This effect was especially pronounced in January 2002 (see section 3.2).

Chart 2

**Frequency of Price Changes from January 1996 to December 2003**



### 3.2 Price Changes during the Euro Cash Changeover

The analysis of charts 1 and 2 also allows for the examination of whether the cash changeover upon the introduction of the euro in January 2002 led to more frequent and/or to more pronounced price adjustments and thus had an influence on the rate of inflation. As to the frequency (chart 1), in January 2002 we could see a jump to close to 40%, which was more pronounced than during the first months of any of the other years. The evidence thus bears testimony to the fact that the introduction of euro cash resulted in more frequent price adjustments than in the previous years. 40% of the prices in the data set were changed during the euro cash changeover, which, however, also implies that some 60% of the prices remained unchanged, having been converted to euro at exactly the prescribed exchange rate for the Austrian schilling. What is more interesting, however, is to examine whether these price changes were mainly increases and thus exerted upward pressure on the inflation rate or not. We find almost exactly half of the price changes from December 2001 to January 2002 to have been increases, and the other half decreases; the overall effect on the rate of inflation was thus neutral.

The euro changeover also had a noticeable effect on the extent of price changes (chart 2): From mid-2001 onward, the average extent of price changes (increases and cuts) declined sharply, reached a low of less than 10% in January 2002, and returned to the previous level only toward the

end of 2002. This means that consumer prices in Austria were changed more often but less strongly during the euro cash changeover period. A further notable feature during this period is that on average, the extent of upward and downward price adjustments was roughly equal.

The two charts therefore provide no evidence that the euro cash changeover had an effect on inflation, at least not in January 2002; at that time, more prices were adjusted than usual, but as many prices were raised as reduced. No asymmetry could be noted between the extent of price increases and price decreases, either. Hence, the micro data do not provide evidence of an impact of the euro cash changeover on inflation.<sup>10</sup>

## 4 Price Setting – Evidence from the Company Survey

This part of the study is based on data collected with a questionnaire sent to about 2,400 Austrian manufacturing and service-sector companies in January 2004, of which 873 firms (36%) contributed to the survey.<sup>11</sup> The companies were asked to base their answers on what they considered their “main product” (as a share of turnover). Thus, all data collected in the survey refer to pricing at the producer level, unlike the data presented in sections 2 and 3, and any discrepancies may well be attributable to the difference between consumer and producer prices.

The evidence gleaned from the responses to the questionnaire indicates that pricing occurs in two stages: In a first step, firms review the appropri-

<sup>10</sup> At the macro level, earlier research did not provide any evidence of an impact of the euro introduction on the Austrian rate of inflation, either. See Fluch and Rumler (2005), in particular section 4 and the studies cited therein.

<sup>11</sup> The questionnaire was structured in 13 sections with a total of 79 questions on all aspects of pricing. See Kwapil et al. (2005) for further details about the survey and the questionnaire.

ateness of prices for the respective demand and cost situation; any deviation thus established would indicate that a price adjustment is in order. Second, once the price review has taken place, firms might change their prices. However, they do so considerably less frequently than they review prices. Prices are possibly left unchanged because there is no reason to change them. But perhaps prices remain unchanged because, even once firms have decided to incur the informational costs of the review, they think that there are additional costs of changing prices, which keeps them from adjusting prices.

#### 4.1 Some 75% of All Companies Review Prices Once a Quarter at Most

The companies that regularly review their prices were asked how often these reviews are made. As table 3 shows,

about 25% of the respondents indicated that they check prices once a year, some 18% do so twice a year, around 28% review prices once a quarter and roughly 22% perform monthly assessments. The median thus reviews prices once a quarter.

This result signals that most companies do not check prices continuously but rather at greater intervals. About three quarters of the companies look at their prices at most four times a year. There may be various reasons for this approach. For one thing, it may not make sense to review prices more often because the required information – e.g. about changing costs – may become available only sporadically or because price reviews might entail “information costs” that firms do not want to incur more often (see e.g. Ball and Mankiw, 1994).

Table 3

#### Frequency of Price Reviews

	Number of firms	Share of firms in %
Less than yearly	2.74	0.9
Yearly	79.66	25.5
Half-yearly	54.48	17.5
Quarterly	88.52	28.4
Monthly	69.11	22.2
Weekly	12.36	3.9
Daily	5.13	1.6
	312.00	100.0

Source: Kwapil et al. (2005).

#### 4.2 Some 75% of All Companies Change Prices Once a Year at Most

In addition to asking how often prices are reviewed, the questionnaire also asked how often prices were changed in a particular year (in this case 2003). About 22% of all firms stated that they had held prices stable, more than half of the respondents replied that they had changed prices once (see table 4). In this distribution – one price change

once a year – the median equals the mode. About three-quarters of the companies surveyed changed their prices at most once during 2003.

A comparison with other euro area countries shows (Fabiani et al., 2005) that at least 70% of the surveyed firms in Belgium, Spain, Italy, the Netherlands and Portugal indicated that they changed their prices at most once a year. In France (67%), Germany



Table 4

Frequency of Price Changes		
	Number of firms	Share of firms in %
0	69.03	22.1
1	169.01	54.2
2 to 3	43.44	13.9
4 to 11	24.07	7.7
12 to 49	3.72	1.2
over 50	2.73	0.9
	312.00	100.0

Source: Kwapil et al. (2005).

(58%)<sup>12</sup> and Luxembourg (46%), the shares of this category of companies are somewhat lower. Similar surveys conducted outside of the euro area provide the following results: In the U.S.A., the share of companies that change their prices once a year at most came to roughly 50% (Blinder et al., 1998), in the United Kingdom, the share was 43% (Hall et al., 1997), in Canada it amounted to 35% (Amirault et al., 2004) and in Sweden the share ran to approximately 70% (Apel et al., 2005).

A comparison between the frequency of price reviews and of price changes demonstrates that prices are reviewed far more often than they are changed. More than half the companies check their prices at least once a quarter, but only about 10% of the enterprises actually change their prices as often. While the median company examines its prices once a quarter, it changes its prices once a year.

There are two ways to interpret this result. On the one hand, reviews could lead to the conclusion that prices do not need to be adjusted because the cost and/or demand situation has not changed. On the other hand, the company could forgo a price change recommended by the review because there are

reasons to keep prices constant. Both instances cause the number of price changes to lag the number of reviews.

## 5 Reasons for Price Rigidities

The survey included the following question: “If a change in costs or demand warrants a price increase, what considerations could keep you from raising prices immediately?” This question was also posed for price decreases. The results for price increases are presented in table 5.<sup>13</sup>

The respondents had the opportunity to state whether each of the ten explanations provided was applicable, rather applicable, hardly applicable or not applicable to their behavior. Depending on the degree of applicability, values ranging from 4 (applicable) to 1 (not applicable) were assigned. Column 1 in table 5 contains the mean value of all companies’ responses and indicates how relevant the theories listed are for the companies’ behavior. The theories in table 5 were ranked according to these values. Another approach could be to rank the responses by agreement (responses 3 and 4) and disagreement (responses 1 and 2). The consent ratio in column 3 calculated by using this ranking thus represents

<sup>12</sup> The data for Germany are not taken from the German survey, but from the Ifo Business Survey.

<sup>13</sup> The result for price cuts is quite similar to that for price boosts. The main conclusions apply to both cases, which is why this study only goes into the reasons for price increases. For more details, see Kwapil et al. (2005).

Table 5

**Ranking of Theories Explaining Price Stickiness in Price Increases**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean	H <sub>0</sub>	Consent ratio in %	Apel et al.	Amirault et al.	Blinder et al.	Fabiani et al.	Hall et al.
Implicit contracts	3.04		77.37	1	2/7	4	1	5
Explicit contracts	3.02	***	73.42	3	3	5	2	1
Cost-based pricing	2.72		67.56	2	1	2	2	2
Kinked demand curve	2.69	***	62.77	4	x	x	x	x
Coordination failure	2.47	***	52.86	x	5/8	1	4	3
Information costs	1.61	**	12.21	13	10	x	9	x
Menu costs	1.52		13.39	11	10	6	8	11
Nonprice competition	1.49		11.19	x	4	3	7	8
Price readjustments	1.42	**	8.42	x	x	x	6	x
Pricing points	1.32		7.98	7	x	8	10	4

Source: Kwapił et al. (2005).

H<sub>0</sub> = The theory's mean score is equal to the score of the theory ranked just below it.

\*\*\* (\*\*\*) [\*] significant at the 1% (5%) [10%] level.

the share of companies that agree to the respective theory. The ranking by this criterion produces basically the same result.<sup>14</sup>

Overall, the tested theories may be classified in one of two groups. The theories in the first group received average valuations of far more than 2, and the consent ratio came to over 50%. We can thus assume that these approaches are very much in line with price setters' actual considerations. The theories in the second group received average valuations of far less than 2, and the consent ratios came to under 15%. Thus, these theories appear to be less relevant in practice. Columns (4) through (8) indicate the rankings determined in other studies.<sup>15</sup> The five theories that represent the first group in this study contain all first- and second-ranked theories in the other studies, which corroborates the overall robustness of the result of this study.

Implicit and explicit contracts represent the main reason for Austrian price-setters to postpone price changes. An implicit contract exists when a firm keeps prices constant to preserve or build long-term customer relationships. This theory, which goes back to Okun (1981), suggests that customers regard price increases in response to cost shocks as fairer than price adjustments in response to demand shocks. This is why enterprises avoid raising prices in response to strong demand for their product. By exhibiting this behavior, firms try to develop customer loyalty, and they secure future demand. Clearly, the companies which cited this theory as an important reason for sticky prices have a fairly large share of regular customers. The same line of reasoning applies to explicit contracts. In this case, however, the commitment to keep prices constant is explicitly laid down in writing. Explicit contracts are

<sup>14</sup> The only difference is that according to the consent ratio criterion, the menu cost theory would be ranked sixth and the information cost theory seventh.

<sup>15</sup> Apel et al. (2005) for Sweden, Amirault et al. (2004) for Canada, Blinder et al. (1998) for the U.S.A., Fabiani et al. (2005) for the euro area and Hall et al. (1997) for the United Kingdom.

a very common practice among the surveyed firms. 75% of the respondents have concluded explicit contracts with their patrons. These contracts are typically in force for one year: 21% of the respondents have contracts with a duration of under one year, 68% have one-year contracts and 11% conclude contracts in effect for more than one year.

Another important reason for sticky prices is cost orientation in pricing. Firms move prices as a reaction to a change in input costs, but they do so with a delay rather than immediately. Hence, it might take a long time for the price of a final product to reflect cost increases if the production process has many stages.

The theories ranked fourth and fifth on our list have some similarities. A kink in the demand curve means that lifting prices would result in a disproportionately strong decline in demand whereas a cut in prices would generate hardly any additional demand. Firms confronted by such a scenario will therefore not change prices. Coordination failure is based on a similar line of reasoning. In this case, companies keep prices stable because if they raised prices, none of their competitors would do the same. As a consequence, they would lose customers. Conversely, if they reduced prices, all competitors would do the same and they would not be able to attract a single new customer. This perception of the market situation leads to rigid prices in the short run and also appears to be prevalent among price-setters in Austria.

## 6 Conclusions

The analysis of micro CPI data shows that consumer prices are adjusted roughly once a year on average in Austria. This is also the average determined by an analysis across the euro

area countries. It follows that in a comparison across Europe, Austria has neither especially rigid nor especially flexible prices at the consumer level. However, the extent of price stickiness varies substantially among sectors, with food and energy prices being adjusted fairly often and service prices being changed far less frequently. Broken down by price increases and price decreases, 45% of all price changes prove to be price reductions (except in the service sector), which demonstrates that prices are not raised much more often than they are cut.

According to the recent economic literature, the heterogeneity of the extent of price stickiness among sectors may have implications for the choice of the price index as a monetary policy objective. Benigno (2004), Aoki (2001), and Goodfriend and King (1997), for example, contended in theoretical and in empirical works that it would be better to accord sectors with stickier prices a higher weight in the monetary policy target than sectors with more flexible prices. Applying this argument to the ECB's monetary policy target would mean dropping the sectors which exhibit the most volatile price developments from the index monitored for monetary policy purposes, which would be tantamount to providing an exclusion-based measure for the core inflation rate. While this consideration represents the theoretical rationale for the use of a core inflation rate as a basis for the monetary policy target, implementing it in practice is difficult. As Camba-Mendez (2003) among others argues, there is no consensus about how to evaluate the different measures of core inflation empirically, that is, how to define the core inflation rate and what criteria to use to select the different measures. This difficulty induced the ECB (ECB, 2001)

to define the monetary policy objective in terms of the entire basket of goods (the headline HICP) and to use core inflation (exclusion-based measures) only for additional information.

The results of the company survey also provide information about the frequency of price changes for a representative product of the respective respondent. The survey signals that the respondents adjusted prices about twice a year on average. The comparison of the survey and of the micro CPI price data reveals that producer prices are changed more often than consumer prices. This ties in with the typical findings of other studies conducted within the framework of the Inflation Persistence Network (e.g. Álvarez et al., 2005).

A more in-depth analysis of the frequency and rise of price changes during the euro changeover period on the basis of the micro CPI data shows a greater frequency of price adjustments in 2002, but the amount of upward and downward adjustments nearly offset each other. The extent of price changes in January 2002 also exhibits a symmetrical breakdown into price increases and price reductions. Hence, the euro cash changeover had no impact on aggregate inflation, at least not during the changeover month

of January 2002, which does not rule out that there may have been an inflationary effect in some sectors.

The results of the company survey lead to the conclusion that many firms do not review prices on a regular basis. In other words, price rigidities might be rooted to some extent in the very first stage of the price formation process, namely the price review stage. Two causes would appear possible: first, information costs may be involved; and second, information may be sticky. However, only 12% of all companies in the survey considered information costs to be relevant. With regard to the relevance of infrequently available new information, a survey by the Bank of Canada (Amirault et al., 2004) rules out sticky information as an important reason for infrequent price changes (only 13.5% of the sample recognized this explanation). Hence the real reasons for short-term price stickiness seem to lie in the second stage of the price formation process. Obviously firms keep prices constant even though cost and demand factors would warrant an increase, either because they do not want to endanger their customer relationships or because they fear a loss of market share.

## References

- Álvarez, L. und I. Hernando. 2005.** The Price Setting Behaviour of Spanish Firms: Evidence from Survey Data. Banco de España. Mimeo.
- Álvarez, L., P. Burriel and I. Hernando. 2005.** Price Setting Behaviour in Spain: Evidence from Micro PPI Data. In: ECB Working Paper 522.
- Amirault, D., C. Kwan and G. Wilkinson. 2004.** A Survey of the Price-Setting Behaviour of Canadian Companies. In: Bank of Canada Review. Winter 2004/2005. 29–40.
- Aoki, K. 2001.** Optimal Policy Response to Relative Price Changes. In: Journal of Monetary Economics 48. 55–80.
- Apel, M., R. Friberg and K. Hallsten. 2005.** Micro Foundations of Macroeconomic Price Adjustment: Survey Evidence from Swedish Firms. In: Journal of Money, Credit and Banking 37(2). 313–338.
- Ball, L. and G. Mankiw. 1994.** A Sticky-price Manifesto. In: Carnegie-Rochester Conference Series on Public Policy (41). 127–151.

- Baumgartner, J., E. Glatzer, F. Rumler and A. Stiglbauer. 2005.** How Frequently Do Consumer Prices Change in Austria? Evidence from Micro CPI Data. In: ECB Working Paper 523.
- Benigno, P. 2004.** Optimal Monetary Policy in a Currency Area. In: *Journal of International Economics* 63(2). 293–320.
- Bils, M. and P. Klenow. 2004.** Some Evidence on the Importance of Sticky Prices. In: *Journal of Political Economy* 112. 947–985.
- Blinder, A. S., E. Canetti, D. E. Lebow and J. B. Rudd. 1998.** Asking about Prices: A New Approach to Understanding Price Stickiness. Russell Sage Foundation. New York.
- Camba-Mendez, G. 2003.** The Definition of Price Stability: Choosing a Price Measure. In: *Background Studies for the ECB's Evaluation of its Monetary Policy Strategy*. Issing, O. (ed.), in collaboration with Angeloni, I., V. Gaspar, H.-J. Klöckers, K. Masuch, S. Nicoletti-Altimari, M. Rostagno und F. Smets.
- Dhyne, E., L. J. Álvarez, H. Le Bihan, G. Veronese, D. Dias, J. Hoffmann, N. Jonker, P. Lünnemann, F. Rumler and J. Vilmunen. 2005.** Price Setting in the Euro Area: Some Stylised Facts from Individual Consumer Price Data. In: ECB Working Paper 524.
- ECB. 2001.** Measures of Underlying Inflation in the Euro Area. In: *ECB-Monthly Bulletin* July.
- Fabiani, S., M. Druant, I. Hernando, C. Kwapil, 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. In: ECB Working Paper (forthcoming).
- Fluch, M. and F. Rumler. 2005.** Preisentwicklung in Österreich nach dem EU-Beitritt und in der Währungsunion. In: *Geldpolitik & Wirtschaft* Q2/05. OeNB. 75–96.
- Goodfriend, M. and R. King. 1997.** The New Neo-Classical Synthesis and the Role of Monetary Policy. In: *NBER Macroeconomics Manual*. 231–283.
- Hall, S., M. Walsh and A. Yates. 1997.** How Do UK Companies Set Prices? In: Working Paper 67. Bank of England.
- Kwapil, C., J. Baumgartner and J. Scharler. 2005.** The Price-Setting Behavior of Austrian Firms. Some Survey Results. In: ECB Working Paper 464.
- Okun, A. 1981.** *Prices and Quantities: A Macroeconomic Analysis*. The Brookings Institution. Washington D.C.