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**PRICE SETTING  
BEHAVIOUR IN THE  
NETHERLANDS  
RESULTS OF A SURVEY**

by Marco Hoeberichts  
and Ad Stokman





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### PRICE SETTING BEHAVIOUR IN THE NETHERLANDS

### RESULTS OF A SURVEY <sup>1</sup>

by Marco Hoeberichts <sup>2</sup>  
and Ad Stokman <sup>3</sup>



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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.

Since June 2005 the IPN is chaired by Frank Smets; 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 Gonzalo Camba-Méndez as Secretary.

The refereeing process is co-ordinated by a team composed of Günter Coenen (Chairman), Stephen Cecchetti, Silvia Fabiani, Jordi Galí, Andrew Levin, and Gonzalo Camba-Méndez. 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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## Abstract

This paper presents the results of a survey among Dutch firms on price setting behaviour in the Netherlands. It aims to identify how sticky prices are, which prices are sticky and why they are sticky. It is part of the Eurosystem Inflation Persistence Network (IPN). The most distinctive feature of the Dutch survey is its broad coverage of the business community (seven sectors and seven size classes). Our primary finding is that price setting behaviour depends critically on both a firm's size and the competitive environment it faces. Small firms in particular adopt more rigid pricing policies, and the weaker the competition a firm faces, the stickier a company's price will be. Furthermore, we find that wholesale and retail prices are more flexible than those for business-to-business services. The survey suggests that explicit and informal contracting are the most important sources of price stickiness. Menu costs and psychological pricing – two prominent explanations of price stickiness in the literature – are of minor importance. Finally, there is clear evidence of asymmetries in shocks driving price increases and decreases.

**JEL codes:** E30, D40

**Key words:** price setting, nominal rigidity, survey data

## NON-TECHNICAL SUMMARY

What type of Dutch firms pursues sticky price policies, and what are the sources of that rigidity? These are the two main questions we investigated on the basis of a survey among 1246 Dutch firms, drawn from a large panel of company owners, directors and high-level management responsible for marketing, sales or finance. We distinguish 7 sectors (of which 6 provide services) and 7 company sizes. By our knowledge, we are the first to investigate pricing behaviour of small companies, including the smallest single-worker firms. The investigation is a part of the Nederlandsche Bank's contribution to the Eurosystem Inflation Persistence Network (IPN) and builds on the seminal work of Blinder (1991). The Dutch survey was carried out in May 2004. In a recent paper, Jonker *et al.* (2004) examine the degree of nominal rigidity of consumer prices in the Dutch economy using a large database with monthly price quotes of 49 articles during 1998-2003. Although the survey study is based on a completely different set of information (broader but 'softer'), a number of interesting similarities arise that strengthen and enrich the findings in both directions.

Our main findings are:

- Prices are being reviewed much more frequent than changed. About two-thirds of all firms review prices more than once a year and only one-third change prices more than once per year;
- The median price duration for the Dutch business sector as a whole is 12 months;
- Price increases occur more often than decreases. Particularly in labour intensive service sectors, price decreases are uncommon. The magnitude of price decreases is larger than of price rises;
- The degree of competition is very important in shaping price setting behaviour. Under conditions of weak competition, prices become stickier;
- Prices are stickiest in small firms and most flexible in large firms. Single-worker firms are by far the stickiest price setters;
- The trade sector (wholesale and retail) adopts relatively flexible pricing policies. Prices for business-to-business services and catering are more rigid;
- The survey provides clear evidence of asymmetries in pricing behaviour: (worsening) market conditions are the main factor underlying price reductions, whereas (rising) costs are the driving force behind price increases;
- Among the motives for not changing prices or delaying price changes, informal and explicit contracts are the most relevant. Popular explanations like menu costs and appealing prices seem to be unimportant. This is in line with findings for other European countries;
- The changeover to the euro has not had a major influence on price setting up to now.

## 1. Introduction

This paper uses the results of a May 2004 survey to study price setting behaviour among firms in the Netherlands. Our primary objective is to identify the characteristics of firms whose pricing policy is relatively sticky, and the sources of that rigidity. The investigation is a part of the Nederlandsche Bank's contribution to the Eurosystem Inflation Persistence Network (IPN). Blinder (1991) was the first to recognize the potential of directly surveying businesses in bridging the gap between theory and practice. Without surveying methods, it is hard to discriminate between the many theories of price rigidity based on their prediction (...they all predict that prices are rigid...) <sup>4</sup>. Blinder's analysis was based on interviews with 200 American companies. A few others followed (for Germany see Köhler, 1996, for Sweden Apel *et al.*, 2005 and for the UK Hall *et al.* 2000). In the context of the IPN, nine Eurosystem national central banks (ncb's) carried out nation-wide surveys <sup>5</sup>. To our knowledge, the Dutch survey is the first attempt to capture the characteristics of price setting for a broad range of companies in the Netherlands.

In our survey, over 1200 firms were asked about the characteristics of their price setting behaviour. We asked about the frequency of price changes, the frequency with which prices were reviewed regardless of whether they were changed, and the rationale for the changes. The survey results allow us to examine various theories of price rigidity, including the role of implicit and explicit contracts, menu costs of changing prices and the costs of collecting information.

We find that implicit contracts (where customers expect prices to remain stable) and explicit contracts (where a price can only be changed after renegotiation) are the most important reasons for delaying a price change. This is in line with findings in other EMU countries (see Fabiani *et al.* (2005)). In a recent paper, Jonker *et al.* (2004) examine the degree of nominal rigidity of consumer prices in the Dutch economy using a large database with monthly price quotes of 49 articles during 1998-2003. Although our study is based on a completely different set of information, a number of interesting similarities arise. Both studies provide strong evidence that prices are stickiest in small firms and most flexible in large firms. Furthermore, in the survey the median price duration is 12 months, against 9 months in the micro-study. The reason for this difference might be that in our survey a broader set of prices is covered (both consumer prices and business-to-business prices). From our survey, we know that business-to-business prices change much less frequently than consumer prices. Furthermore, both studies find evidence that price increases occur more often than decreases and that the magnitude of price decreases is larger, but in the survey this difference is more pronounced.

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<sup>4</sup> Surveys have their shortcomings. For example, outcomes may depend on the formulation and the ordering of the questions or the timing of the survey. One of the interesting by-products of the IPN exercise is that the findings are quite robust across countries despite differences in survey techniques and differences in business cycle positions.

<sup>5</sup> Country-specific studies that have been conducted in the framework of the IPN are Kwapil *et al.* (2005) for Austria, Aucremanne and Druant (2005) for Belgium, Loupias and Ricart (2004) for France, Stahl (2005) for Germany, Fabiani *et al.* (2004) for Italy, Lünnemann and Mathä (2005) for Luxembourg, Martins (2005) for Portugal and Álvarez and Hernando (2005) for Spain.

Finally, in both the micro-study and the survey, Dutch price setters follow time-dependent and state-dependent pricing strategies. There are also remarkable differences. The micro-study concludes that single-worker businesses change prices almost as often as large firms, whereas we do not find this in the survey. However, in our survey single-worker firms cover a much wider range of activities: whereas the micro-study focuses on consumer goods and services, our study also deals with business-to-business deliveries. Overall, the similarities strengthen the findings in both directions.

The paper is structured as follows. In Section 2, we briefly describe the survey set-up. In Section 3, we analyse and discuss the outcomes of the survey, focussing on the frequency of price reviews and price changes, the role of competition, firm size and type of sector (par. 3.2), price setting rules (par. 3.3), reasons of price stickiness (par. 3.4) and the existence of asymmetries in pricing behaviour (par. 3.5). Section 4 discusses the effect of EMU on price-setting behaviour and Section 5 concludes.

## 2. Survey set-up

The survey, carried out in May 2004 by a private company (TNS-NIPO), is based on a questionnaire prepared by the Nederlandsche Bank (see Appendix). The survey design builds on a combination of the work of Blinder (1991) and material from IPN members. The sample was drawn from a panel of 12,000 company owners, directors and high-level management responsible for marketing, sales or finance. Questionnaires were sent by email to almost 1,900 potential respondents, in most cases to their home email addresses. The advantage of this approach is that respondents can respond at a time of their own choosing. The questionnaire was pre-tested using a pilot sample of 200 firms. In total, TNS-NIPO received 1,246 replies; a response rate of 67%. Considering the specialized nature of the survey, this is very high (Apel *et al.* (2005) report a high response rate of 48.7%) but we find large differences in response rates between small and large companies. Excluded from our survey were the government, construction, the financial sector, the energy sector and farming.

Table 1 summarizes the sample breakdown into company size and sector. To ensure that potentially relevant categories are sufficiently represented in our survey, the sample was stratified into seven sectors and seven company sizes (measured by numbers of employees). We use this stratification to apply a weighting scheme that renders our results representative for the population of firms in the Netherlands. Next to manufacturing, we distinguish six services sectors. The main reason for our focus on the services sector is that the Dutch economy is to a large extent service orientated. In total, the service sector accounts for 80% of total employment and 75% of value added in the Netherlands (Figure 1A).



**Table 1 - Sample characteristics and response rates**

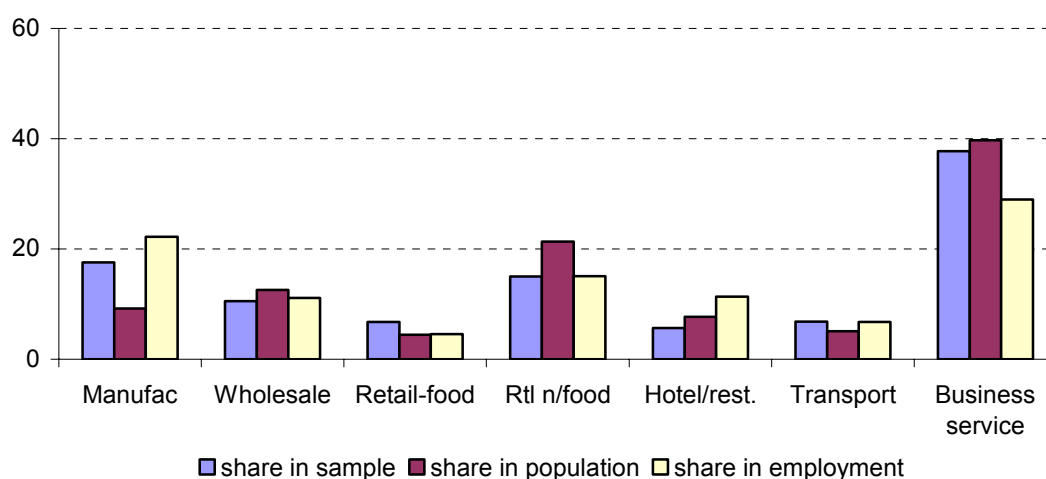
Business sector	Number of respondents	Response rate (%)	Size	Number of respondents	Response rate (%)
Manufacturing	219	64	1 person	230	88
Services	1027	67	2-4 persons	292	87
- Wholesale	131	61	5-9 persons	198	84
- Retail food	84	62	10-19 persons	152	67
- Retail non-food	187	71	20-49 persons	141	57
- Hotel/restaurant	70	77	50-99 persons	86	56
- Transportation	85	54	>100 persons	147	36
- Other business services	470	71			
Total	1246	67	Total	1246	67

An interesting feature of our survey is that both large and small companies are included. As far as we know, we are the first to investigate the price setting behaviour of the smallest firms with 1, 2-4 or 5-9 workers. This group is interesting, because small firms' pricing behaviour is particularly rigid (see later). Moreover, small firms represent a substantial part of the Dutch economy: together they account for almost a quarter of business sector's employment in the Netherlands.

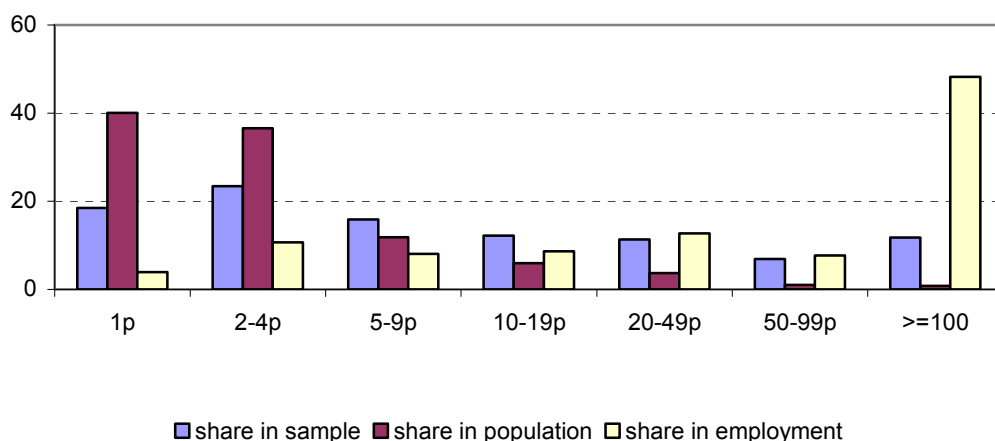
Figure 1A and 1B show that the sample distribution deviates substantially from the population composition. The difference is particularly large when taking the firms' size perspective: small firms are overrepresented in the sample at the expense of large companies' shares. Since the sample was stratified, we calculated the behaviour of the average Dutch firm on the basis of the 7x7 stratum shares in total employment.

We asked respondents to relate the questions in the survey to either the main product or a typical product sold by the company. Picking a specific product is convenient for the respondent,

**Figure 1A - Composition sample and population by sector**  
(percentage of sector)



**Figure 1B - Composition sample and population by firm size**  
(percentage of size class)



especially in cases where a company adopts different pricing strategies for different goods and services. In this way we retain internal consistency, preventing respondents from switching products as they answer the questions. First, we asked respondents whether or not their company pursues a single pricing policy for all of its products. On average, 28% of respondents report the same price setting for all products; 24% of the respondents adopt one pricing strategy for most of their products and 44% states that price setting varies substantially across products. Of the large companies in our survey, 53% apply various price setting strategies versus only 37% of small companies. All in all, these figures suggest that the single-product approach provides an accurate picture for the majority of the companies in our survey.

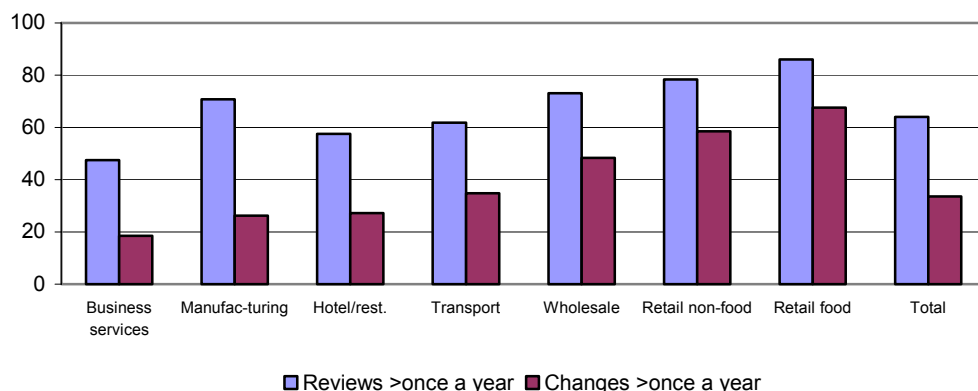
### 3. Survey outcomes

#### 3.1 Price reviews and changes

In this section, three indicators are presented in order to assess the degree of price stickiness: the frequency of price reviews (Question 2.3), the frequency of price changes (Question 2.4) and the share of firms raising and lowering their prices in a given year (Question 1.10 and 1.11). Blinder (1991) warns there is no definite evidence that prices are sticky. First of all, the equilibrium price level is not observable; and secondly, prices may be stable because underlying economic circumstances are.

In Figure 2A below, frequencies of price changes and reviews are shown for different sectors. The first observation is that firms review their prices more often than they change them. Frequencies of price reviews and price changes differ substantially across sectors. Price reviews are most frequent in the wholesale and retail sectors and especially in retail food. These sectors

**Figure 2A - Frequency of price reviews and changes by sector**  
(percentage of sector)



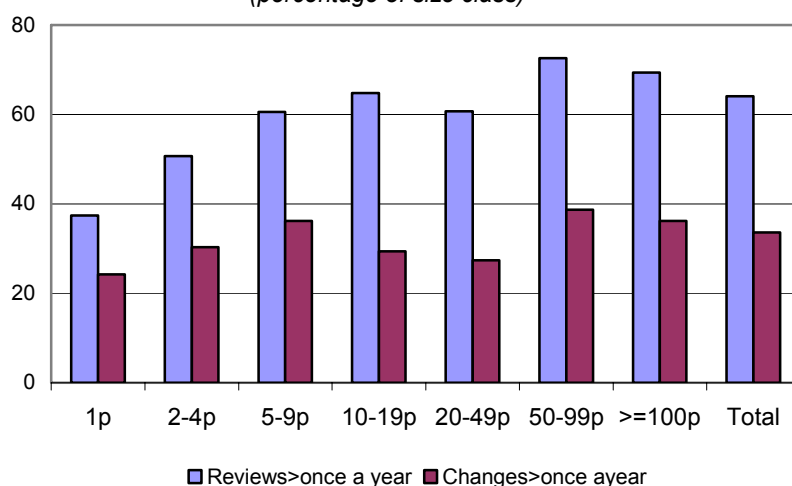
also change prices most frequently. Within the services sector, prices for business-to-business services are most rigid. In manufacturing, while more than two thirds of firms review prices more than once a year, still only 25% change them more than once a year. Both price reviews and price changes are least frequently observed in business services. The high relative frequency of price reviews suggests that the cost of collecting information is not a decisive factor in determining price flexibility.

Table 2 shows the frequency of price reviews and actual price changes in the sectors that we distinguish. In the hotel and restaurant sector, 60% raised prices in 2003, whereas only 7% lowered prices. Price decreases were most common in the retail food sector, where 47% have lowered their price. For the Dutch economy as a whole, the median decrease is about twice the median increase. Moreover, almost one-third of all reported price changes in 2003 were price cuts. The study by Jonker *et al.* (2004) into Dutch CPI prices also finds that price increases occur more often than decreases and that on average, the magnitude of decreases is larger. Fabiani *et al.* (2005) and Dhyne *et al.* (2005) report similar findings.

**Table 2 - Price increases and decreases in 2003 by sector**  
(percentages)

Sector	Firms that raised prices in 2003		Firms that lowered prices in 2003	
	% of firms	Median increase	% of firms	Median decrease
Manufacturing	39.3	3	34.6	15
Wholesale	45.7	6	29.8	10
Retail food	32.4	10	47.1	10
Retail non-food	49.5	5	18.3	10
Hotel/rest.	59.2	5	7.0	5
Transport	58.4	3	9.2	10
Business services	54.0	5	18.2	10
<b>Total</b>	<b>49.1</b>	<b>5</b>	<b>22.6</b>	<b>10</b>

**Figure 2B - Reviews and price changes by firm size**  
(percentage of size class)



As mentioned in the introduction, our survey covers a broad range of firm sizes. Figure 2B below and Table 3 show how the frequency of price reviews and actual price changes varies with firm size. Clearly, firms with only one employee have the most rigid prices. Only 37% of firms review and only 23% change more than once a year. The low frequency of price reviews by the smallest firms stands out in particular: of the slightly larger firms with 2-4 employees, 52% review more than once a year. Large firms tend to review frequently (69% do so more than once a year), yet only 37% change prices more than once a year. In 2003, price changes (and especially price decreases) were relatively rare for small firms. This confirms earlier findings by Jonker *et al.* (2004) for CPI prices in the Netherlands and is also consistent with results in Fabiani *et al.* (2005) for surveys in other countries participating in the IPN.

**Table 3 - Price increases and decreases in 2003 by firm size**  
(percentages)

Firm size	firms that raised prices in 2003		firms that lowered prices in 2003	
	% of firms	Median increase	% of firms	Median decrease
1 employee	42.1	6	14.8	15
2-4	44.2	6	16.0	10
5-9	46.9	5	17.8	10
10-19	49.1	5	16.3	10
20-49	63.7	4	15.3	10
50-99	51.6	5	24.0	10
100+	46.8	4	28.2	10
<b>Total</b>	<b>49.1</b>	<b>5</b>	<b>22.6</b>	<b>10</b>



### 3.2 Price setting and competition

In the economic literature, the degree of competition is considered to be crucial in price setting behaviour. Under conditions of perfect competition, the individual firm is unable to decide its own prices: there is one unique price that clears the market and there are no price rigidities. A firm's pricing decisions make sense only if it has some degree of market power. Hence market power is a prerequisite for price stickiness to be an equilibrium phenomenon. In New Keynesian models with sticky prices, firms do indeed exercise some market power (monopolistic competition). In highly competitive markets, companies will change their prices more often in response to changing market conditions or price revisions by main competitors (see for example Bayoumi *et. al.*, 2004). One might think of circumstances under which firms become more reluctant to change their prices when competitive pressure grows (see Section 3.4).

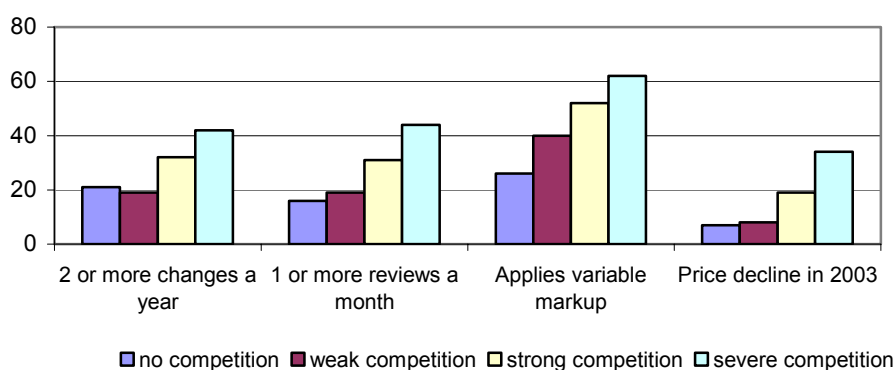
Because of the central role of competition, we included a couple of questions that relate to competitive pressure. In general, we expect competitive pressure to rise with the number of competitors. This measure has its shortcomings, though. For example, even in oligopolistic markets with a small number of firms, competition may still be strong. Therefore, we asked companies about the perceived degree of competition, distinguishing severe, strong, weak and no competition (see Question 1.9).

In our sample of 1,246 firms, competition was experienced as severe by 21%, as strong by 47%, as weak by 23%, while 5% experienced no competition. Figure 3 shows the relationship between the degree of perceived competition and frequency of price reviews and changes (see Question 2.3 and 2.4 respectively), downward nominal rigidity of prices (Question 1.10 and 1.11) and the choice between fixed and variable mark-ups in price determination (Question 2.7). We find that price setting is much more flexible in highly competitive markets: firms operating in these markets review and change their prices much more frequently and apply flexible mark-ups more often. E.g., 20% of the firms experiencing no or weak competition say they change prices at least two times a year, against 40% of firms operating in highly competitive markets. According to our survey, one third of the respondents that experience strong competition had lowered the price of the main product the previous year. In markets with weak competition, on the other hand, price decreases were uncommon.

#### *Multivariate analysis of factors influencing the frequency of price reviews and changes*

Tables 2 and 3 indicated that firms that provide business services and small firms charge the most rigid prices. However, one would expect to find some degree of correlation between firm size and sector. For example, business services providers may be smaller, on average, than

**Figure 3 - Price setting characteristics and competition**  
 (% respondents in competition cluster)



manufacturing firms. In order to distinguish between the size effect and the sector effect, we follow Blinder (1994), using an ordered logit regression to estimate the relationship between an ordinal dependent variable (the price review and change frequency band reported in our questionnaire, see Appendix, Questions 2.3 and 2.4) and a set of independent dummy variables that represent firms' characteristics. Just like Blinder (1994), we find this an efficient way of summarizing partial correlations found in the data.

To simplify the interpretation of the results, we report, in Tables 4A and 4B, marginal effects the firms' characteristics have on the frequency of price reviews and price changes. Therefore, we also need to choose a hypothetical benchmark firm. Our benchmark is in manufacturing, has 50 or more employees and faces strong competition. The columns in the table represent the categories the respondents could choose from. The first row gives the estimated probabilities (in %) of our benchmark firm falling into each of the response categories. Each subsequent row gives the percentage point change in the estimated probability if one of the characteristics of the benchmark firm changes. For example, our benchmark firm (with 50 or more employees) has a 22.2% estimated probability of reviewing prices once per year. For a similar firm with only 1-4 employees, the estimated probability of once-yearly price reviews would be 32.7% (22.2+10.5). As is usual in this kind of studies (see Apel *et al* (2005)), the explanatory power of the regressions is rather low. Nevertheless, we report Pseudo R<sup>2</sup> values for the logit regressions and Adjusted R<sup>2</sup> values for linear regressions.

The logit analysis broadly confirms the conclusion drawn from Figure 2A: Price changes and price reviews happen very frequently in the wholesale and retail (especially food) sectors, while the business-to-business services sector and the manufacturing sector change and review prices relatively infrequently. In the logit analysis we report the marginal effect of changing one characteristic with the others kept constant, whereas in Figures 2A and 2B the other factors also change. This explains the differences between the two analyses. In Figure 2A, the fraction of

firms in the manufacturing sector that review more than once a year is similar to the fraction of firms in the wholesale sector. In Table 4A, we find that a firm in the wholesale sector with 50 or more employees facing strong competition reviews its prices significantly more often than a similarly sized manufacturing firm facing similar competition. Wholesale firms, however, tend to be much smaller. The conclusion from Figure 2B, that large firms review and change prices more often than small firms is also confirmed in Tables 4A and 4B, which show that more competition significantly increases the frequencies of price reviews and changes.

**Table 4A - Ordered logit regression of the frequency of price reviews (marginal effects)**

*Question 2.3: On average, how often do you check or review the adequacy of the price of product X?*

(percentage points unless stated else)

	Occasionally	Once per year	Once per quarter	Once per month	Once per week	Daily	Total
Benchmark	11.3%	22.2%	23.5%	20.4%	10.9%	11.8%	100%
1-4 workers	17.5 (3.8)**	10.5 (2.9)**	-4.2 (1.9)**	-9.6 (1.5)**	-6.5 (0.1)**	-7.7 (1.2)**	0
5-9	10.7 (3.7)**	8.5 (1.9)**	-1.6 (1.6)	-6.6 (1.9)**	-4.9 (1.2)**	-6.1 (1.4)**	0
10-49	4.8 (1.9)**	4.8 (1.7)**	-0.0 (0.6)	-3.3 (1.3)**	-2.7 (0.1)**	-3.6 (1.2)**	0
Tough comp.	-5.1 (1.2)**	-7.7 (1.6)**	-3.5 (1.1)**	2.8 (0.9)**	4.8 (1.1)**	8.8 (2.2)**	0
Weak/no comp.	2.0 (1.5)	2.2 (1.6)	0.2 (0.3)	-1.4 (1.1)	-1.3 (0.9)	-1.8 (1.3)	0
Retail food	-9.2 (1.5)**	-16.4 (2.2)**	-13.1 (2.4)**	-2.0 (2.6)	8.4 (1.4)**	32.3 (7.0)**	0
Retail non-food	-7.1 (1.4)**	-11.6 (2.0)**	-7.0 (1.7)**	2.4 (1.2)**	7.2 (1.4)**	16.2 (3.5)**	0
Wholesale	-6.8 (1.5)**	-11.0 (2.2)**	-6.4 (1.9)**	2.6 (1.2)**	6.8 (1.5)**	14.9 (4.0)**	0
Hotel/rest.	0.5 (2.1)	0.6 (2.4)	0.1 (0.4)	-0.3 (1.4)	0.3 (1.4)	-0.5 (2.0)	0
Transport	1.9 (2.6)	2.2 (2.8)	0.2 (0.3)	-1.4 (1.8)	-1.2 (1.6)	-1.7 (2.2)	0
Business svc.	3.7 (1.9)**	3.9 (1.9)**	0.1 (0.4)	-2.6 (1.3)**	-2.2 (1.1)**	-3.0 (1.5)**	0

Pseudo R<sup>2</sup> = 0.06

Benchmark firm: manufacturing, 50 or more employees, strong perceived competition

Standard errors in parentheses

\*\* = significant at the 5% level, \* = significant at the 10% level.

**Table 4B - Ordered logit regression of the frequency of price changes (marginal effects)**

*Question 2.4: On average, how many times a year do you adjust your selling price of product X?*

(percentage points unless stated else)

	Occasionally	Once per year	2-4 times per year	5-11 times per year	Monthly	More than once a month	Total
Benchmark	6.4%	67.6%	18.4%	2.4%	1.7%	3.5%	100%
1-4 workers	8.0 (2.6)**	5.5 (2.3)**	-9.2 (1.8)**	-1.4 (0.3)**	-0.9 (0.3)**	-2.1 (0.5)**	0
5-9	3.8 (2.2)**	4.7 (1.9)**	-5.7 (2.4)**	-0.9 (0.4)**	-0.6 (0.3)**	-1.4 (0.6)**	0
10-49	4.6 (1.7)**	5.1 (1.7)**	-6.5 (1.8)**	-1.0 (0.3)**	-0.7 (0.2)**	-1.5 (0.5)**	0
Tough comp.	-1.5 (0.8)*	-4.5 (2.4)*	3.7 (1.9)*	0.7 (0.4)*	0.5 (0.3)*	1.1 (0.6)*	0
Weak/no comp.	1.9 (1.2)	3.1 (1.8)*	-3.2 (1.9)*	-0.5 (0.3)*	-0.4 (0.2)*	-0.8 (0.5)*	0
Retail food	-5.7 (1.1)**	-44.2 (5.4)**	15.0 (3.0)**	7.2 (1.4)**	6.5 (1.6)**	21.1 (5.4)**	0
Retail non-food	-5.1 (1.0)**	-33.4 (4.3)**	16.3 (2.2)**	5.5 (1.1)**	4.5 (1.1)**	12.4 (2.6)**	0
Wholesale	-5.1 (1.0)**	-33.2 (5.0)**	16.2 (2.2)**	5.4 (1.2)**	4.5 (1.2)**	12.2 (3.0)**	0
Hotel/rest.	-2.5 (1.1)**	-8.6 (4.5)*	6.6 (3.1)**	1.3 (0.7)*	1.0 (0.5)*	2.3 (1.2)*	0
Transport	-2.5 (1.2)**	-8.5 (4.8)*	6.5 (3.3)*	1.3 (0.8)*	1.0 (0.6)*	2.2 (1.3)*	0
Business svc	-0.0 (1.1)	-0.0 (2.5)	0.0 (2.3)	0.0 (0.4)	0.0 (0.3)	0.0 (0.1)	0

Pseudo R<sup>2</sup> = 0.07

Benchmark firm: manufacturing, 50 or more employees, strong perceived competition

Standard errors in parentheses

\*\* = significant at the 5% level, \* = significant at the 10% level.

### 3.3 Price determination

We have asked firms how they determine the price for their main product. All possible answers are listed in the appendix (Question 2.7). In the analysis, we focus on the most important five answer categories. As in the previous section, we distinguish by sector and by size (Tables 5 and 6). It is clear that in most sectors and in the Dutch economy as a whole, most firms apply a variable markup to their costs. In the transport sector, the largest group consists of firms that link their price to other prices. In retail non-food the fixed markup dominates and in retail food the competitors' price is important.

**Table 5 - Price determination by sector**  
(percentages)

Firm size	Fixed markup	Variable markup	Competitors	Linked to e.g. wage	Depend on customer	Other
Manufacturing	27.9	<b>39.4</b>	21.2	6.7	3.3	1.5
Wholesale	24.2	<b>52.6</b>	21.3	0.0	1.4	0.5
Retail food	23.5	30.2	<b>40.2</b>	1.9	2.0	2.2
Retail non-food	<b>30.5</b>	27.3	28.4	1.9	9.8	2.1
Hotel/rest.	24.4	<b>33.2</b>	18.7	9.4	5.5	8.8
Transport	21.3	19.8	14.9	<b>24.6</b>	15.0	4.4
Other services	17.7	<b>34.8</b>	18.2	19.4	4.8	5.2
<b>Total</b>	<b>23.9</b>	<b>35.4</b>	<b>21.6</b>	<b>10.2</b>	<b>5.5</b>	<b>3.5</b>

**Table 6 - Price determination by size**  
(percentages)

Firm size	Fixed markup	Variable markup	Competitors	Linked to e.g. wage	Depend on customer	Other
1 worker	23.1	18.8	<b>34.1</b>	7.0	9.7	7.3
2-4	<b>33.9</b>	27.6	18.9	9.6	5.7	4.4
5-9	<b>35.5</b>	30.5	17.5	8.4	6.2	1.9
10-19	29.6	<b>33.8</b>	12.9	11.0	5.9	6.8
20-49	18.5	<b>36.7</b>	27.1	6.8	3.6	7.3
50-99	<b>29.0</b>	28.9	20.5	16.1	4.4	1.2
100+	19.3	<b>40.2</b>	22.1	10.8	5.6	2.0
<b>Total</b>	<b>23.9</b>	<b>35.4</b>	<b>21.6</b>	<b>10.2</b>	<b>5.5</b>	<b>3.5</b>

The single-employee firms stand out in the way they determine prices. Where the overall picture shows that smaller firms tend to apply fixed markups and large firms variable markups, single-employee firms appear to determine their price by looking at competitors' prices. We apply a multinomial logit regression to analyze which factors influence the way a firm determines its price (Table 7).

Again, we take as our benchmark a manufacturing firm with 50 or more employees facing strong competition. The probability of our benchmark firm applying a variable markup to its costs is put



**Table 7 - Multinomial logit regression of price determination (marginal effects)**  
(percentage points, unless stated else)

	Fixed markup	Variable markup	Competitors' price	Linked to other price	Depends on customer	Other	Total
Benchmark	27.0%	39.9%	22.3%	6.9%	2.9%	1.0%	100%
1 worker	4.3 (8.7)	-20.0 (6.9)**	15.8 (8.7)*	-4.0 (2.1)*	1.7 (2.6)	2.1 (2.3)	0
2-4	15.6 (5.6)**	-11.7 (4.9)**	-4.2 (4.0)	-0.8 (2.1)	-0.1 (1.2)	1.3 (1.3)	0
5-9	15.8 (6.1)**	-9.2 (5.5)*	-6.0 (4.2)	-0.6 (2.5)	0.1 (1.4)	-0.1 (0.8)	0
10-49	2.7 (3.9)	-3.7 (3.9)	0.8 (3.3)	-1.2 (1.6)	-0.4 (0.9)	2.5 (1.6)	0
Tough competition	-8.5 (3.1)**	9.4 (3.8)**	1.4 (3.1)	-2.4 (1.5)	0.8 (1.1)	-0.7 (0.5)	0
Weak/no competition	7.8 (3.8)**	-7.2 (3.9)*	-6.1 (3.0)**	3.5 (2.1)*	1.2 (1.3)	0.7 (0.6)	0
Retail food	-5.8 (6.4)	-9.0 (7.3)	20.1 (7.6)**	-4.8 (2.7)*	-1.2 (2.0)	0.7 (1.7)	0
Retail non-food	-0.3 (4.6)	-9.7 (4.9)**	8.8 (4.8)*	-4.7 (2.0)**	5.7 (2.7)**	0.2 (0.9)	0
Wholesale	-6.4 (4.5)	15.6 (5.6)**	0.3 (4.7)	-6.9 (1.7)**	-1.7 (1.3)	-0.8 (0.6)	0
Hotel/restaurants	-6.6 (4.7)	-0.6 (6.1)	0.1 (5.2)	2.3 (3.3)	2.1 (2.4)	2.7 (1.7)	0
Transport	-5.8 (5.4)	-20.2 (5.4)**	-6.8 (4.9)	20.4 (5.9)**	9.4 (3.9)**	3.1 (2.3)	0
Business services	-11.8 (3.4)**	-1.1 (4.3)	-3.4 (3.5)	13.4 (3.1)**	1.1 (1.4)	1.7 (1.0)*	0

Pseudo  $R^2 = 0.07$

Benchmark firm: manufacturing, 50 or more employees, strong perceived competition

Standard errors in parentheses

\*\* = significant at the 5% level, \* = significant at the 10% level.

at 40%. We find that larger firms tend to use a variable markup while smaller firms use a fixed markup. As firms perceive stronger competition, the variable markup becomes a more important strategy. Linking to other prices becomes less important with growing competition and tends to be more important for transport or business services firms. In business servicing labour costs are likely to play an important role. In the transport sector, fuel costs are another relevant factor. The dummy for single-employee firms shows that they tend to follow competitors' prices, even if corrected for perceived competition and sector.

We also asked firms (Question 2.2) whether they adjust their prices at regular intervals (time-dependent) or in response to specific events (state-dependent). Our benchmark firm applies a state-dependent price adjustment strategy with a 39% probability. Looking at the marginal effects, it is remarkable that if we change the size of the benchmark firm from '50 or more' to '1-4' employees, almost 60% is estimated to apply state-dependent pricing. Stronger perceived competition encourages companies to adapt prices either on a daily basis or on a combined time/state dependent basis (Table 8). The sector dummies show that most wholesale and retail (especially food) firms adapt prices on a daily basis, whereas most manufacturers use state-dependent pricing.

**Table 8 - Multinomial logit regression Time versus State dependent (marginal effects)**  
(percentage points, unless stated else)

	Daily	Time- dependent	Mixed time/state	State dependent	Total
Benchmark	1.5%	30.4%	29.1%	39.1%	100%
1-4 workers	-0.8 (0.5)	-4.8 (4.0)	-15.0 (3.4)**	20.6 (4.5)**	0
5-9	-1.0 (0.6)	-0.3 (5.2)	-5.3 (5.0)	6.6 (5.8)	0
10-49	-0.3 (0.4)	3.8 (3.7)	-7.3 (3.3)**	3.8 (3.9)	0
Very strong competition	1.7 (1.0)*	-0.6 (3.4)	0.8 (3.5)	-1.9 (3.6)	0
Weak/no competition	-0.1 (0.5)	6.8 (3.6)*	-7.8 (3.4)**	1.1 (3.7)	0
Retail food	24.8 (6.8)**	-14.7 (5.8)**	7.6 (7.7)	-17.7 (6.3)**	0
Retail non-food	7.1 (2.6)**	-8.1 (4.2)**	1.9 (4.9)	-0.9 (4.9)	0
Wholesale	14.4 (4.3)**	-1.1 (5.1)	-7.9 (5.0)	-5.5 (5.3)	0
Hotel/restaurants	5.8 (2.8)	-4.4 (4.8)	4.9 (5.6)	6.3 (5.2)	0
Transport	0.0 (1.4)	23.8 (6.4)**	-5.5 (5.9)	-18.4 (5.4)**	0
Business services	0.4 (1.0)	4.5 (3.9)	-0.8 (4.0)	-4.1 (4.0)	0

Pseudo R<sup>2</sup> = 0.06

Benchmark firm: manufacturing, 50 or more employees, strong perceived competition

Standard errors in parentheses

\*\* = significant at the 5% level, \* = significant at the 10% level.

### 3.4 Reasons for price stickiness

Firms may have several reasons for being reluctant to change prices. The economic literature provides many explanations for sticky prices. Table 9 lists eight popular theories that were evaluated in our survey. The table provides the average scores and a brief explanation for each theory. The Dutch results are in line with results for the euro area (Fabiani *et al.*, 2005): implicit and explicit contracts play an important role in delaying price changes, whereas menu costs appear to be unimportant.

In Table 10, we analyze which of a firm's characteristics influence the importance it assigns to each of the theories for price stickiness. We have performed an OLS regression of the score given to a certain theory of price stickiness (listed in the first column) on a set of firm's characteristics (dummies for size, perceived competition and sector). The first row gives the predicted score for our benchmark company (manufacturing sector, 50 or more employees, strong

**Table 9 - Importance of theories of price stickiness**

(Average scores and standard deviations, scale: 1=irrelevant to 4=very important)

Reasons not to change	Short description of theory in questionnaire (see question 2.10)	Mean	Std. dev
Implicit contracts	Customers expect supplier to keep prices as stable as possible	2.66	0.78
Nominal contracts	Prices can only be changed when contract is re-negotiated	2.57	0.88
Judging quality by price	Lowering prices might mistakenly be interpreted as quality loss	2.34	0.84
Temporary shocks	Fear that one may need to revise the price in opposite direction	2.34	0.81
Co-ordination failure	Fear that competing firms will not change their price	2.22	0.79
Change non-price factors	Instead of changing prices, prefer to change other conditions	2.07	0.82
Pricing thresholds	Prices are set at attractive psychological thresholds	1.80	0.80
Menu costs	Menu costs of changing prices are high	1.71	0.77

competition). The other rows are marginal effects on the score for the benchmark firm. The most remarkable result is that for small firms implicit contracts are, *ceteris paribus*, a more important reason not to adjust prices than for large firms. Explicit contracts, however, are more important to large firms. Furthermore, implicit and explicit contracts are less important in the retail sector (compared to manufacturing), whereas attractive prices and menu costs are more important in retail (although at a low level, see Table 10). In the hotel/restaurant sector, the explicit contract is a much less important reason for not changing prices and the fear that a price reduction will be associated with a reduction in quality is important.

**Table 10 - Determinants of the importance of theories for price stickiness (marginal effects)**  
(Scale 1=irrelevant to 4=very important)

	Explicit contract	Implicit contract	Price is quality	Temporary shocks
Score for benchmark firm	2.78	2.67	2.18	2.35
1-4 workers	-0.24 (0.08)**	0.15 (0.08)**	0.13 (0.08)	0.02 (0.08)
5-9	-0.21 (0.11)**	0.05 (0.10)	0.13 (0.11)	0.02 (0.10)
10-49	-0.08 (0.07)	0.09 (0.06)	0.12 (0.07)*	0.11 (0.07)*
Very strong competition	-0.10 (0.07)	0.07 (0.06)	0.01 (0.06)	-0.12 (0.06)*
Weak/no competition	-0.26 (0.07)**	-0.01 (0.06)	0.11 (0.07)	-0.07 (0.06)
Retail food	-0.08 (0.14)	-0.15 (0.13)	0.40 (0.14)**	0.16 (0.13)
Retail non-food	-0.31 (0.09)**	-0.21 (0.09)**	0.08 (0.09)	-0.01 (0.09)
Wholesale	0.04 (0.10)	0.03 (0.09)	-0.02 (0.10)	-0.03 (0.09)
Hotel/rest.	-0.54 (0.10)**	-0.29 (0.10)**	0.20 (0.10)*	-0.09 (0.10)
Transport	0.10 (0.12)	0.07 (0.11)	-0.07 (0.12)	-0.10 (0.11)
Business services	0.06 (0.07)	-0.02 (0.07)	0.10 (0.07)	0.06 (0.07)
Adjusted R <sup>2</sup>	0.08	0.01	0.01	0.00

Benchmark firm: manufacturing, 50 or more employees, strong perceived competition

Standard errors in parentheses

\*\* = significant at the 5% level, \* = significant at the 10% level.

**Table 10 - Determinants of the importance of theories for price stickiness (ctd.)**

	Coordinati- -tion	Other conditions	Psychologi- -cal pricing	Menu costs
Score for benchmark firm	2.30	2.27	1.67	1.62
1-4 workers	-0.15 (0.08)*	-0.37 (0.08)**	0.07 (0.08)	-0.19 (0.07)**
5-9	-0.05 (0.10)	-0.29 (0.10)**	-0.03 (0.10)	-0.01 (0.09)
10-49	-0.08 (0.06)	-0.13 (0.07)*	0.07 (0.06)	-0.06 (0.06)
Very strong competition	0.12 (0.06)*	-0.09 (0.06)	-0.19 (0.06)**	-0.17 (0.06)**
Weak/no competition	-0.21 (0.06)**	0.07 (0.06)	0.02 (0.06)	0.19 (0.06)**
Retail food	0.11 (0.13)	-0.15 (0.13)	0.59 (0.13)**	0.37 (0.12)**
Retail non-food	0.08 (0.09)	0.03 (0.09)	0.60 (0.09)**	0.51 (0.08)**
Wholesale	0.01 (0.09)	-0.00 (0.09)	0.12 (0.09)	0.24 (0.09)**
Hotel/rest.	-0.11 (0.10)	-0.46 (0.10)**	0.05 (0.10)	0.14 (0.09)
Transport	-0.26 (0.11)**	0.01 (0.11)	0.25 (0.11)**	0.32 (0.10)**
Business services	-0.02 (0.07)	-0.16 (0.07)**	0.04 (0.07)	-0.06 (0.06)
Adjusted R <sup>2</sup>	0.03	0.04	0.07	0.08

Benchmark firm: manufacturing, 50 or more employees, strong perceived competition

Standard errors in parentheses

\*\* = significant at the 5% level, \* = significant at the 10% level.

### 3.5 Asymmetries of price reactions

In the previous sections we have discussed price stickiness in several sectors of the economy and the reasons why prices are sticky. In this section we discuss the presence of asymmetric price responses of Dutch firms to shocks (see Questions 2.8 and 2.9 for price raising respectively price lowering factors). We take a closer look at which factors are associated with, respectively, upward and downward price revisions. We also investigate the role of competition and firm size in greater detail.

#### *Asymmetries and competition*

In our survey we find evidence of asymmetric responses to shocks in the Dutch business sector (Table 11). The upward effect of rising *costs* proves significantly stronger than the downward effect of falling costs. Asymmetric responses are strongest for labour cost shocks. Moreover, for firms perceiving weak competition reported cost asymmetries are significantly larger. Similar results are found in most other countries. See Hall *et al.* (2000) for the UK and Fabiani *et al.* (2004) for Italy.

Asymmetric responses are also observed when *market conditions change*. In competitive markets, company prices respond more strongly to price depressing conditions such as weakening demand and lower competitor prices than they do to price raising conditions, e.g. strengthening demand or higher competitor prices. Under weak competition, asymmetric price responses vanish. These results are very interesting, with important implications for monetary policy making, but also for macroeconomic model building in which asymmetries are often ignored.

**Table 11 - Survey evidence of asymmetries**

(Scale 1=irrelevant to 4=very important)

Average score	Entire sample			Severe competition			Weak competition		
	Prompting a price			Prompting a price			Prompting a price		
	rise	cut	$\Delta$	rise	cut	$\Delta$	rise	cut	$\Delta$
<i>Cost factors</i>									
1 Raw materials	2.62	2.13	0.49	2.70	2.23	0.47	2.43	1.86	0.57
2 Labour costs	2.85	2.18	0.67	2.87	2.19	0.68	2.79	2.10	0.69
3 Other costs	2.64	2.09	0.55	2.59	2.12	0.47	2.75	2.06	0.69
Average	2.70	2.13	0.57	2.72	2.18	0.54	2.66	2.01	0.65
<i>Market conditions</i>									
4 Demand	2.35	2.57	-0.22	2.41	2.72	-0.31	2.38	2.54	-0.16
5 Competitor price	2.58	2.70	-0.12	2.72	2.90	-0.18	2.43	2.48	-0.05
Average	2.47	2.64	-0.17	2.56	2.81	-0.25	2.40	2.51	-0.10

### *Asymmetries and small companies*

Compared to the surveys in other countries, the Dutch price setting survey includes detailed information about small firms, including the single-worker ones. There are quite a number of single-worker firms in the Netherlands (around 40% of all businesses, accounting for 4% of employment). The share of the single-worker firms offering business-to-business services is 56%, 19% are active in retail non-food, 8% in manufacturing, 7% in wholesale and 10% in transport, retail food or hotel/restaurant. In section 3.2 we presented evidence that companies with only one employee charge the most rigid prices. For example, only 1 in 5 of these firms changes prices more than once a year and price decreases are relatively rare.

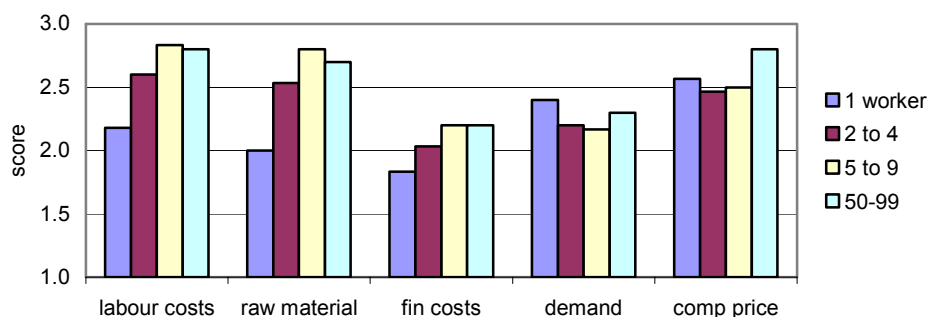
Pricing by single-worker companies is unusual not only in comparison with large firms, but also compared to other small firms. In Figure 4 and 5, this is shown for asymmetries. Price responses to cost shocks by single-worker firms are by far the weakest, both in case of downward and upward pressure. The response to changes in demand or competitors' prices is stronger, however, especially under worsening market conditions; this is more in line with the response of larger companies.

This exceptional price setting behaviour can be explained by the special characteristics of single-worker firms. To begin with, the employer and employee generally is one and the same person, which explains why they are relatively insensitive to labour cost shocks. Secondly, for many single-worker firms, raw materials are of little importance. Finally, the weak responsiveness to financial costs can be explained by the fact that small companies rely largely on internal financial resources.

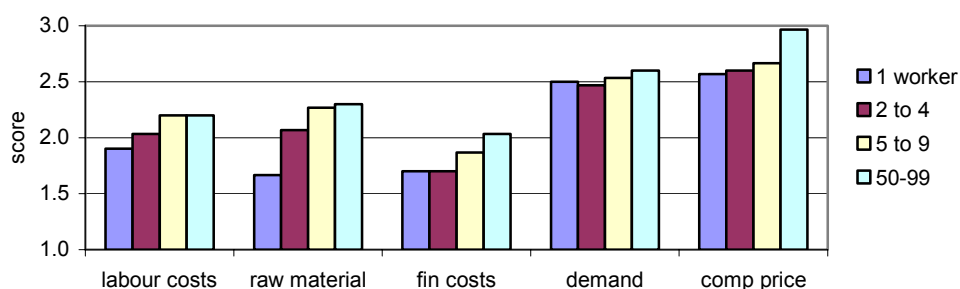
To sum up: Most single-worker companies change their prices only occasionally, but when they do they set prices in accordance with market conditions.

**Figure 4 - Price raising factors in small Dutch firms**

*(scale 1=irrelevant to 4=very important)*



**Figure 5 - Price lowering factors in small Dutch companies**  
(scale 1=irrelevant to 4= very important)



## 4. Special topics

### *Price setting and EMU*

EMU increases market transparency. Prices between EMU member countries can be better compared and price differentials are no longer disturbed by exchange rate fluctuations. This is bound to promote competition and affect pricing behaviour sooner or later. When asked about the impact of EMU on pricing policies, a majority of our respondents replied that EMU had had no major impact on pricing policies (see Question 2.11). About 70% of the respondents operating abroad reported that their pricing policies had not changed yet; 10% expected EMU to affect their pricing policy in the near future. Another 10% of the respondents reported that price discrimination between countries has become more difficult because of the euro and a final 10% replied that they had become less sensitive to exchange rate movements. Firms perceiving stronger competition or bigger companies reported a heavier impact under EMU. All in all, the survey suggests that changes in pricing behaviour in response to EMU are likely to be gradual<sup>6</sup>. Faber and Stokman (2004) draw the same conclusion on the basis of price dispersion developments within EMU.

### *Pass-through of price stickiness in production chains*

Price stickiness might have a major impact on macro-economic variables, even if it is not widespread at the micro-level. One explanation for this is that price stickiness in one part of the production chain may be passed on to the next (see e.g. Huang and Liu, 2001).

We asked respondents whether they synchronize their own price changes with those of their suppliers (see Question 2.5). About 22% of all respondents report that they do so often or always, 35% say occasionally and 37% say they do not. Differences between sectors are large: in

<sup>6</sup> In a number of Dutch sectors operating in local markets, the euro changeover led initially to substantial price rises. See for example Folkertsma, Van Renselaar and Stokman (2002) who provide evidence that short-run pricing behaviour had changed in response to the introduction of EMU.

wholesale and retail, timing in tune with suppliers is common practice for 1 in 3 firms, compared with 1 in 6, on average, for other sectors.

Next, we asked to what extent customers take respondents' timetables for price changes into account. According to the respondents, 9% of customers follow their suppliers' timing of price changes. Larger companies report substantially higher numbers (19%).

## 5. Conclusions

Our survey provides interesting new insights into the price setting behaviour of Dutch companies. Because of its broad coverage, we were able to identify some basic characteristics of sticky-price companies. First of all, we find for all sectors and all firm sizes that price reviews are much more frequent than price changes. This suggests that the cost of collecting information is not a decisive factor in determining price rigidity. For the Dutch economy as a whole, about two-thirds of all firms review prices more than once per year and one-third change prices more than once per year.

We also find that the degree of competition is very important in shaping price setting behaviour. Generally speaking, under conditions of weak competition, producer prices become much stickier. Company size is also found to be relevant. Our study is the first to shed light on the pricing behaviour of small companies (1-9 employees). Together they make up a significant part of the business community. Single-worker firms are by far the stickiest and large firms the most flexible price setters.

Next to size and competition, sector matters: the trade sector (wholesale and retail) adopts relatively flexible pricing policies. Prices for business-to-business services and catering are the most rigid.

Furthermore, there is clear evidence of asymmetries in pricing behaviour. Here, a distinction in the type of shock is relevant (cost shocks or shocks in market conditions). Among the motives for not changing prices or delaying price changes, informal and explicit contracts are the most relevant. Menu costs and appealing prices are unimportant. This is in line with findings for other European countries. The changeover to the euro has not had a major influence on price setting.

## References

- Apel, M., R. Friberg and K. Hallsten (2005), "Micro foundations of macroeconomic price adjustment: survey evidence from Swedish firms", *Journal of Money, Credit, and Banking*, 37(2), pp. 313-338.
- Alvarez, L. and I. Hernando (2005), "The price setting behaviour of Spanish firms: evidence from survey data", *ECB Working Paper*, No 538.
- Aucremanne, L. and M. Druant, 2005, "Price-setting behaviour in Belgium: What can be learned from an ad hoc survey", *ECB Working Paper*, Nr. 448.
- Ball, L. and N.G. Mankiw (1994), "A sticky-price manifesto", *Carnegie-Rochester Conference Series on Public Policy*, Vol. 41, pp. 127-151.
- Ball, L. and D. Romer (1990), "Real rigidities and the non-neutrality of money", *Review of Economic Studies*, Vol. 57, pp. 183-203.
- Bayoumi, T., Laxton, D. and P. Pesenti (2004), "Benefits and spillovers of greater competition in Europe: a macroeconomic assessment", NBER Working Paper, Nr. 10416.
- Blinder, A. S. (1991), "Why are prices Sticky? Preliminary Results from an Interview Study", *American Economic Review* Vol. 81(2), pp. 89-100.
- Blinder, A. S. (1994), "On sticky prices: Academic theories meet the real world", in Mankiw, N.G. (ed.), *Monetary Polity*, Chicago and London, The University of Chicago Press.
- 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.
- Dhyne, E., L.J. Alvarez, H. le Bihan, G. Veronese, D. Dias, J. Hoffman, N. Jonker, P. Lünnemann, F. Rumbler, J. Vilmunen (2005), 'Price setting in the euro area: Some stylized facts from individual consumer price data', *ECB Working Paper*, No 524.
- Faber, R.P. and A.C.J. Stokman (2004), "Price convergence in Europe from a macro perspective: Trends and determinants (1960-2003)", *DNB Working Paper*, Nr. 12.
- Fabiani, S. A. Gattulli and R. Sabbatini (2004), "The pricing behaviour of Italian firms: new survey evidence on price stickiness", *ECB Working Paper*, Nr. 333.
- Fabiani, S., M. Druant, I. Hernando, C. Kwapil, B. Landau, C. Loupias, F. Martins, T. Mathä, R. Sabbatini, H. Stahl, A. Stokman (2005), 'The pricing behaviour of firms in the euro area: New survey evidence' *ECB Working Paper*, Nr.535. .
- Finn, M. (1996), "A theory of the capacity utilisation/inflation relationship", *Federal Reserve Bank of Richmond Economic Quarterly*, Nr. 82-/3.
- Folkertsma, C.K., C. van Renselaar and A.C.J. Stokman (2002), "Smooth Euro changeover, higher prices?", *DNB Quarterly Bulletin*, March.
- Hall, S., A. Yates and M. Walsh (2000), "Are UK companies' prices sticky?", *Oxford Economic Papers*, Vol. 52(3), pp. 425-446.



- Huang, K. and Z. Liu (2001), "Production Chains and General Equilibrium Aggregate Dynamics", *Journal of Monetary Economics* 48(2), pp. 437-462.
- Jakulj, J., N. Jonker and H.M.M. Peeters (2003), "Employment dynamics within small, medium and large establishments in the Netherlands at the end of the 1990: Where and to what extent did job creation and job destruction occur?", *DNB Research Memorandum* nr. 742.
- Jonker, N., Blijenburg H. and C. Folkertsma (2004), "An empirical analysis of price setting behaviour in the Netherlands in the period 1998-2003 using micro data", *ECB Working Paper*, Nr. 413.
- Köhler, A. (1996), "Nominale Preisrigidität auf Gütermärkten: eine empirische Überprüfung neukeynesianischer Erklärungsansätze", *CIRET-Studien* No 51.
- Kwapil, C., J. Baumgarten and J. Schaler (2005), "The price-setting behaviour of Austrian firms: some survey evidence", *ECB Working Paper*, Nr. 464.
- Loupias, C. and R. Ricart (2004), "Price setting in France: new evidence from survey data", *ECB Working Paper*, Nr. 423.
- Lünnemann, P. and T. Mathä (2005), "New survey evidence on the pricing behaviour of Luxemburg firms" Banque Centrale du Luxemburg, *mimeo*.
- Rotemberg, J. and G. Saloner (1987), "The relative rigidity of monopoly pricing", *American Economic Review*, vol. 77, pp. 917-926.
- Small, I. and T. Yates (1999), "What makes prices sticky? Some survey evidence for the United Kingdom", *Bank of England Quarterly Bulletin*, pp. 262-270.
- Stahl, H. (2005), "Price setting in German manufacturing: New evidence from a new survey", Deutsche Bundesbank, *mimeo*.

## Appendix - Survey on pricing behaviour of Dutch companies

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The European Central Bank (ECB) and the national central banks in EMU have launched a joint research project on price setting by European companies. Together, they are responsible for price stability in the euro area. Information about pricing behaviour is vital to the preparation and conduct of monetary policy. De Nederlandsche Bank (DNB) is involved in surveying Dutch companies on this topic. The information you provide will only be used for research purposes. TNS-NIPO does not provide company specific information like respondent or branch names. DNB guarantees strict confidentiality of your answers. Answering the questionnaire will take you about 10 minutes. We are very grateful for your cooperation.

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### 0 AVAILABLE BACKGROUND INFORMATION

#### 0.1 Position of respondent in the company

#### 0.2 Sector

- Manufacturing
- Business services
- Wholesale
- Retail (food/non-food/catering)
- Transportation
- Other

#### 0.3 Number of employees including owner

- 1 person
- 2-4 persons
- 5-9 persons
- 10-19 persons
- 20-49 persons
- 50-99 persons
- 100 or more persons

### 1 GENERAL INFORMATION

#### 1.1 Are you in a position to provide information on price setting within your company?

- Yes
- No (end of survey)

#### 1.2 Does your company pursue a single pricing policy for all products?

- Yes, policy is basically the same for all our products
- Yes, for the greater part of our product range
- No, depends on the type of product
- Don't know/no answer

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Please answer the following questions for the main product or one typical product sold by your company, referred to in the questionnaire as product X.

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#### 1.3 What product (X) do you have in mind?

#### 1.4 What percentage of your sales is accounted for by product X. A rough estimate suffices.

#### 1.5 In what markets do you sell your main products? (more answers allowed)

- Local market
- Regional market
- National market
- Foreign markets

#### 1.6 What is your main market for product X? Please tick only one answer

- Local market
- Regional market
- National market
- Foreign markets

- 1.7 If you sell your main product abroad, what percentage of your sales is due to exports?  
- .....%  
- Don't know / no answer
- 1.8 Could you roughly indicate the number of competitors for your main product on the Dutch market?  
Please tick only one answer  
- None  
- 1  
- 2 to 5  
- 5 to 20  
- 20 or more  
- Don't know / no answer
- 1.9 How strong is the competition you experience for product X?  
- Severe competition  
- Strong competition  
- Weak competition  
- No competition  
- Don't know / no answer
- 1.10 Did you raise or lower the selling price of product X last year?  
- Raised it  
- Lowered it  
- Left it unchanged  
- Don't know / no answer
- 1.11 By what percentage has your selling price changed in 2003 compared to 2002?  
- .....%  
- Don't know / no answer

## **2 PRICE SETTING BEHAVIOUR: TIMING AND DETERMINANTS**

- 2.1 Do you decide the price of product X independently or is it dictated by head office or government rules?  
- Determine prices myself  
- Partially dependent on suggested prices/prices of head office  
- Fully dependent on suggested prices/prices of head office  
- Price is to a large extent regulated by government  
- Other ...  
- Don't know/ no answer
- 2.2 Do you adjust the selling price of product X at fixed time intervals?  
- Yes, daily  
- Yes, periodically (e.g. once a week, month, year)  
- Generally periodic, but occasionally in response to specific events (large shocks for example)  
- No, depends fully on specific events
- 2.3 On average, how often do you check or review the adequacy of the price of product X?  
- Occasionally  
- Once a year  
- Quarterly  
- Monthly  
- Weekly  
- Daily  
- Don't know / no answer
- 2.4 On average, how many times a year do you adjust your selling price of product X?  
- Occasionally (less than once a year)  
- Once a year  
- 2-4 times per year  
- 5-11 times per year  
- 12 times per year (monthly)  
- More often  
- Don't know/ no answer

- 2.5 Do you align the timing of your own price changes with those of your supplier(s)?
- No
  - Sometimes (e.g. in case of major price change by supplier)
  - Often
  - Always
  - Don't know / no answer
- 2.6 Do customers align the timing of their price changes to yours?
- No
  - Sometimes (e.g. in case of major price change by you)
  - Often
  - Always
  - Don't know / no answer
- 2.7 How do you calculate the price of your "main product"?
- a fixed mark-up is applied to unit variable costs (cost of labour and other inputs)
  - a variable mark-up is applied to unit variable costs, depending on market conditions
  - to a large degree on the basis of my competitors' prices
  - linked to another price (like wages)
  - dictated by our customer(s)
  - linked to price index
  - fixed by supplier
  - differs per customer
  - other
  - don't know/ no answer
- 2.8 Which factors would be likely to cause an increase in the price of your "main product"?  
Attribute a value of 1 (irrelevant) to 4 (very important)
- An increase in the cost of labour
  - An increase in the cost of raw materials
  - An increase in financial costs
  - An increase in other production costs
  - An increase in demand
  - An increase in competitors' prices
  - An increase in quality of the product
  - A cash flow or financing problem
- 2.9 Which factors would be likely to cause a decrease in the price of your "main product"?  
Attribute a value of 1=irrelevant to 4=very important to each
- A decrease in the cost of labour
  - A decrease in the cost of raw materials
  - A decrease in financial costs
  - A decrease in other production costs
  - A decrease in demand
  - A decrease in competitors' prices
  - A decrease in quality of the product
  - Liquidity surpluses
- 2.10 Which of the following factors might delay price changes for product X?  
Attribute a value of 1=irrelevant to 4=very important to each
- The presence of a formal contract: prices can only be changed when the contract is re-negotiated
  - Our customers expect us to keep prices as stable as possible
  - Lowering prices might mistakenly be interpreted as quality loss
  - Fear that competing firms will not adjust their price
  - Fear that you may need to revise the price in the opposite direction
  - Prices are set at 'appealing' thresholds
  - Presence of high menu costs of changing prices (e.g. printing new catalogues, costs of adjusting price tags ..)
  - Instead of changing prices, prefer to change other conditions like terms-of-payment, service level
  - Other (please specify if possible)
- 2.11 The introduction of the euro has enhanced comparability of prices between EMU member countries.  
Has this affected your price setting policy?
- Had no or hardly any effect
  - Not yet, but expect this to be the case in the future
  - More difficult to differentiate prices across EMU countries
  - Less sensitive to exchange rate movements
  - Other
  - Don't know / no answer

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