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New insights into price-setting behaviour in the United Kingdom

Jennifer Greenslade and Miles Parker

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Jennifer Greenslade⁽¹⁾ and Miles Parker⁽²⁾

Abstract

It is important to understand how companies set prices, since price-setting behaviour plays a key role in the monetary policy transmission mechanism. Many surveys have been conducted in a range of countries to shed light on this issue by asking companies directly about how they set prices. This paper reviews the results of a new survey of the price-setting behaviour by the Bank of England of around 700 UK firms. In terms of how companies set prices, the survey evidence supported the use of the mark-up over costs form of pricing. Firms reviewed prices more frequently than actually changing them, with the median firm changing price only once per year, but the frequency with which companies changed their prices varied considerably across sectors. Over the past decade a significant number of firms had increased the frequency of price changes. Different factors influenced price rises and price falls. Higher costs — in particular, labour costs and raw materials — were the most important driver behind price rises, whereas lower demand and competitors' prices were the main factor resulting in price falls. Nearly half of firms changed their prices within three months of an increase in costs or a fall in demand.

Key words: Price-setting, nominal rigidity, survey data.

JEL classification: E30, D40.

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Summary

It is important to understand how companies set prices, since price-setting behaviour plays a key role in the monetary transmission mechanism. Part of the reason why monetary policy may affect the real economy, at least in the short run, is that some prices adjust sluggishly. Many of the economic models that are frequently used for monetary policy analysis assume that there are constraints on price adjustment, often called ‘nominal rigidities’. Many surveys have taken place to try to improve our understanding of the extent of price rigidity, and the reasons underlying it, by asking firms directly. Examples include surveys for the United States, Canada, the euro area, as well as an earlier survey for the United Kingdom in 1995. The advantage of surveys over econometric techniques is that by asking firms directly we can obtain qualitative information, such as the factors taken into consideration by firms when reviewing the prices charged for their products.

This paper analyses the results of a new survey of the price-setting behaviour of nearly 700 UK firms. It was carried out between December 2007 and February 2008, before the onset of the recent recession. Consequently, the results need to be interpreted as applying to a period of relative macroeconomic stability, although there had been a background of volatile commodity prices and a very recent tightening in credit conditions. Our survey suggested that in the United Kingdom, many firms reviewed their prices at regular intervals, but it was also common for firms to review prices in response to specific events. This was similar to the findings of a recent euro-area survey. Overall, the median UK firm reviewed its price twice a year, although there were notable differences between sectors.

When determining the optimal price, around a fifth of firms used a rule of thumb. Around one third of firms set their prices based on their expectations of the near future. In terms of how companies set prices, survey evidence supported the use of the mark-up over costs form of pricing. Firms reviewed prices more frequently than actually changing them, with the median firm changing price only once per year. But there were marked differences between sectors - for example, UK construction and retail companies changed their prices more often than companies in the manufacturing and other services sectors. And large firms often changed prices on a more frequent basis. So, there were important heterogeneities at work.

Different factors influenced price rises and price falls. Higher costs - in particular, labour costs and raw materials – were the most important driver behind price rises, whereas lower demand and competitors’ prices were the main factors resulting in price falls. The survey also considered the speed of response to changes in cost and demand conditions. Nearly half of companies changed their prices within a quarter following an increase in costs or a fall in demand.

When asked which factors were most important in causing price stickiness, the existence of implicit and explicit contracts between firms and customers and ‘co-ordination failure’ (where firms felt constrained because they were acting individually) were viewed as the most important. Pure menu costs (time, effort, reprinting etc) were not widely cited, in keeping with previous survey results.

Looking at how price-setting had changed over time, a substantial number of firms increased the frequency of price resets over the decade preceding the survey. Firms mainly attributed that to an increase in competition over the period, which increased the cost to the firm from deviating from the optimal price, and higher variability of input prices. Yet the more stable macroeconomic environment then in place also resulted in some firms decreasing the frequency of price changes.

1 Introduction

Price-setting behaviour influences the way in which monetary policy affects the economy and so it is important for central banks to understand how companies set prices. Part of the reason why monetary policy may affect the real economy, at least in the short run, is that some prices are sticky. Many of the economic models that are frequently used for monetary policy analysis assume that there are some constraints on price adjustment, often called ‘nominal rigidities’. Such nominal rigidities play a key role in the monetary policy transmission mechanism, since they provide leverage over the real interest rate, thus allowing monetary policy to influence real economic activity. Understanding the extent of these nominal rigidities, their causes, and to what extent they react asymmetrically to demand or supply shocks is therefore crucial to the correct implementation of monetary policy.

Many surveys have been conducted to try to improve our understanding of the extent of price rigidity and reasons for this price sluggishness by asking firms directly about these issues. Examples include surveys for the United States (see Blinder (1991) and Blinder *et al* (1998)), Canada (see Amirault *et al* (2005, 2006)), the euro area (see Fabiani *et al* (2005, 2006)), Sweden (see Apel *et al* (2005)) as well as an earlier survey that the Bank of England conducted for the United Kingdom in 1995 (see Hall *et al* (1997, 2000)). The advantage of surveys over econometric techniques is that by asking firms directly we can obtain qualitative information, such as the factors taken into consideration by firms when reviewing the prices charged for their products. This may help to discriminate between competing economic theories of how prices are set.

This paper analyses the results of a new survey of the price-setting behaviour of UK firms. It covers the responses of 693 firms surveyed over the period December 2007 to February 2008. The aim of this new survey was to obtain a comprehensive view of price-setting across the whole economy and the responses broadly match the sectoral balance of the UK economy. A new survey for the United Kingdom also sheds light on how price-setting behaviour has changed in the light of significant changes such as inflation targeting in the United Kingdom, and the growing emergence of China in the world economy.¹ Product market competition also increased over the last decade or so, with the advent of the internet allowing consumers to significantly reduce the search costs involved in comparing the prices of competing firms. These macroeconomic changes may have influenced the frequency of price changes by firms. The survey took place against a backdrop of large external commodity price rises and after the initial deterioration in credit conditions (although well before the onset of recession). It is possible that respondents were influenced by such circumstances.

¹ The introduction of inflation targeting in the United Kingdom was in 1992 and so this preceded the earlier survey in 1995. However, it was still relatively new at that time and the Bank of England did not have operational independence of monetary policy until 1997 (after the earlier survey).

This paper is organised as follows. Section 2 describes the method used to construct a sample for the survey and also the main characteristics of the firms that responded. Section 3 discusses the price reviewing process carried out by firms. Section 4 deals with the frequency of actual price changes. Factors influencing price changes are analysed in Section 5. Section 6 considers how prices react to significant changes in demand and costs. Section 7 highlights how price-setting behaviour has changed over the past decade, and compares the results of the most recent UK survey with that carried out in 1995.

2 The survey

As with the previous 1995 survey carried out by the Bank of England (Hall *et al* (1997)), this survey was sent to a selection of the business contacts of the Bank's Agents. The Agents speak to these contacts on a regular basis to build a picture of current conditions in the UK economy to help inform the Bank of England's Monetary Policy Committee. The earlier survey conducted in 1995 was to a large degree composed of manufacturing firms, and consequently may not represent the behaviour of all firms. Given the further expansion of the service sector since then and taking advantage of a bigger and richer base, the aim of this new survey was to obtain a more comprehensive view of the entire economy by using a broader sample of companies.

2.1 Sample design

Economic theory of price-setting is based on the actions of a profit-maximising firm. To ensure the firms in our sample were likely to be representative of such firms we excluded firms in the public sector, or those subject to regulatory price controls. Specifically this meant those firms in the water supply; public administration and defence; health and education sectors. We also excluded firms in the agriculture; hunting, forestry, fishing and extraction sectors. These firms were often price-takers in international commodity markets where price is determined by the global balance of supply and demand.

Once these initial exclusions had been made, the sample was stratified by industry. A target was set of a minimum of 30 replies for the smallest industry (except for electricity and gas supply where we had fewer firms). Recent postal surveys carried out by euro-area central banks had a response rate of around a third, implying we might need a minimum sample of around a hundred firms in the smallest sector to obtain our target number of replies. The sample for larger sectors was increased proportionately, so that the share of each industry in the full sample matched that industry's share in value added.

Within each industry the sample was further stratified by size of firm, as measured by the number of employees. Firms were classified as small (less than 50 employees), medium (50 to 249 employees) and large (250+ employees). The share of small, medium and large firms to be sampled within each industry was set by the share of turnover within that sector.

The sample included all firms that had responded to the 1995 Bank of England survey and remained contacts of the Bank of England's Agents. Additional firms were then chosen at

random from the database of contacts, according to the stratification set out above. The final sample consisted of 2,331 firms which were surveyed in two separate waves in December 2007 and February 2008. Each firm was sent a paper version of the survey along with the option to complete the survey online. The majority of respondents opted for the paper version. The appendix lists the questions.²

2.2 Main characteristics of the firms

We received 693 responses to the survey, an aggregate response rate of 30%. The industrial breakdown was broadly consistent with the structure of the UK economy, implying that response rates were similar across different sectors (Table 1). The real estate, renting and business services sector was the sole sector where the share of responses was markedly different from the share of value added, although this sector had a large number of responses.

Table 1: Respondents by industry

Industry	No of responses	Share of responses (%)	Memo: Share of GVA (%)
Manufacturing	154	22.2	18.1
Electricity & gas supply	9	1.3	2.1
Construction	70	10.1	7.4
Wholesale, vehicle repairs & fuel	44	6.3	7.9
Retail	62	8.9	7.2
Hotels & restaurants	30	4.3	3.8
Transport, storage & communication	87	12.6	9.6
Financial intermediation	46	6.6	9.0
Real estate, renting & business services	150	21.6	29.1
Recreational, cultural & other personal services	41	5.9	5.9
Total	693	100	100

Columns may not sum to 100 due to rounding

Chart 1 shows the breakdown of respondents by employment size. Medium-sized firms were overrepresented in the responses, at the expense of large firms. There was a broad spread of firm size by turnover, with around 9% of the sample having a turnover of less than £1 million a year and around a third of the sample with a turnover of more than £50 million (Chart 2). In terms of market share, the majority of firms perceived themselves to have a market share of less than 5%, whereas a fifth of the respondents stated they had a market share above 20% (Chart 3). Around half the respondents said they could discover their competitors' prices easily, and 7% could not find it out at all (Chart 4). However, there was a marked divergence between industries, with nearly 90% of firms in the retail and hotels and restaurants sectors being able to find competitors' prices easily. This is unsurprising as hotel rates are widely publicised. But a fifth of construction firms could not discover their competitors' prices at all, probably because unpublished bilateral contracts are common in the construction sector.

² Many of the questions in this survey were similar to those used in the euro-area surveys (see Fabiani *et al* (2005)).

The clear majority of respondents (85%) listed the United Kingdom as their main market. A further 9% cited the whole international economy, and 5% the European Union. Around half of firms sold exclusively to the United Kingdom, with 12% of firms making more than 30% of their sales abroad. Around 40% of firms sold directly to consumers, and a third sold to the public sector. Nearly 80% of firms had predominantly long-term customers (of over one year).

Chart 1: Firm size by employment

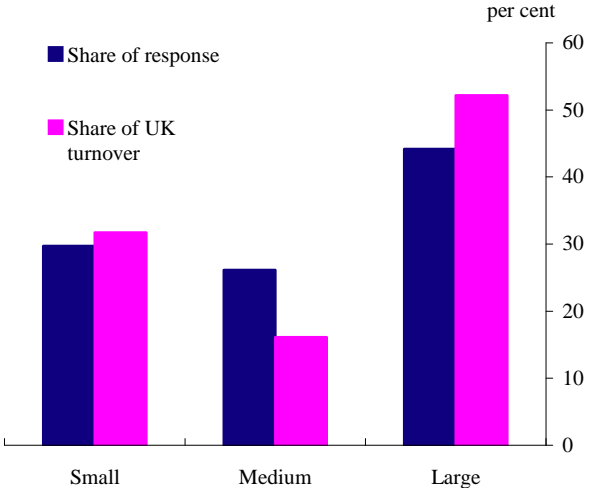


Chart 2: Firm size by turnover (share of response, %)

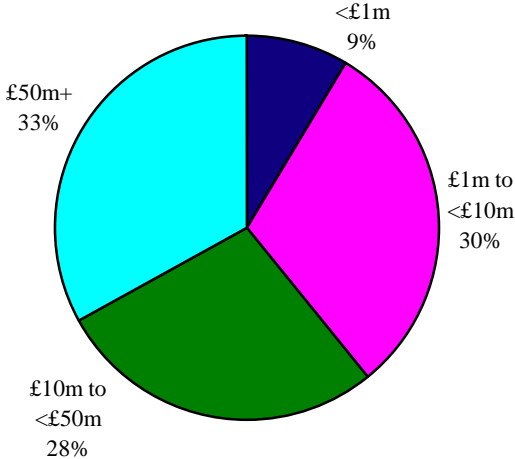


Chart 3: Market share (share of response, %)

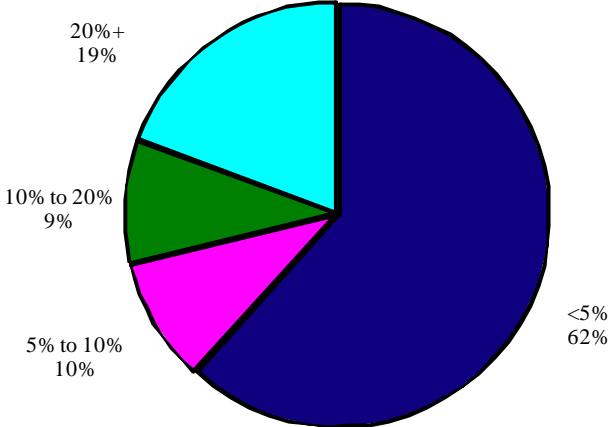
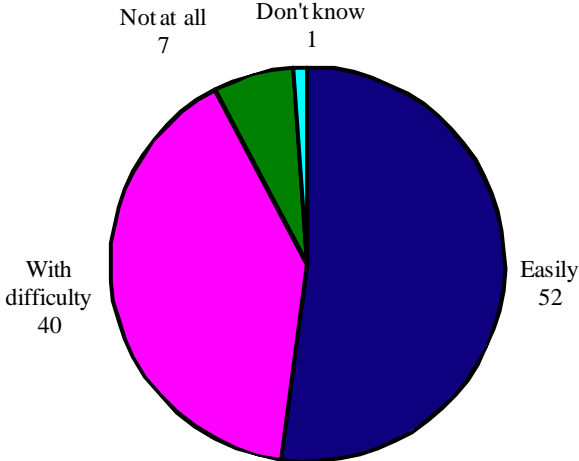


Chart 4: Ease of finding out competitors' prices (share of response, %)



3 Price reviews

Individual firms are unlikely to be changing their prices continuously because price reviews and changes are costly to conduct and implement. The first stage of the process of price adjustment is for a firm to evaluate whether its current price is optimal since it may be costly to charge the 'wrong' price. So this section investigates whether or not firms review their prices in regular

intervals, looks at the information set that firms use when reviewing prices and assesses how often firms review prices.

3.1 Did firms review prices at specific intervals or in response to specific events?

Individual firms do not adjust prices continuously because price reviews and changes are costly. The theoretical literature considers two main forms of pricing behaviour: ‘time-dependent’ and ‘state-dependent’ rules. Price-setting is usually considered to be time-dependent when the price is changed as a function of time. The price change is an outcome of the optimisation process by the firm but the point of time of the price change is exogenous to the firm. In some time-dependent models, there may be a fixed duration between price changes, but in other models, such as the Calvo (1983) model, the duration length is random. In state-dependent models, the price is changed as a function of the state. The price will remain the same until there is a sufficiently large change in market conditions and so firms change prices when their desired prices violate some upper or lower bound. The usual justification is that there are fixed costs of changing prices (eg, Sheshinski and Weiss (1977) or Dotsey, King and Wolman (1999)).³

Before turning to the survey results on price reviewing, it is important to note that there are important differences between price reviews and price changes. A company may choose to review its price but to leave its price unchanged (see Section 4.3) or it could change its price at a fixed interval, but review the price less frequently. Price reviewing (as well as adjusting the price) may be costly and there may be many reasons why a firm does not review prices continuously. For example, Reis (2006) built into his model the costs of gathering, absorbing and processing information that the firm may face. He showed that it may be rational for firms to be inattentive to news, and only to update its information sporadically. In the widely cited Calvo model, the random contract ends at a point in time that is exogenous to the firm. At that time, the firm can review its price and it is able to change the price without incurring any adjustment costs. The firm will choose to do so in a continuous setting (where costs, demand and other factors do not jump discretely, the probability of an optimal zero price change is zero). So, if a firm reviews its price but does not change the price, then there must either be adjustment costs or some other state-dependent impediment.

Companies were asked whether they reviewed their prices in regular intervals or in response to specific events. This question is often interpreted in surveys in terms of evidence relating to time-dependent or state-dependent pricing rules, but one should be cautious about drawing strong inferences since it is not a perfect measure of the definition given above (where price-setting is time-dependent if the timing of the change is exogenous to the firm). But this question (which is the same as in many other surveys) can still shed light on the price review process. The survey found that more companies reviewed their prices at regular intervals (42%) than in response to specific events (15%). But it was not unusual for companies to review prices both at regular intervals and in response to specific events (44%), for example following a

³ In the Sheshinski and Weiss (1977) paper, there are fixed adjustment costs and a constant inflation rate over a long period. The firm decides in advance how much to change the price by and at what time. In their 1983 paper, prices change only after a shock. State-dependent models may therefore imply a continuous price review. We are grateful to an anonymous referee for pointing this out.

substantial change to costs. Such pricing behaviour may suggest that the shocks that many firms experienced were not large enough to make them deviate from a normal policy of reviewing/setting prices at fixed intervals. The responses for this survey were similar to those obtained for the euro area (though differences did exist within countries in the euro area). Fabiani *et al* reported that 46% of companies reviewed prices both at regular intervals and in response to specific events, compared to 44% in the United Kingdom. However, the extent of firms only reviewing prices at regular intervals is higher in the United Kingdom than in the euro area (42% relative to 34%). The earlier Bank survey found that 79% reviewed their prices at specific intervals, with 11% of respondents doing so in response to specific events. So, this share in the earlier UK survey was much higher than suggested by other surveys and it was also higher than suggested in this latest survey. However, that was most likely to be due to the different options included in the surveys.⁴ This highlights the potential problem when making cross-country comparisons.

Table 2: Investigating whether firms reviewed prices in regular intervals or in response to specific events by firm size, sector and level of competition (share of response, %)

	Employment size			Inferred competition ^(a)				Sector***		
	Small	Medium	Large	Very low	Low	High	Very high	Industry	Trade	Other services
In regular intervals	43.9	39.8	41.2	37.9	39.8	36.8	35.6	28.2	42.5	48.7
Generally in regular intervals, but also in response to specific events	42.0	45.3	43.8	48.3	46.6	46.0	49.4	60.1	39.6	39.9
In response to specific events	14.1	14.9	15.0	13.8	13.6	17.2	15.0	11.7	17.9	11.3

Columns may not sum to 100 due to rounding

(a) Following Fabiani *et al* (2005), we take this to be the importance given by firms of a fall in competitors' price as a reason for cutting own price.

A Kruskal-Wallis rank sum test of the equality of populations was conducted. *** indicates rejection of the null hypothesis at the 99% confidence level.

Table 2 shows how the decision between reviewing prices at regular intervals or in response to specific events differed by firm characteristics. The size of the firm had little bearing on this decision. To investigate the effect of competition we inferred the level of competition faced by the firm by the importance attached to an actual reduction in the price of a domestic competitor in causing a fall in the firm's price. On this basis, the intensity of competition also had little bearing on the choice between reviewing prices at regular intervals or in response to specific events. However, there were differences between sectors. Industry (manufacturing and electricity/gas supply) tended to use a combination of strategies, whereas trade companies (retail

⁴ As a general strategy, we used the common questions from the earlier UK study to allow us to examine how pricing behaviour had changed. However, given the divergence between the earlier UK results and other surveys, our question on this topic was based on that used in the euro-area surveys.

and wholesale) were more likely to review prices in regular intervals, and almost half of firms in the other services sectors used such an approach.

3.2 *Were firms solely forward looking?*

Many standard macro models relate inflation to expected inflation and the firm's expectations of current deviations of marginal cost from its steady state (see Galí and Gertler (1999) for details of the widely used New Keynesian Phillips Curve (NKPC) approach which is at the heart of many dynamic stochastic general equilibrium (DSGE) models). However, despite the theoretical appeal of these models, the pure 'forward-looking' model has been unable to generate enough inflation persistence to match the data. Due to these empirical problems, Galí and Gertler (1999) proposed an alternative 'hybrid' Phillips curve, where lagged inflation is assumed to also affect inflation.⁵ There are a number of essentially *ad hoc* ways in which this inertia is introduced. One is to assume that some firms simply set prices today to ensure that they change in line with the overall inflation rate in the previous period. Another is to modify the pricing rule so that only some firms choose to set prices at the optimal level each period and the remainder of firms that do not receive the Calvo signal to change prices choose to index prices to last period's inflation rate. Such deviations from optimising behaviour generate an additional source of persistence in the response of inflation to shocks. But, as these modifications are not usually derived from theory they do not explain why prices are sticky.

Surveys can tell us which information firms use when they are reviewing their prices. This is important since it can shed light on the degree of optimality of price-setting strategies. As explained in Fabiani *et al*, if firms were to use only a simple rule of thumb at all times, it is possible that they charge a price which deviates quite substantially from the optimal price in the event of a large shock. It may be more optimal for firms to use a wide set of information, including expectations, when reviewing prices. To address this issue, companies were asked the following question: *Which of the following methods best describes how you set the UK price of your main product or activity?* Around a fifth of firms adopted rules of thumb or primarily used backward-looking information. Over a third of firms reviewed prices mainly looking forward, whereas nearly half of firms set the price primarily for current conditions. Larger firms (as measured by the number of employees) were more forward looking than smaller firms, which often tended to set prices mainly for current conditions. Rule of thumb behaviour was not prevalent, but did occur more in smaller firms than larger firms. Retail and wholesale firms were more likely to set prices based on current rather than expected future developments, but that may reflect a more frequent review of prices. Few surveys have investigated the information set used when reviewing prices. These results, together with the limited international survey evidence to date, were broadly consistent with empirical work that uses the

⁵ See Fuhrer and Moore (1995) for another example of a Phillips curve containing leads and lags of inflation.

hybrid version of the NKPC (where pricing decisions today depend on expected future inflation, past inflation and real marginal cost).

Table 3: Information used when reviewing prices (share of response, %)

	Aggregate	Employment size***			Sector***		
		Small	Medium	Large	Industry	Trade	Other services
Rule of thumb	12	15	13	9	3	15	16
Set price primarily given conditions that have applied in the recent past	8	8	11	6	10	8	8
Set price primarily for current conditions	45	51	42	43	41	57	45
Set price primarily looking forward over the near future	35	26	33	42	46	20	31

Columns may not sum to 100 due to rounding

A Kruskal-Wallis rank sum test of the equality of populations was conducted. *** indicates rejection of the null hypothesis at the 99% confidence level.

3.3 How often did firms review their prices?

The frequency of price review sheds light on the informational costs of changing price, that is, the cost of gathering information necessary to determine if the current price is appropriate. These costs differ from those costs involved in implementing a new price. If reviewing prices were costless, firms would be continuously doing this. A small proportion of respondents (7%) reviewed their prices daily, which may suggest that they found it was relatively costless to review prices or that the costs of not reviewing prices were high (Table 4). Around one third of companies reviewed prices at least monthly, whereas around one quarter only did so on an annual basis. About 15% of companies reviewed prices irregularly or at other frequencies. This was the same figure as that for only state-dependent pricing, though it was not always the same companies doing so. Of those companies that responded ‘irregularly’ or ‘other’ to the frequency of price review, on average they had reviewed prices 39 times over the last 12 months. There was an enormous variation in responses, ranging from zero to 1,012 times, with the median response for these firms being one review over the last 12 months.

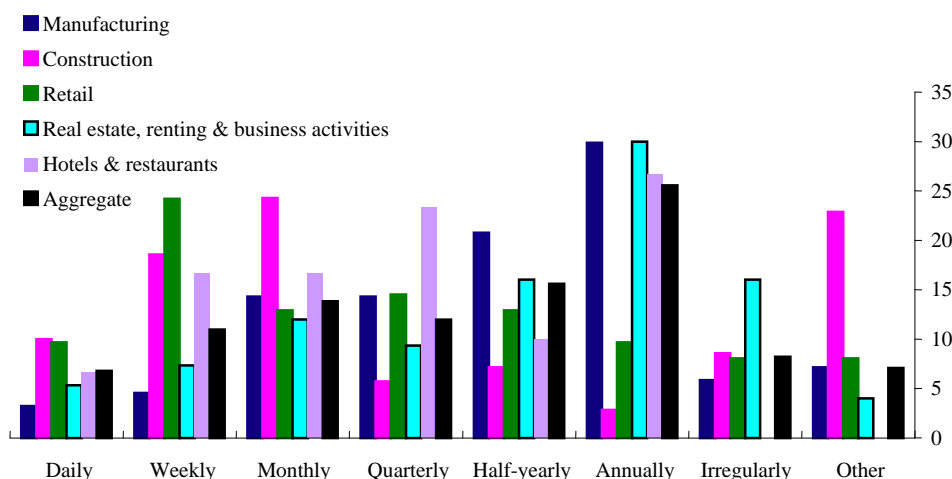
Overall, based on all firms in the sample, the median firm reviewed its price twice per year. This compares to a median of 12 times per year in the earlier UK study. This earlier figure was higher than seen in the euro area, where firms reviewed their prices around twice per year on average, but there was wide variation across countries. The median firms in Belgium, Spain and Italy reviewed their prices once per year, whereas the median number of reviews in France, the Netherlands and Austria was four (it is two for the United States and four for Canada).

Table 4: Frequency of price review (share of response, %)

Daily	6.8
Weekly	11.0
Monthly	13.9
Quarterly	12.0
Half-yearly	15.6
Annually	25.5
Irregularly	8.2
Other (please specify)	7.1

Columns may not sum to 100 due to rounding

Chart 5: Frequency of price review in selected sectors



In order to examine whether there was a uniform pattern of price reviewing, we looked at the frequency of price review by firm size, industry or competitive environment. The top section of Table 5 shows that larger firms reviewed their prices more often than smaller firms – 37% of large firms reviewed prices at least monthly compared to 25% of small firms. In terms of the competitive environment, firms that perceived that they face intensive competition often appeared to review prices frequently, with 45% of firms with a ‘very important’ level of inferred competition doing so at least monthly (although differences across the level of perceived competition are not significant). For those firms that did review prices more frequently as a result of perceived competition, this may imply that they have more incentive to check that their price was not out of line with their competitors as the demand for their product was more sensitive to price. And in terms of sectors, UK construction and retail sector reviewed prices relatively often, whereas manufacturing and other services firms did not. This suggests that there were some important differences across sector, firm size and competitive environment.

Table 5: Frequency of price review and firms' characteristics (share of response, %)

	Daily	Weekly	Monthly	Quarterly	Half-yearly	Annually	Irregularly	Other
Size**								
Small	5	8	12	12	17	27	13	6
Medium	6	12	11	15	19	26	8	4
Large	8	12	17	10	12	25	5	10
Inferred competition^(a)								
NA /not important	8	9	16	12	11	27	6	9
Slightly important	9	13	13	11	18	25	5	7
Important	7	13	15	12	15	21	12	5
Very important	10	16	19	14	13	13	6	10
Market share								
<5%	7	13	14	13	14	24	9	7
5% to 10%	6	6	20	5	20	23	9	11
10% to 20%	5	14	16	14	13	28	2	9
20%+	7	5	11	12	20	30	8	5

Rows may not sum to 100 due to rounding

(a) This is the importance given by firms of a fall in competitors' price as a reason for cutting own price.

A Kruskal-Wallis rank sum test of the equality of populations was conducted. ** indicates rejection of the null hypothesis at the 95% confidence level.

4 Price changes

The second stage of the price adjustment process is the implementation stage. Surveys can shed light on how sticky prices are by asking companies directly how often they change prices in a given period. So, this section investigates how firms determined prices and whether they price discriminated, as well as looking at how often firms reset their prices.

4.1 How did firms determine prices?

The DSGE models that are frequently used for monetary policy analysis incorporates some form of price or wage rigidity. Such models are generally derived in a monopolistically competitive setting for firms, who generally choose to set their price as a mark-up over marginal costs (this mark-up could be constant or time-varying).

The survey asked firms how prices were determined. Table 6 summarises the results. The importance of mark-up over costs form of pricing – whether fixed or variable – can be clearly seen, with 25% of respondents describing constant mark-up pricing as 'very important' and 33% doing so for variable mark-up pricing (which could be related to the economic cycle). Around one third of firms reported that setting prices largely based on competitors' prices was 'very important'. These overall results were similar to those obtained for the euro area where over half of the firms surveyed use (fixed or variable) mark-up pricing, with just over a quarter setting prices according to competitors' prices.

There were some differences relative to the earlier UK survey, where firms were asked to rank the different options according to their importance. The top preference was for firms to set prices at the highest level that the market could bear (39%) followed closely by cost plus mark-up (37%), although these need not be distinct as both approaches could describe profit maximisation.

Table 6: How were UK prices for your main product or activity primarily determined? (share of response, %)

	Not important	Slightly important	Important	Very Important
Price is made up of direct cost per unit plus a fixed percentage mark-up	15.9	19.3	19.0	24.7
Price is based on direct cost per unit, as above, but the percentage mark-up is not fixed	8.9	14.9	25.1	32.9
Price is primarily specified by your principal customer	22.5	20.5	17.7	9.5
Price is primarily determined by your competitors' price	4.9	16.3	35.6	32.6
Price is primarily determined by a regulatory agency	30.2	4.6	3.3	2.6
Price is set at a statutory level	31.9	2.3	0.9	1.0
Price is primarily determined in other ways	15.6	3.0	4.3	12.8

Figures do not sum to 100 as excludes 'not applicable' or 'I can't evaluate' responses

We investigated whether factors such as firm size or competitive environment had an impact on how prices are determined. Table 7 reports the average score for each of the factors above by firm size and level of competition (the mean is calculated by assigning the value 1 to 'not important', 2 to 'slightly important', 3 to 'important' and 4 to 'very important').

Table 7: Average importance of price determination

	Whole sample	Employment size***			Inferred competition			
		Small	Medium	Large	Not important	Slightly important	Important	Very important
Fixed mark-up	2.1	2.2	2.1	2.1	2.2	2.4	2.0	2.1
Variable mark-up	2.5	2.1	2.5	2.7	2.6	2.6	2.5	2.7
Principal customer	1.6	1.4	1.6	1.7	1.4	1.8	1.6	1.8
Competitors' price	2.8	2.7	2.8	2.8	2.1	2.7	2.9	3.4
Regulatory	0.6	0.5	0.6	0.7	0.5	0.7	0.7	0.7
Statutory	0.4	0.4	0.5	0.4	0.3	0.5	0.4	0.5
Other	0.9	1.0	0.9	0.8	1.0	0.9	0.9	0.9

A Kruskal-Wallis rank sum test of the equality of populations was conducted. *** indicates rejection of the null hypothesis at the 99% confidence level.

The results suggested that mark-up pricing did not tend to be more prevalent for smaller companies than it was for larger companies – if anything, large companies were more likely to use variable mark-up pricing. In terms of competition, firms that saw competition as ‘very important’ were much more likely to set prices based on their competitors’ prices than other approaches. This was a useful consistency cross-check on the survey results. Firms that had a higher level of competition were less likely to use fixed mark-up pricing than firms with less competition, which provides some evidence that firms were more likely to be price-takers in a highly competitive environment.

4.2 Did firms charge the same price to all consumers?

One of the key features of pricing behaviour is whether firms sold the same product at different prices either to the same consumer or to different consumers. Euro-area surveys rejected the use of a uniform pricing scheme, finding that on average 80% of respondents set prices on a case by case basis or in accordance with the quantity sold. The results for the United Kingdom were similar, with only 22% of firms charging the same price for all customers and quantities. However, more UK firms (57%) decided prices on a case by case basis and fewer (22%) depended on the quantity sold (the relevant figures for the euro area were around 40% in each case).

Construction, real estate/business activities and manufacturing companies were most likely to decide on a case by case basis, but most retailers charged the same price for all customers and quantities. So, there were many differences in whether/how firms price discriminated according to the sector in which they operated, as well as some difference by firm size. But the level of perceived competition in the market did not have a statistically significant impact (Table 8).

**Table 8: How were UK prices for your main product or activity primarily determined?
(share of response, %)**

	The same for all customers/quantities	Depends on quantity sold	Decided case by case
Aggregate	21.9	21.5	56.6
Industry***			
Manufacturing	11.0	30.5	58.4
Construction	7.1	2.9	90.0
Retail	64.5	17.7	17.7
Transport, storage and communication	23.0	24.1	52.9
Real estate, renting & business activities	14.0	11.3	74.7
Electricity & gas supply	22.2	33.3	44.4
Wholesale & vehicle repairs	13.6	29.5	56.8
Hotels & restaurants	36.7	40.0	23.3
Financial intermediation	28.3	17.4	54.3
Recreational, personal and other services	41.5	36.6	22.0
Employment size*			
Small	20.4	19.4	60.2
Medium	25.4	26.5	48.1
Large	20.9	19.9	59.2
Inferred competition			
Not applicable/not important	15.5	16.5	68.0
Slightly important	20.5	18.2	61.4
Important	20.7	21.3	57.9
Very important	18.8	21.3	60.0
Market share			
<5%	23.8	16.6	59.6
5% to 10%	15.4	23.1	61.5
10% to 20%	23.4	32.8	43.8
20%+	17.4	30.3	52.3

Rows may not sum to 100 due to rounding

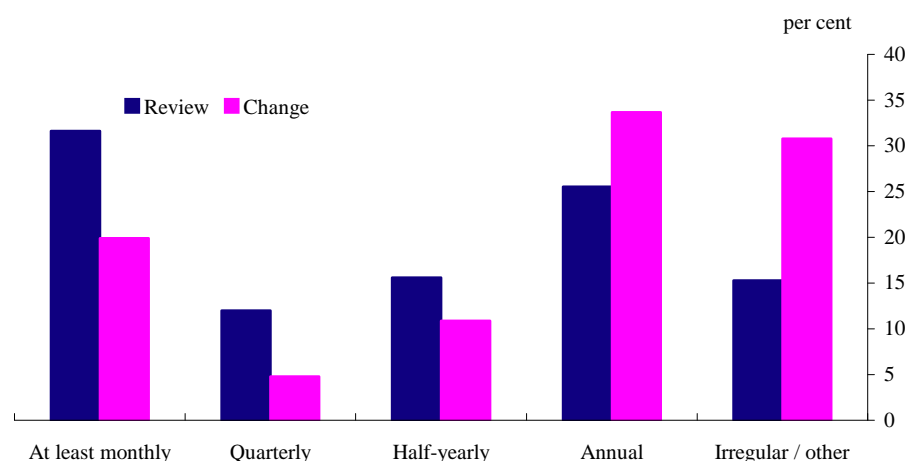
A Kruskal-Wallis rank sum test of the equality of populations was conducted. *** indicates rejection of the null hypothesis at the 99% confidence level, * indicates 95% confidence level.

4.3 How often did firms change their prices?

The average duration of prices is a key assumption in the calibration of DSGE models, which are the workhorse models used in monetary policy analysis. Some evidence has been obtained for this parameter from analysing individual consumer prices (see for example Dhyne *et al* (2005)), but surveys can provide a useful cross-check on such estimates. To address this question, firms were asked: *At which interval do you change the UK price of your main product or activity?* Around one fifth of companies changed prices at least monthly, whereas one third of firms did so annually. Almost the same proportion (31%) changed prices irregularly or other than the options given. Again there was a wide variation in these responses, with the average number of price changes being twenty times over the last twelve months, with a median response in this category of one change over the last twelve months. A little under half (43%) of the ‘irregular/other’ category of firms did not change their price over the past year.

Overall, the median number of times that prices were changed was once per year. This was in line with the median change in the euro-area surveys, but less often than in the United States (1.4 price changes per year), earlier UK study (2 changes) and Canada (4 changes per year). Firms reviewed prices more frequently than actually changing them (Chart 6).

Chart 6: Frequency of price reviews versus changes



We can look at the firm level responses for the frequency of price review and price change. This is summarised in Table 9, which reports the cross-tabulations for how often firms reviewed and changed their prices. The majority of firms reviewed and changed their prices at the same frequency (highlighted in bold below). For those firms that reviewed and changed prices at different frequencies, most reviewed prices more often than they changed prices (the majority of the non-diagonal responses are concentrated in the upper right triangle). This suggested that the price that they were charging was broadly in line with the optimal price and/or that the cost of changing prices exceeded the benefit from doing so. The firm may not have needed to change its price frequently, but if the adjustment that was needed did not take place, then the opportunity cost was very high relative to the cost of reviewing the price. There were a few firms that changed prices more often than they reviewed them. This could be an inconsistency in the survey responses or it may be justified if they reviewed prices at a specific interval and then decided a pattern for price changes before the next review takes place.⁶ It was interesting to note that out of 128 firms that changed prices irregularly, 77 reviewed their prices at regular intervals (time-dependent pricing) and 48 (over one third) reviewed their prices irregularly. There may be several reasons why this was the case – these firms may have had big market power, reacted only to strong signals, were weak with respect to their customers or there may have been a large threshold to cross.

⁶ This may be consistent with firms applying state-dependent pricing (for example, Sheshinski and Weiss (1977)).

Table 9: Relationship between the frequency of price review and price change (number of responses)

	<i>Frequency of price change</i>							
	Daily	Weekly	Monthly	Quarterly	Half-yearly	Annually	Irregularly	Other
<i>Frequency of price review</i>								
Daily	26	6	4			4	2	4
Weekly	3	32	14	2	5	2	8	10
Monthly	2	2	34	12	8	9	23	6
Quarterly	1	1	3	16	13	26	16	7
Half-yearly	1	1	1	1	47	41	10	5
Annually	1		1		1	146	18	8
Irregularly					1	4	48	4
Other	1		3	2			3	40
Total	35	42	60	33	75	232	128	84

Another question was whether firms that change prices less frequently were more forward looking in their price-setting. Table 10 shows the proportion of companies that used each type of information by frequency of price change. The top row shows that 11% of companies that changed prices daily used the ‘rule of thumb’ approach and 9% used primarily information on past conditions, with 63% focusing on current conditions and 17% on future conditions. Generally, current conditions were the most relevant for firms, followed closely by future conditions. This was true both for companies that set prices at regular intervals, as well as firms that set prices irregularly. There may have been some trade-off between current conditions and rule of thumb behaviour as the importance of current conditions increased with the frequency of price changes and the importance of rule of thumb behaviour declined (although there were some cases where this was less clear-cut). Perhaps surprisingly, there was no significant evidence that companies that set prices half-yearly or annually relied more than average on forward-looking information. But, as expected, those companies setting prices daily looked mainly at current conditions and less at future conditions. Firms that changed prices irregularly tended to place slightly more than average weight on past conditions and less weight than average on future conditions. And finally, there was no evidence that firms with mainly long-term customers were more forward looking than firms with short-term customers.

We will investigate how pricing behaviour differs relative to the earlier UK study, but first examine whether the sector in which a firm operated and the competitive environment that a firm faced influenced how often firms reviewed or changed their prices.

Table 10: Relationship between the frequency of price change and information used when reviewing prices (share of response, %)

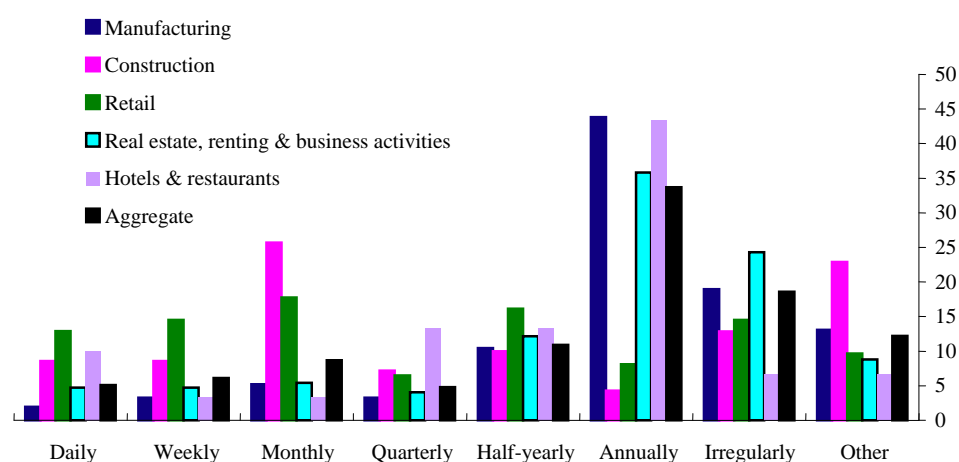
	Rule of thumb	Primarily past conditions	Primarily current conditions	Primarily future conditions	Total at each frequency
Daily	11	9	63	17	100
Weekly	5	10	48	38	100
Monthly	5	2	55	38	100
Quarterly	12	3	55	30	100
Half-yearly	11	12	41	36	100
Annually	17	9	38	36	100
Irregularly	12	10	48	30	100
Other	5	5	47	43	100
Total of each information type	12	8	45	35	100

Rows may not sum to 100 due to rounding

4.4 Effect of competition and firms' characteristics on the frequency of price changes

Survey evidence did suggest that prices tended to be stickier in the services sector and more flexible in the traded sector. But there were important differences within the service sector as shown by looking at the frequency of price changes for selected sectors in Chart 7. Many UK construction and retail companies reported that they changed their prices most often whereas manufacturing, real estate/business activities and hotels and restaurants generally did so less often (though there were some firms in the hotel and restaurant sector that changed price daily). Overall, as Table A1 in the Appendix shows, the median retail and construction sector firm changed prices monthly, relative to annually for manufacturing or other services firms.

Chart 7: Frequency of price changes in selected sectors



Firm size (measured by the number of employees) also had an impact on how often companies reset prices. Larger firms were more likely to set prices at high frequencies, with a quarter of large firms resetting prices at least monthly, but only 15% of small firms doing so. In terms of the effect of competition, firms that perceived themselves to be facing stronger competition sometimes changed their prices more frequently (Table 11). This was the case whether competition was measured by the number of competitors or by the market share of the firm. This may have been because demand was more sensitive to price and some companies had a strong incentive to check that their price was not out of line with their competitors' price. Evidence from earlier micro studies was mixed in terms of whether more concentrated industries adjust prices in response to changes in demand or costs.⁷

Table 11: Frequency of price change by firm size and level of competition

	At least monthly	Quarterly	Half-yearly	Annually	Irregular/other
Employment size*					
Small	15.2	5.4	13.7	35.3	30.4
Medium	16.6	4.4	14.4	30.9	33.7
Large	25.0	4.6	6.9	34.2	29.3
Inferred competition					
NA /not important	20.6	4.1	10.3	34.0	30.9
Slightly important	18.4	2.3	18.4	32.2	28.7
Important	23.2	6.1	8.5	29.3	32.9
Very important	28.1	6.3	6.9	23.1	35.6
Market share*					
<5%	21.7	5.5	11.4	30.5	31.0
5% to 10%	17.5	6.3	11.1	34.9	30.2
10% to 20%	26.6	3.1	14.1	32.8	23.4
20%+	13.6	2.3	6.8	43.2	34.1

Rows may not sum to 100 due to rounding

A Kruskal-Wallis rank sum test of the equality of populations was conducted. * indicates rejection of the null hypothesis at the 90% confidence level.

Like other strands of micro pricing work, the Bank's survey revealed that heterogeneities were present and capturing these in models used for macroeconomic analysis is very difficult. This is an area for further research.

5 Which factors influenced price changes?

In the previous section we investigated how often firms change their prices and discussed reasons why prices might be sticky. In this section, we examine which factors caused prices to change and whether these effects were asymmetric. We also investigate how changes in the exchange rate affected price-setting.

⁷ A brief summary of some of the earlier findings is given in Hall *et al* (1997), page 20.

5.1 Factors influencing domestic prices

Firms were asked about the importance of a range of cost factors (such as labour costs, raw material prices and financial costs) and market conditions (demand and competitors' prices) for price adjustment. Unlike other surveys, we asked companies about the importance of expected changes in key variables as well as actual changes, and we also distinguished between domestic and overseas competition.

Table 12 shows the importance of various factors in terms of driving prices upwards. 6% of firms reported that they never adjust prices upwards so are excluded from the table. Rises in labour and raw material prices emerged as the most important determinant in driving prices upward. Around 40% of all respondents rated such factors as being 'very important'. Financial costs were less important, though nearly one third of companies rated this influence as 'important' or 'very important'. Given that the survey took place after the initial deterioration in credit conditions, it is possible that the respondents were influenced by such circumstances. This survey was not designed to capture this in detail. However, the euro-area surveys which were conducted prior to the credit crisis also found that labour costs and raw materials prices were the main factors driving price increases, with financial costs being less important. This was not surprising given that labour costs and raw materials costs were likely to have accounted for the majority of firms' costs.

Table 12: Importance of different factors in terms of causing an increase in UK prices (share of response, %)

	Not important	Slightly important	Important	Very important
Increase in cost of labour	6.4	19.0	29.6	39.0
Increase in the prices of fuel, raw materials or input/components	8.6	18.1	24.1	42.9
Increase in financing costs	21.9	39.4	21.0	9.4
Actual rise in demand	15.3	23.6	33.1	21.3
Expected rise in demand	21.9	28.5	30.7	12.0
Actual price increase by one or more of your domestic rivals	16.3	29.9	32.2	12.7
Expected price increase by one or more of your domestic rivals	27.0	32.7	22.9	6.0
Actual price increase by one or more of your overseas rivals	29.6	15.0	9.4	4.0
Expected price increase by one or more of your overseas rivals	31.9	14.4	7.1	3.2
Significant increase in market share	27.5	24.7	21.0	5.8
Increase in costs arising out of regulation	16.1	22.4	26.1	19.0

Rows do not sum to 100 as excludes 'not applicable' or 'I can't evaluate' responses

A variety of other factors were also considered to be important, such as price increases by competitors, particularly domestic rivals. More companies rated actual price rises of competitors as being an important factor, rather than expected price changes, though expected price increases by domestic competitors were still rated as at least ‘important’ by nearly 30% of all firms. Market conditions were also relevant, albeit less so than cost factors. Over half of all firms rated the actual rise in demand as being an ‘important’ or ‘very important’ factor driving price rises, with over 40% reporting that expected demand was an important determinant. And regulatory costs were mentioned by around 45% of firms as being at least an ‘important’ factor behind costs increases.

Table 13 shows the importance of various factors in terms of driving prices downwards. 26% of firms reported that they never adjust prices downwards so are excluded from the table.⁸ Unlike price rises, demand conditions and competitors’ prices were the most important factors driving prices downwards. Over three quarters of firms reported that an actual decline in demand was ‘important’ or ‘very important’ in reducing prices, with over one half of firms reporting that expectations of lower demand was also at least important. Given the weak outlook for economic activity in the United Kingdom, these results suggested that this was likely to be a key factor restraining price rises in the current conjuncture.

Table 13: Importance of different factors in terms of causing a decrease in UK prices (share of response, %)

	Not important	Slightly important	Important	Very important
Decrease in cost of labour	30.5	18.4	16.7	13.2
Decrease in the prices of fuel, raw materials or input/components	21.6	19.2	20.4	23.7
Decrease in financing costs	34.0	29.1	12.4	7.8
Actual decline in demand	8.5	16.7	29.1	38.4
Expected decline in demand	14.8	19.8	33.8	22.1
Actual price reduction by one or more of your domestic rivals	11.5	17.1	31.8	31.1
Expected price reduction by one or more of your domestic rivals	17.9	24.1	29.1	16.5
Actual price reduction by one or more of your overseas rivals	25.0	11.1	12.2	8.5
Expected price reduction by one or more of your overseas rivals	27.0	11.7	10.9	5.8
Significant reduction in market share	14.6	17.1	27.4	23.3
Decrease in costs arising out of regulation	26.0	22.7	13.6	8.5

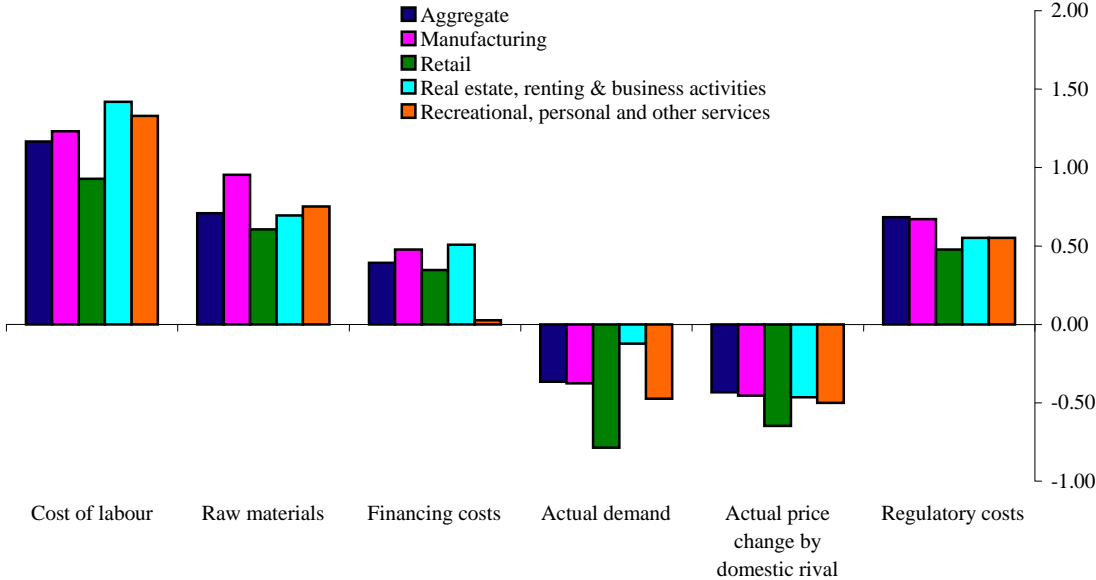
Rows do not sum to 100 as excludes ‘not applicable’ or ‘I can’t evaluate’ responses

⁸ The most important reasons why these firms did not adjust costs were likely to be related to the risk that their competitors did not change their prices, concerns that they would need to readjust their price in the opposite direction and the existence of written contracts.

Over 60% of firms reported that actual price falls by domestic competitors were important in reducing their prices, with many firms also reporting that expectations of such falls were also important. Domestic competition emerged as more of an influence than overseas competition, although around 20% of all firms reported that this was still an important factor. As around one half of all firms did not operate in international markets, this result may have downplayed the importance of overseas competition for those companies that did operate abroad.

The results above suggested that higher costs – in particular, labour costs and raw materials – were the most important driver behind price rises, whereas lower demand and competitors’ prices were the main factors resulting in price falls. This can be seen in Chart 8 which shows the difference between the mean scores for each of the factors.

Chart 8: Difference in importance of factors leading to price increases or falls



The survey also asked firms how changes in demand and competitors’ prices influenced their margins. Most firms reported that margins could be raised in response to higher demand for their product (Table 14). This suggested that margins were procyclical, in line with the findings of Macallan *et al* (2008). About 70% of firms reported that they could increase their margin in response to a rise in domestic competitors’ prices, though less than one quarter of firms could do so in response to a rise in overseas competitors’ prices.

Table 14: Effect of various changes in market conditions on ability to change margins (share of response, %)

	No effect	Upward effect	Downward effect
A rise in market demand for your product	18.6	78.4	2.2
A rise in domestic competitors’ prices	24.5	68.0	6.6
A rise in overseas competitors’ prices	71.4	23.4	3.8

Rows do not sum to 100 as excludes non-responses

5.2 Exchange rates and prices

Sterling's effective exchange rate fell by 9% in the six months to end-February 2008. Such a fall in the exchange rate could motivate firms to raise their prices in the United Kingdom. To consider the effect of changes in the value of sterling, importers were asked: *How much does the exchange rate change before you would adjust your price of goods sold in the United Kingdom?* Several points emerged from the responses shown in Table 15, which were based on 143 responses from companies that operated in international markets as importers (21% of the sample). First, companies appeared to respond symmetrically to depreciations and appreciations. Second, about 13% of companies required a relatively small change (of less than 2%) before they adjusted prices. Third, around half of firms would change prices if the exchange rate changed between 2% and 10%, whereas over one third of firms would wait until the exchange rate changed by over 10%.

Table 15: Exchange rate change needed before firms adjusted their UK prices (importers only)

<u>Sterling appreciation</u>		<u>Sterling depreciation</u>	
	Share of response (%)		Share of response (%)
<2%	13.7	<2%	12.9
2% to <10%	48.9	2% to <10%	52.5
10% to <20%	25.9	10% to <20%	23.7
20% +	11.5	20% +	10.8

The survey also asked importers: *Are foreign exchange costs more difficult to pass on to UK consumers now than a decade ago?* Just under two thirds of importers acknowledged that it was more difficult to shift higher import prices to consumers than it was a decade ago. Competition – both domestic and from overseas – appeared to be a key factor explaining this.⁹

The survey then asked exporters: *If a significant share of your sales (at least 20%) goes to a single country and, if sterling permanently appreciates by 5% vis-à-vis that country, how would you change the price in that market of your main product or activity?* The question differentiated between the effect in the near term (within six months) and in the longer term. The responses based on 128 firms who operated as exporters (18% of total sample) are given in Table 16.

⁹ Over one third of firms said that it was more difficult to pass higher import prices onto consumers because 'low inflation makes price increases more visible and more difficult to justify'. It may be that if inflation expectations were well anchored, consumers see any price rise above the inflation target as being a real price change rather than a nominal price change. Further investigation is needed on this.

Table 16: Effect of 5% appreciation of sterling on the price in the market overseas (exporters only)

<u>In the near term (first six months)</u>		<u>In the longer term</u>	
Share of response (%)		Share of response (%)	
The price would increase by more than 5%	11.2	The price would increase by more than 5%	21.6
The price would increase by less than 5%	20.0	The price would increase by less than 5%	25.6
The price would increase by 5%	16.0	The price would increase by 5%	28.8
The price would remain basically unchanged	52.8	The price would remain unchanged	24.0

Just over half of respondents reported that they would leave their price in the market overseas unchanged after six months, whereas over one quarter of firms reported that they would increase prices by 5% or more within six months. Over the longer term, the proportion of firms that would not change their overseas prices at all fell from about one half to one quarter. Overall, the survey suggested that around half of exporting firms applied some form of pricing to market, as in the longer term either the price was unchanged or it increased by less than the extent of the exchange rate change.

Firms that operated in international markets as exporters were asked directly whether they charged the same price in sterling terms in different countries. Nearly three quarters of firms replied that they did not charge the same price, that is they price differentiated across national markets. These companies were then asked about the importance of various factors in discriminating their price between markets. Exchange rate changes and transportation costs were the most important factors (Table 17).

Table 17: Importance of factors in differentiated price-setting across markets (share of response, %)

	Important	Very important
Exchange rate changes	33.3	41.7
The country tax system	12.5	21.9
Structural market conditions (tastes, standard of living)	35.4	21.9
Cyclical fluctuations in country demand	29.2	7.3
Regulation	28.1	13.5
Transportation costs	29.2	29.2
Other factors	4.2	6.3

6 How did prices adjust following a cost or demand shock?

All companies were then asked how long it took them to reset prices following shocks. Focusing first on costs, all companies in our sample were asked: *After a significant increase in production costs, how much time on average elapses before you raise your prices?* Chart 9 shows the cumulative response (for the full set of responses, see Table 18). In response to a significant increase in production costs, nearly half of firms said they would raise their prices within one quarter (of which half of those firms reacted within one month). Over 80% of firms said that they would raise prices following an increase in costs within one year, whereas 12% of firms would not change their price in response to an increase in production costs.¹⁰

Chart 9 : Percentage of firms changing price in reaction to significant increase in costs

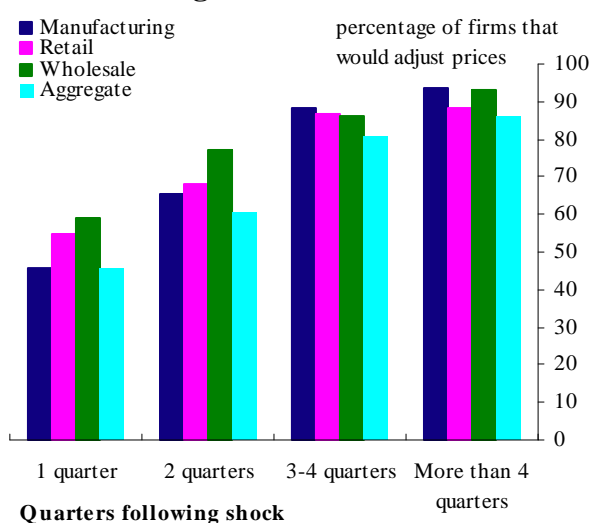
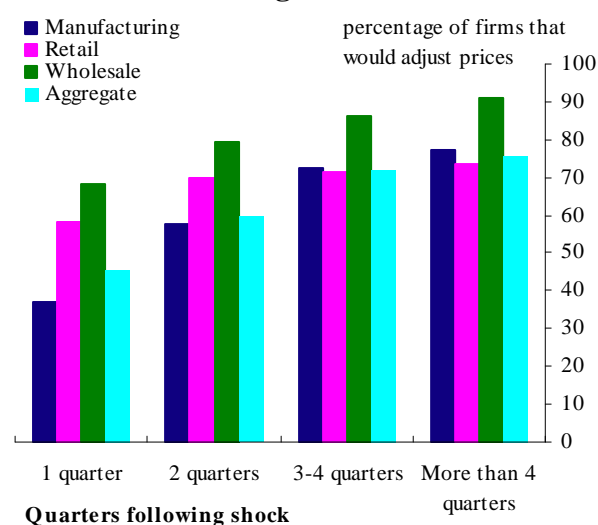


Chart 10 : Percentage of firms changing price in reaction to significant fall in demand



Turning to demand, firms were asked: *After a significant fall in demand, how much time on average lapses before you reduce your prices?* There was a similar initial speed of price adjustment response following a rise in production costs, with just under half of all firms cutting their prices within one quarter (of which one half of these firms do so within one month). But, there were some differences with regard to the cost increase after this horizon. Over 70% of firms said they would reduce prices following a fall in demand within one year (rather than over 80%) and nearly a quarter of firms said they would not change their price in response to a fall in demand. There was a further difference in response to a fall in production costs – the price response tended to be slower and around one third of firms left their price unchanged (see Table 18). The survey also pointed to differences in the speed of reaction between industries – retailers and wholesalers said they were far more likely than manufacturers to change prices following a fall in demand within the first quarter.

¹⁰ For some firms, the time taken to react to shocks may be little different from their standard price review window.

Table 18: How companies responded to changes in demand and costs (share of response)

	Less than one week	1 week to 1 month	1 to 3 months	3 to 6 months	6 to 12 months	More than one year	Price remains unchanged
After a significant increase in demand, how much time on average lapses before you raise your prices?	5.5	12.3	19.9	14.9	22.7	5.1	18.8
After a significant increase in production costs, how much time on average elapses before you raise your prices?	7.8	14.1	23.8	15.0	20.2	5.1	12.3
After a significant fall in demand, how much time on average lapses before you reduce your prices?	5.6	16.9	22.8	14.3	12.6	3.5	23.1
After a significant fall in production costs, how much time on average lapses before you reduce your prices?	3.6	8.4	17.5	11.1	17.0	6.5	33.9

Rows do not sum to 100 as excludes non responses

An interesting empirical question is whether or not pricing is more flexible for firms that reviewed prices regularly. This survey, found that on average firms that reviewed prices only in response to specific events reacted faster to demand shocks than firms who reviewed prices at regular intervals.

6.1 Why did prices not adjust?

As noted above, the median firm reviewed its price more often than it changed prices. Many theories have been put forward to explain why prices do not adjust. As Hall *et al* (1997) point out some theories suggest that a firm's optimal price may deviate from the actual price because of costly price adjustment, whereas other theories explain price rigidity in terms of the type of demand or cost conditions that the company faces. For example, there may be costs to reprinting price lists (physical 'menu costs'), or companies may be concerned about initiating a price war (often referred to in the economic literature as 'co-ordination failure') or of breaching implicit or explicit contracts with their customers. The survey asked a similar question to that used in many of the euro-area surveys, but allowed respondents to differentiate between factors which might influence why they did not raise prices or cut prices separately. The reason for doing this was that some of these factors may have been more important for price rises (or price falls), that is, the effects might not have been symmetric. For example, concerns about antagonising customers were likely to be less relevant for price reductions than increases. The findings of the survey confirmed that this was the case. Indeed, firms tended to report asymmetries more generally as the impediments were rated as more important for price rises than for price falls. This might be surprising, but it could simply reflect firms not having to cut prices at the time that the survey was conducted.

The main theoretical factors that tended to be cited by survey respondents as explaining price stickiness were explicit and implicit contracts, a desire not to antagonise customers and co-ordination failure (Table 19). Companies citing the importance of contracts may have wished to avoid damaging long-term relationships with their customers, whereas firms citing co-ordination failure may have not wanted to be the first to change their prices, fearing that they may initiate a price war. About a third of firms reported that they did not raise prices because their variable prices (such as input prices) did not change much. Menu costs (costs such as time, effort, or reprinting) did not seem to provide a key reason for why prices may be sticky. This confirmed the findings from other surveys.

Table 19: Importance of different factors in explaining price stickiness (share of response listing these factors as ‘important’ or ‘very important’)

	<u>Reasons to decide not to raise the price</u>		<u>Reasons to decide not to lower the price</u>	
	Important	Very important	Important	Very important
Co-ordination failure	33	25	21	13
Temporary shock	22	9	19	8
Explicit contract	15	31	13	20
Implicit contract	22	15	18	10
Maintaining prices at a certain threshold	16	8	10	4
Menu costs	8	2	6	2
Variable costs do not change by much with market conditions	23	8	19	5
It would antagonise our customers	31	24	15	9
Other	2	2	1	1

Implicit and explicit contracts were much more important for manufacturing firms than for retail. Conversely, maintaining prices at a certain threshold was more important for retail and hotels and catering companies. These sectors were also concerned with antagonising customers by increasing prices. It was not obvious that implicit contracts were more important for small firms than they were for large firms, but explicit contracts were more important for large firms (see Table A2 in the Appendix).

7 How had pricing behaviour changed over the past decade?

There were many reasons why pricing behaviour may have changed over the past decade, such as a move to a lower inflation environment, technological advances or an increase in competition. By itself, a move to a lower and more stable inflation environment may have reduced the frequency at which firms needed to adjust their prices. However, technological advances may have enabled firms to change their prices more often, by making it easier and less

costly to implement price reviews and changes. Or increased competition may have led to firms changing their prices more often if the cost of charging the wrong price was greater in a more competitive environment. This section investigates whether pricing behaviour had changed in the United Kingdom over the past decade.

7.1 *Did firms change their prices more or less often than a decade ago?*

To investigate whether the frequency of price change had changed in the past decade, firms were asked the following question: *Has the frequency of price adjustments changed for your main UK product or activity in the past decade?* The results suggested that the frequency of pricing changes was the same as a decade ago for around half of companies. However, 39% of firms reported that they now changed prices more frequently than they did a decade ago and 6% reported that the frequency of price resets had fallen (Table 20). Companies were asked to give reasons why the frequency of resetting their prices had changed. For those firms that had increased the frequency of price changes, the most commonly cited reasons were increased competition (42% of those that had increased) and increased variability of input costs (31%).¹¹ For those that had decreased the frequency, the most common response was that this was because of a more stable macroeconomic environment with lower inflation (45%). However, 43% also cited increased competition as a factor in reducing the number of price resets. So, for the United Kingdom, over the past decade, an increase in competition and higher variability of input prices may have increased the frequency of price changes, yet the more stable macroeconomic environment may have resulted in a small number of companies amending their prices less often.

Table 20: Had the frequency of price changed over the past decade? (share of response, %)

Yes, increased	39.0
Yes, reduced	6.3
No, unchanged	51.1
Not applicable	3.5

Column may not sum to 100 due to rounding

Firms were asked whether they faced more competition for their main UK product than a decade ago. Three quarters of firms stated that competition had increased, with 7% of firms facing less competition.

¹¹ A survey conducted by the Bank of Canada (Amirault *et al* (2005, 2006)) reached a similar conclusion.

7.2 Comparison with 1995 survey results

The previous UK study found that the median firm resets its price twice per year, whereas the latest survey found that this has fallen to once per year. Yet as discussed above, when asked how the frequency of price changes had changed over the past decade, few firms claimed to have reduced the frequency of price changes and a large number stated that they had increased the frequency.

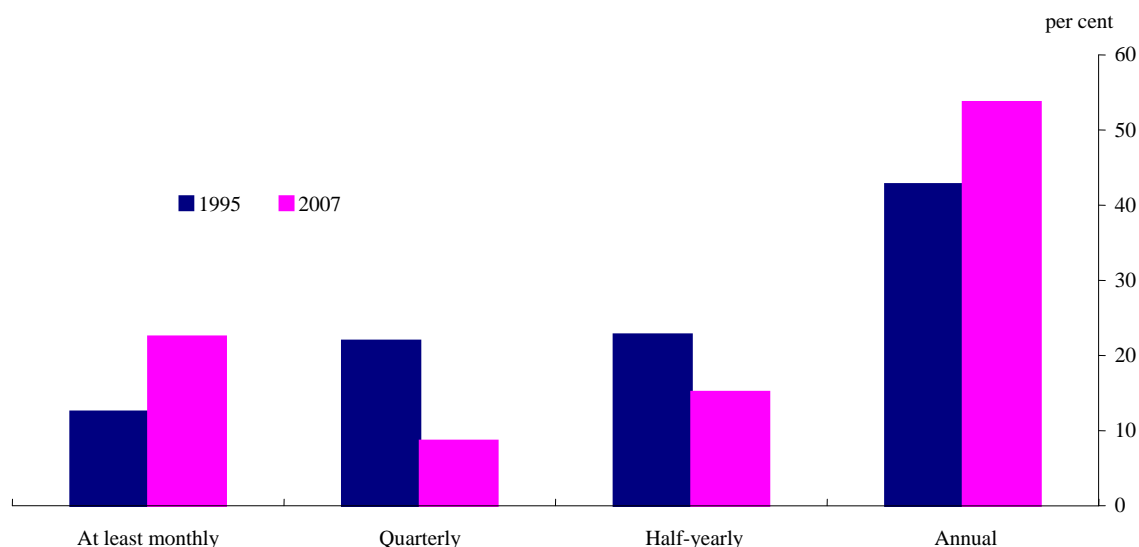
Table 21: Breakdown of respondents by sector, 1995 and 2007 surveys

Industry	Share of responses 2007 (%)	Share of responses 1995 (%) ^(a)
Manufacturing	22.2	68.6
Electricity & gas supply	1.3	0.9
Construction	10.1	5.9
Wholesale, vehicle repairs & fuel	6.3	5.8
Retail	8.9	6.9
Hotels & restaurants	4.3	1.4
Transport, storage & communication	12.6	4.5
Financial intermediation	6.6	0.3
Real estate, renting & business services	21.6	4.5
Recreational, cultural & other personal services	5.9	1.1
Total	100	100

(a) Numbers differ slightly from that published in Hall *et al* (1997) due to inclusion of certain companies into different sectors, most notably wholesale firms split from retail.

There were a range of potential reasons for this discrepancy. The first was the type of firms that replied to the two surveys. The 1995 survey was not representative of the sectoral composition of the UK economy, with nearly 70% of respondents in the manufacturing sector (cf a 19% share of GVA) (Table 21). In practice, this appeared to have little effect. Reweighting the responses to align the shares of each industry with that industry's share of GVA resulted in a similar overall distribution of price changes (Chart 11). This was because the distribution of price changes in manufacturing was similar to that of the other services excluded in the earlier survey.

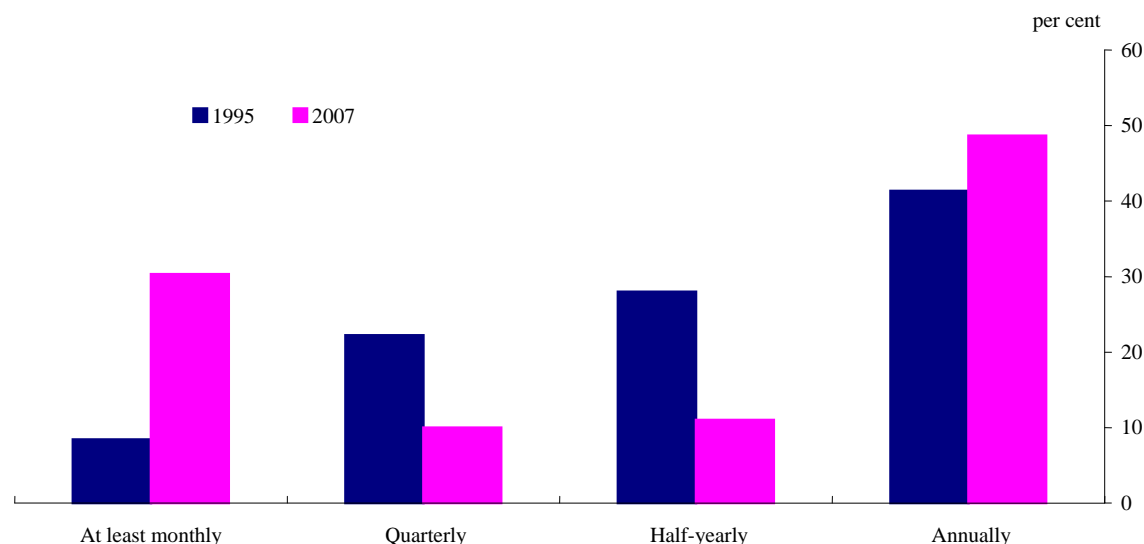
Chart 11: Frequency of price changes, weighted by sector share in GVA



The previous survey was skewed towards large firms. As discussed in Section 4.4 above, larger firms often reset prices more frequently than smaller firms. Reweighting the survey responses to the same split between firm size eliminated some of the overall difference, but not all.

However, there was a marked change in the distribution of price changes by firms between the two surveys. Taking into account those firms that reset prices at ‘irregular’ or ‘other’ frequencies, the proportion of firms that reset prices at most once over the previous year had increased from a little under half in the previous survey to a little over half in the current survey, which accounted for the change in median response. But the proportion of firms that reset prices at least monthly had increased from a little under 9% in the previous survey to almost a quarter in the current survey. The proportion of firms that changed prices either quarterly or half-yearly had dropped. This trend appeared to hold true across industries and firm sizes. It was particularly marked for large firms (Chart 12).

Chart 12: Frequency of price changes, large firms



8 Conclusion

It is important to understand how companies set prices, since price-setting behaviour plays a key role in the monetary transmission mechanism. This new survey improves our understanding of price-setting behaviour and in particular the extent of nominal rigidities by asking firms directly about these issues. This paper has reviewed the results of a survey of the price-setting behaviour of around 700 UK firms after a period of relative macroeconomic stability, albeit after significant commodity price volatility and immediately after the onset of tightening credit conditions in the first phase of the financial crisis.

In the United Kingdom, it was rare for firms to review their prices only in response to specific events. Many firms reviewed their prices at regular intervals, but it was also common for firms to review prices in response to specific events. This was similar to the findings of a recent euro-area survey. When considering the optimal price, around a fifth of firms used a rule of thumb. Around one third of firms set their prices based on their expectations of the near future. Large firms were more forward looking than small firms and there were also differences between industries with retail firms more likely to set prices according to current conditions. The median UK firm reviewed its price twice a year, although there were notable differences between sectors.

In terms of how companies set prices, survey evidence supported the use of the mark-up over costs form of pricing. Firms reviewed prices more frequently than actually changing them, with the median firm changing price only once per year. But there were marked differences between sectors — for example, UK construction and retail companies changed their prices more often than companies in the manufacturing and other services sectors. Large firms, and those facing strong competition often changed prices on a more frequent basis. So, there were important heterogeneities at work. Further work may be needed to investigate this.

Different factors influenced price rises and price falls. Higher costs – in particular, labour costs and raw materials – were the most important driver behind price rises, whereas lower demand and competitors' prices were the main factor resulting in price falls. The survey also provided some insights about the speed of response to changes in cost and demand conditions. Nearly half of companies changed their prices within a quarter following an increase in costs or a fall in demand.

When asked which factors were most important in causing price stickiness, the existence of implicit and explicit contracts and co-ordination failure were viewed as the most important. Pure menu costs (time, effort, reprinting etc) were not widely cited, in keeping with previous survey results.

Over the decade preceding the survey, a substantial number of firms increased the frequency of price resets. Firms mainly attributed that to an increase in competition over the period, which increased the cost to the firm from deviating from the optimal price, and higher variability of input prices. Yet the more stable macroeconomic environment in place at that time had also resulted in some firms decreasing the frequency of price changes, such that the distribution of price resets was becoming bi-modal.

Appendix

Table A1: Frequency of price change by sector

	At least monthly	Quarterly	Half-yearly	Annual	Irregular /other	Median ^(a)
Manufacturing	10.5	3.3	10.5	43.8	32.0	Annual
Construction	42.9	7.1	10.0	4.3	35.7	Monthly
Retail	45.2	6.5	16.1	8.1	24.2	Monthly
Transport, storage and communication	10.3	2.3	8.0	51.7	27.6	Annual
Real estate, renting & business activities	14.9	4.1	12.2	35.8	33.1	Annual
Electricity & gas supply	22.2	0.0	11.1	33.3	33.3	Annual
Wholesale & vehicle repairs	31.8	11.4	11.4	25.0	20.5	Quarterly / half-yearly
Hotels & restaurants	16.7	13.3	13.3	43.3	13.3	Half-yearly
Financial intermediation	15.6	2.2	8.9	22.2	51.1	Half-yearly
Recreational, personal and other services	9.8	2.4	7.3	53.7	26.8	Annual
Aggregate	19.9	4.8	10.9	33.7	30.8	Annual

^(a) Median is adjusted for irregular/other

Table A2: Importance of different factors to explain price stickiness by firm size (mean score)

	<u>Reasons to not raise price</u>				<u>Reasons to not lower price</u>			
	Aggregate	S	M	L	Aggregate	S	M	L
Co-ordination failure	2.5	2.2	2.6	2.6	1.7	1.5	1.8	1.8
Temporary shock	1.8	1.7	1.8	1.8	1.5	1.4	1.5	1.6
Explicit contract	2.0	1.8	1.9	2.2	1.6	1.4	1.6	1.7
Implicit contract	1.7	1.7	1.6	1.7	1.3	1.2	1.4	1.4
Maintaining prices at a certain threshold	1.5	1.5	1.5	1.5	1.1	1.1	1.2	1.1
Menu costs	1.1	1.1	1.1	1.1	1.0	0.9	1.0	1.0
Variable costs do not change by much with market conditions	1.7	1.9	1.6	1.5	1.4	1.5	1.3	1.4
It would antagonise our customers	2.4	2.3	2.5	2.5	1.4	1.4	1.5	1.4
Other	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1



General information

1. What is your main product or activity, by domestic turnover? _____
2. What is the 'market share' of your main product or activity in the United Kingdom?
 <5% 10% to <20%
 5% to <10% 20%+
3. Roughly how many products do you currently sell in the United Kingdom? _____
4. On average, approximately how many full-time equivalents does your company employ in the United Kingdom?
 0-49 250+
 50-249
5. Approximately what size was your UK turnover in the last financial year?
 <£1m £10m to <£50m
 £1m to <£10m £50m+
6. What do you regard as the principal market for your main product or activity?
 The United Kingdom North America
 European Union The whole international economy
(If one country or other group of countries please specify) _____
7. What proportion of the sales of your main UK product or activity is sold to overseas markets?
 0% 10% to <30%
 >0% to <10% 30%+
8. a) What is the main destination of your sales (choose only one option)?
 Retailers/wholesalers Other private sector companies
 Public sector Directly to consumers

b) If you sell to retailers, wholesalers or other private sector companies, are they within your own group?
 Yes No
9. How intensive is the competition you experience for your main UK product or activity?
 Strong None
 Weak Don't know/No answer
10. How easily can you find out the prices set by your competitors for your main product or activity?
 Easily Not at all
 With difficulty/effort Don't know/No answer
11. Do you face more competition for your main UK product or activity compared with a decade ago?
 Yes The same
 No Not applicable
12. Do you generate the largest share of your UK turnover with long-term or short-term customers?
 Long-term (more than one year)
 Short-term (less than one year)



Pricing in the United Kingdom

13. The UK price of your main product or activity is (choose only one option)
- The same for all customers/quantities
 - Depends on the quantity sold (but according to a standard price list)
 - Decided case by case
14. Companies often *review* their prices without necessarily changing them. Do you generally *review* the UK sales price of your main product or activity (choose only one option)
- In regular intervals
 - Generally in regular intervals, but also in response to specific events (eg as reaction to a substantial change in costs)
 - In response to specific events (eg as reaction to a substantial change in costs)
15. a) How frequently do you actively *review* your UK pricing decisions?
- | | |
|------------------------------------|---|
| <input type="checkbox"/> Daily | <input type="checkbox"/> Half-yearly |
| <input type="checkbox"/> Weekly | <input type="checkbox"/> Annually |
| <input type="checkbox"/> Monthly | <input type="checkbox"/> Irregularly |
| <input type="checkbox"/> Quarterly | <input type="checkbox"/> Other (please specify) _____ |

If you answered IRREGULARLY or OTHER to question 15 please answer the following question.

b) In the past twelve months how many times have UK pricing decisions been actively *reviewed*? _____

16. a) At which interval do you *change* the UK price of your main product or activity?
- | | |
|------------------------------------|---|
| <input type="checkbox"/> Daily | <input type="checkbox"/> Half-yearly |
| <input type="checkbox"/> Weekly | <input type="checkbox"/> Annually |
| <input type="checkbox"/> Monthly | <input type="checkbox"/> Irregularly |
| <input type="checkbox"/> Quarterly | <input type="checkbox"/> Other (please specify) _____ |

If you answered IRREGULARLY or OTHER to question 16 please answer the following question.

b) In the past twelve months how many times have you actually *changed* your UK prices? _____

17. Which of the following methods best describes how you set the UK price of your main product or activity (choose only one option)?
- Rule of thumb (eg change by a fixed amount or percentage; change in accordance with the economy-wide inflation)
 - We set the price primarily given conditions that have applied in the recent past
 - We set the price primarily for current conditions
 - We set the price primarily based on our view of the near future
18. Has the frequency of price adjustments changed for your main UK product or activity in the past decade?
- | | |
|---|---|
| <input type="checkbox"/> Yes, increased | <input type="checkbox"/> No, unchanged |
| <input type="checkbox"/> Yes, reduced | <input type="checkbox"/> Not applicable |
- If yes, why? _____



19. How are UK prices for your main product or activity primarily determined?

Please rank each of the following options by circling the numbers to the right of each statement. Use the following options: 1 = not important; 2 = slightly important; 3 = important; 4 = very important; 0 = not applicable, I can't evaluate.

Price is made up of direct (ie prime or variable) cost per unit plus a fixed percentage mark-up	1	2	3	4	0
Price is based on direct (ie prime or variable) cost per unit, as above, but the percentage mark-up is not fixed	1	2	3	4	0
Price is primarily specified by your principal customer	1	2	3	4	0
Price is primarily determined by your competitors' price	1	2	3	4	0
Price is primarily determined by a regulatory agency	1	2	3	4	0
Price is set at a statutory level	1	2	3	4	0
Price is primarily determined in other ways (please specify)	1	2	3	4	0

20. How important are the following factors listed below in terms of causing an *increase* in UK prices?

Use the following options: 1 = not important; 2 = slightly important; 3 = important; 4 = very important; 0 = not applicable, I can't evaluate.

Not applicable — upward adjustment never takes place (go to Q.21)					0
Increase in cost of labour	1	2	3	4	0
Increase in the prices of fuel, raw materials or inputs/components	1	2	3	4	0
Increase in financing costs	1	2	3	4	0
Actual rise in demand	1	2	3	4	0
Expected rise in demand	1	2	3	4	0
Actual price increase by one or more of your domestic rivals	1	2	3	4	0
Expected price increase by one or more of your domestic rivals	1	2	3	4	0
Actual price increase by one or more of your overseas rivals	1	2	3	4	0
Expected price increase by one or more of your overseas rivals	1	2	3	4	0
Significant increase in market share	1	2	3	4	0
Increase in costs arising out of regulation	1	2	3	4	0

21. How important are the following factors in causing a *fall* in UK prices?

Use the following options: 1 = not important; 2 = slightly important; 3 = important; 4 = very important; 0 = not applicable, I can't evaluate.

Not applicable — downward adjustment never takes place (go to Q.22)					0
Decrease in cost of labour	1	2	3	4	0
Decrease in the prices of fuel, raw materials or inputs/components	1	2	3	4	0
Decrease in financing costs	1	2	3	4	0
Actual decline in demand	1	2	3	4	0
Expected decline in demand	1	2	3	4	0
Actual price reduction by one or more of your domestic rivals	1	2	3	4	0
Expected price reduction by one or more of your domestic rivals	1	2	3	4	0
Actual price reduction by one or more of your overseas rivals	1	2	3	4	0
Expected price reduction by one or more of your overseas rivals	1	2	3	4	0
Significant reduction in market share	1	2	3	4	0
Decrease in costs arising out of regulation	1	2	3	4	0





22. What effect will the following changes in market conditions have on your ability to change gross profit margins?

	No effect	Upward effect	Downward effect
A rise in market demand for your product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A rise in domestic competitors' prices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A rise in overseas competitors' prices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. Companies often differ in how quickly they adjust prices in response to changes in demand and costs. How does your firm respond?

Use the following options: 1 = less than one week; 2 = from one week to one month; 3 = from one to three months; 4 = from three to six months; 5 = from six months to one year; 6 = more than one year; 7 = the price remains unchanged.

After a significant increase in demand, how much time on average lapses before you raise your prices?	1	2	3	4	5	6	7
After a significant increase in production costs, how much time on average elapses before you raise your prices?	1	2	3	4	5	6	7
After a significant fall in demand, how much time on average lapses before you reduce your prices?	1	2	3	4	5	6	7
After a significant fall in production costs, how much time on average lapses before you reduce your prices?	1	2	3	4	5	6	7

24. Companies sometimes decide to postpone price changes or to change their price only slightly. This is generally due to various factors, some of which are listed below. Some of these factors may be more relevant for price rises, whereas others may be more important for price falls. Please indicate how important each of these factors are in your company. Use the following options: 1 = not important; 2 = slightly important; 3 = important; 4 = very important; 0 = not applicable, I can't evaluate.

	Reasons to decide not to raise the price					Reasons to decide not to lower the price				
	1	2	3	4	0	1	2	3	4	0
The risk that our competitors do not change their prices	1	2	3	4	0	1	2	3	4	0
The risk that we subsequently have to readjust our prices in the opposite direction	1	2	3	4	0	1	2	3	4	0
The existence of written contracts specifying that prices can only be changed when the contract is renegotiated	1	2	3	4	0	1	2	3	4	0
The existence of an implicit contract (regular contact with a customer without any written contract)	1	2	3	4	0	1	2	3	4	0
The preference for maintaining prices at a certain threshold (eg you would rather charge £4.99 than £5.00)	1	2	3	4	0	1	2	3	4	0
The costs implied by price changes (eg printing of price lists or information gathering costs)	1	2	3	4	0	1	2	3	4	0
The variable costs in our company do not change by much with market conditions, making our price quite stable	1	2	3	4	0	1	2	3	4	0
It would antagonise our customers	1	2	3	4	0	1	2	3	4	0
Other (please specify) _____	1	2	3	4	0	1	2	3	4	0

For companies that trade in international markets (as importers or exporters), please proceed to Q.25.

If you only operate in the United Kingdom, thank you again for your co-operation in completing this survey.





Information regarding price behaviour in international markets

Only to be filled out by companies operating in international markets, as importers and/or exporters.

Importers (if you are not an importer but an exporter, please go straight to Q.27)

25. How much does the exchange rate change before you would adjust your price of goods and services sold in the United Kingdom?

Sterling appreciation

- <2%
- 2% to <10%
- 10% to <20%
- 20%+

Sterling depreciation

- <2%
- 2% to <10%
- 10% to <20%
- 20%+

26. Are foreign exchange costs more difficult to pass on to UK consumers now than a decade ago?

- Yes
- No

If yes, why?

- Competition from domestic sources
- Competition from foreign sources
- Low inflation makes price increases more visible and more difficult to justify
- Other factors (please specify) _____

Exporters (if you are not an exporter, thank you for your co-operation in completing this survey).

27. Companies may charge different prices on different markets. Which of the following statements is true for your company (please tick one answer only)?

- The price — expressed in sterling — varies across countries (proceed to Q.28)
- The price — expressed in sterling — is identical in all countries (proceed to Q.29)

28. How important are the following factors in discriminating your price between markets?

Use the following options: 1 = not important; 2 = slightly important; 3 = important; 4 = very important; 0 = not applicable, I can't evaluate.

Exchange rate changes	1	2	3	4	0
The destination country tax system	1	2	3	4	0
Structural market conditions (tastes, standard of living)	1	2	3	4	0
Cyclical fluctuations in country demand	1	2	3	4	0
Regulation	1	2	3	4	0
Transportation costs	1	2	3	4	0
Other factors, please specify _____	1	2	3	4	0

29. If a significant share of your sales (at least 20%) goes to a single country and, if sterling were to permanently appreciate by 5% *vis-à-vis* that country, how would you change the price in that market of your main product or activity (choose only one option)?

In the near term (first six months)

- The price would increase by more than 5%
- The price would increase by less than 5%
- The price would increase by 5%
- The price would remain basically unchanged

In the longer term

- The price would increase by more than 5%
- The price would increase by less than 5%
- The price would increase by 5%
- The price would remain unchanged

Thank you again for your co-operation.



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