

How do UK companies set prices?

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Abstract

This paper reports the results of a survey conducted by the Bank of England in the autumn of 1995 to investigate the price-setting behaviour of 654 UK companies. The survey sheds light not only on the extent of price rigidity in general, but also on the form this rigidity takes, and the characteristics of companies and markets that influence it. The survey found that, although market conditions are of primary importance in price determination, many companies set prices on the basis of cost plus a mark up. There was also evidence of considerable price rigidity. In the year preceding the survey, the average company reviewed its prices once a month. Time-dependent pricing rules appeared to be much more widespread than state-dependent pricing rules, suggesting that the short-run real effects of monetary policy could increase at lower rates of inflation. Retailers reviewed and changed their prices more frequently than manufacturers. As in Carlton (1986), companies operating in more competitive markets reviewed prices more often than companies with few direct competitors; but in contrast to his findings long-term relationships with customers appeared to reduce price flexibility. Despite the frequency of reviews, actual prices were only changed twice on average, indicating that there may be substantial costs of changing prices. Companies stated that the *physical* menu costs of changing prices were a less important source of price rigidity than the need to preserve customer relationships (due to explicit or implicit contractual arrangements) or to maintain market share. In addition, cost-based rather than market-led pricing was widespread and the overwhelming majority of companies indicated that they would be more likely to increase overtime and capacity than change their price in response to a boom in demand. The survey also found substantial asymmetries in the factors which drive prices up and those that push prices down. Overall, the survey results indicate that UK markets do not behave as if prices are costlessly and instantaneously determined. It appears that uncertainty about the extent or permanence of changes in market conditions combined with costs of adjusting prices means that many companies' short-run response to a change in demand is to adjust output rather than price. Taking account of such behaviour could be important in explaining the short-run real effects of monetary policy.

1 Why is price setting important?

Price-setting behaviour determines how decisions about monetary policy—on interest rates, money and inflation—affect the economy. Early—what we might call ‘classical’—theories about the macroeconomy assumed that monetary variables had no impact on real variables. These theories were based, at least in part, on the idea that price changes were costless and instantaneous. But anyone who has bought or sold something knows that in reality prices are set by buyers and sellers and that it costs time and money to calculate the right price of any product, or to work out how prices should respond to a change in the market. The ‘classical’ theorists knew this also, but still argued that modeling the economy as though there were no price frictions was a good approximation to reality.

There is now considerable evidence suggesting that changes in money and prices (*nominal* quantities) can and do affect output and employment (*real* quantities), at least in the short run. This was the finding of Friedman and Schwartz (1963) and of many other researchers since then who have explored and refined their observations.⁽¹⁾ Many—foremost among them ‘new-Keynesian’—economists have long suspected that at least part of the reason might be that prices are slow to adjust, or ‘sticky’. There are now many models that incorporate this feature explicitly and suggest, for example, that strategic interactions between companies, cost conditions, company-customer relations and the costs of revising price lists could all lead to prices not changing very much nor very frequently.

Section 2 describes a survey of price-setting behaviour in the United Kingdom that was intended not only to measure the extent of price stickiness, but also to explain it. Section 3 outlines the survey results on the way in which companies determine their product prices. Section 4 reports findings on the frequency with which companies review and change their prices. Section 5 discusses the survey results on the importance companies place on alternative theories explaining price rigidity, and Section 6 outlines the impact of company characteristics and circumstances on recognising these theories. This section mirrors the approach taken in a survey of price-setting behaviour carried out by Alan Blinder in the United States in 1991. The remaining sections look at further aspects of price-setting behaviour: Section 7 examines the factors leading companies to raise or lower their prices, and Section 8 discusses what companies say they would

(1) For a survey of recent contributions, see Blanchard (1990).

do in response to a demand boom. Section 9 draws together the conclusions of the survey.

2 The survey

There have been many attempts to investigate price-setting behaviour using aggregate data.⁽²⁾ But studies using data on individual products and companies are less common. In the United States, Blinder (1991) surveyed 200 companies and asked questions about different pricing theories. Carlton (1986) analysed data collected by Stigler and Kindahl (1970) on individual product prices and looked at the frequency of price changes and the duration of company-customer relationships. Cecchetti (1986) studied the frequency of price adjustment of news-stand magazines. Kayshap (1995) looked at evidence based on retail catalogues. In the United Kingdom, there seems to be even less company or product-level evidence. An early study by Hall and Hitch (1939) asked 38 UK manufacturing companies about their pricing behaviour. More recently, the Workplace Industrial Relations Surveys of 1984 and 1990 asked questions about whether prices would respond to changes in demand;⁽³⁾ and the Lloyds Bank Small Business Research Trust has published a survey of price setting in 350 small companies in the United Kingdom.⁽⁴⁾

The Bank of England's survey was carried out by the Bank's Agents and its Business Finance Division, who approached some 1,100 industrial contacts across the country during September 1995. A questionnaire was then sent out to those who agreed to participate and 654 usable responses were received. Respondents to the survey tended to be established rather than new companies, and this meant that companies in the sample were likely to be larger than average. For example, whereas large companies (with more than 500 employees) account for about 37% of employment in the United Kingdom,⁽⁵⁾ in the Bank survey they accounted for 96% of total employment of the companies which responded. Chart 1 shows the size of companies in the survey. Partly because of this large-company bias, the sample was

(2) For example, Ball, Mankiw and Romer (1988), and later Yates and Chapple (1996), observed a cross-country correlation between the level of inflation and the output-inflation trade-off, and used this to infer that there are significant costs in changing prices that decline in importance as inflation rises. Rae (1993) and Hall and Yates (1997) make inferences about price rigidity by examining the correlation between moments of inflation across sub-components of the aggregate price index.

(3) For analysis of the questions on price responses in the Workplace Industrial Relations surveys, see Yates (1994) and Haskel *et al* (1995).

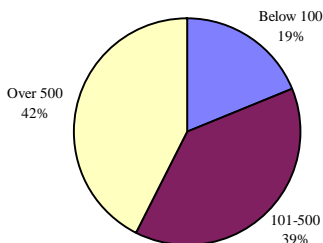
(4) See Lee (1995) for a survey of pricing studies.

(5) Dale and Kerr (1995) report employment shares by company size based on data contained in the Inter-Departmental Business Register.

dominated by manufacturing companies (see Chart 2): 68% of the sample were manufacturing companies, compared with only 12% for the country as a whole.⁽⁶⁾ The survey also asked questions about market structure. As discussed below, the number of competitors in a company's market (Chart 3), a company's market share (Chart 4) and the length of customer relationships (Chart 5) are all likely to affect pricing decisions.⁽⁷⁾

Chart 1
Company size by number of employees

Percentage of companies in each category



Survey respondents were asked to specify numbers of both full and part-time workers. Company size was categorised using numbers of full-time equivalent workers, for which part-time workers have been treated as equivalent to 40% of a full-time worker. This proportion is based on *Labour Force Survey* data on hours worked by part and full-time workers in the economy as a whole.

(6) The Bank questionnaire may have induced an additional bias in the responses because it asked respondents to focus on the pricing of a specific, main product. This may have been appropriate for manufacturing companies, but was potentially less suitable for service and construction companies, whose 'product' may vary with each new transaction. For these companies, it might have been more appropriate to ask about the factors determining charges for labour time.

(7) The survey also asked companies about organisational structure, trade union arrangements, market location, discounting and customer markets. This information is not used in this discussion but will be considered in subsequent work on the survey results.

Chart 2
Sectoral Composition

% of companies in each category

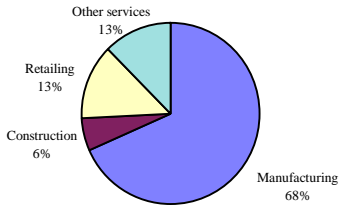


Chart 3
Number of competitors

% of companies in each category

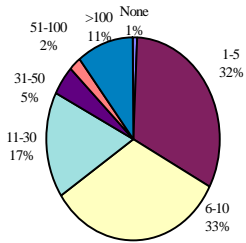


Chart 4
Market share

% of companies in each category

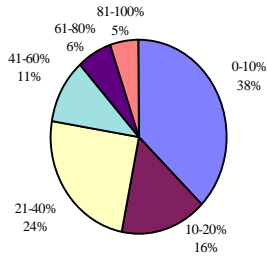
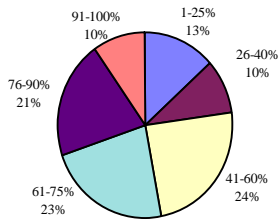


Chart 5
Proportion of customer relationships over five years

% of companies in each category



3 How are prices determined?

The first section of the Bank survey asked companies to assess the relative importance of alternative factors which might be thought to influence price formation. Table A summarises the results. The top preference⁽⁸⁾ for almost 40% of respondents was that prices were set at the highest level that the market could bear. The importance of market conditions in price formation is reinforced by the fact that an additional 25% of respondents stated that they set prices in relation to their competitors.⁽⁹⁾

Retailing and manufacturing companies were particularly conscious of rival prices, which may be linked with the high ranking of co-ordination failure as a cause of price rigidity in these sectors (reported below). Companies in more concentrated markets were more likely to look to their competitors' prices when determining their own, possibly reflecting the importance of strategic price behaviour. Construction companies suggested that the market level was by far the most important factor in price determination but, surprisingly, gave less weight to competitors' prices.

Despite the weight placed on market conditions by many companies, the survey also confirmed the importance of company-specific factors. The first preference of about 20% of respondents was that the price was made up of a direct cost per unit plus a variable percentage mark-up. A further 17% of companies, particularly retailing companies, stated that they priced on the basis of costs plus a fixed percentage mark-up. Cost plus mark-ups tended to be more important for small companies, and market conditions much less so. This may suggest that the cost mark-up 'rule of thumb' for pricing is more suitable for small companies, which cannot afford expensive market research.

(8) Companies were able to choose more than one response as their top preference. This means that the total percentage of companies expressing first preferences for all of the explanations of price determination exceeds 100%. Unfortunately, the existence of multiple preferences means that we have not been able to test statistically for differences in responses across company characteristics.

(9) There is an issue here about how far respondents perceived 'market level' and 'competitors' as alternative responses, but it is not one that we can resolve with the data we have.

Table A
How are prices determined ?

	Market level	Competitor prices	Direct cost plus variable mark-up	Direct cost plus fixed mark-up	Customer set	Regulatory agency
Whole sample	39	25	20	17	5	2
Industry						
Manufacturing	41	26	20	16	6	1
Construction	51	11	22	19	3	0
Retail	18	30	21	24	0	0
Other services	48	23	17	14	6	3
Company size						
Small	32	22	20	27	4	1
Medium	41	24	23	18	5	1
Large	42	27	16	12	5	3
Number of competitors						
0-5	41	24	19	15	6	2
6-10	38	29	22	17	5	1
11 or more	41	20	18	17	4	2
Percentage of long-term relationships						
0-40% ^(a)	38	23	26	17	1	0
41-60%	46	24	15	16	5	1
61-75%	44	27	21	13	5	1
>75%	33	25	19	18	8	5

(a) Includes those companies responding 'not applicable'.

Only 5% of companies reported that their prices were set by their customers; this was more a feature of manufacturing and services than other sectors. This method of pricing was more important for companies with a larger proportion of long-standing customer relationships. It was also more prevalent for companies operating in more concentrated markets. This is puzzling, since companies with fewer competitors should have more power over their customers, who have fewer alternative suppliers if they are dissatisfied.

4 How often are prices reviewed and changed?

The factors which influence price determination may differ from those which lead companies to review and change price. The survey asked companies directly about the frequency of price reviews—the process of assessing whether their product price is consistent with current cost and demand conditions—and the frequency at which prices are actually changed. On price reviews, the survey asked '*How frequently are pricing decisions actively reviewed?*'. On price changes, it asked '*In the last twelve months, how many times have you actually changed the price of your main*

product?'. Charts 6 and 7 compare the frequency of price reviews and price changes.

Chart 6
Frequency of price reviews

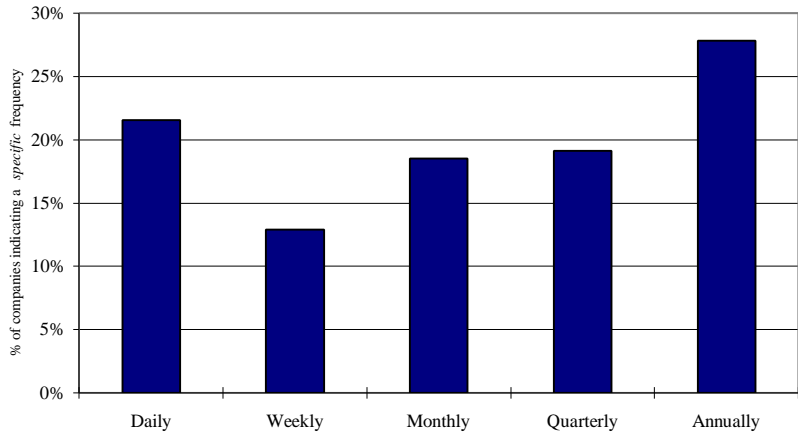
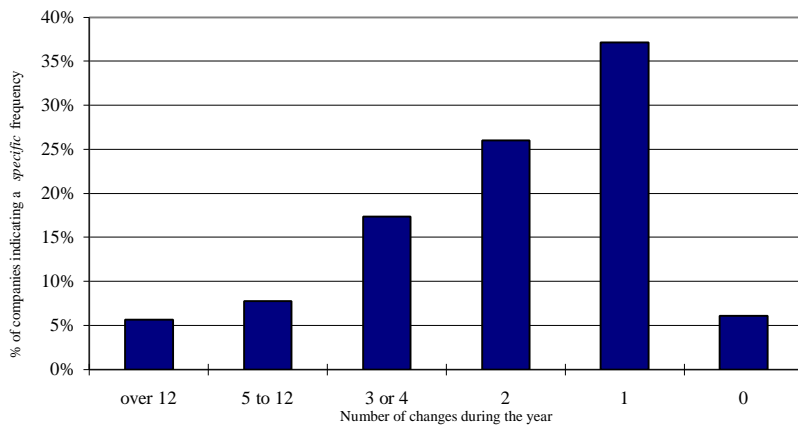


Chart 7
Actual price changes



Informational menu costs

The frequency of price reviews reveals something about informational costs of price changes—the costs of collecting the data needed to decide whether the current price is right or not—as distinct from additional costs of implementing the outcome of a price review, discussed below. For example,

if price reviews were entirely costless, companies would conduct them continuously to pick up each change in market conditions as it occurred. For the 80% of companies in our sample that review prices less than once a day, price changes are probably not costless; the expected gains from reviewing prices continuously are not large enough to justify the costs. Indeed, the fact that 28% of companies said that they reviewed prices only once a year suggests that the informational costs involved in assessing market conditions are substantial.

Time and state-dependent pricing

Companies were asked whether they normally reviewed prices at a particular frequency and/or whether prices were reviewed ‘in response to particular events’. These questions can help to distinguish between two different theories of price setting—time-dependent and state-dependent pricing rules.

In time-dependent pricing models,⁽¹⁰⁾ because price reviews and changes are costly, companies choose to review prices at discrete time intervals. The length of the interval depends on the rate of inflation, since (in the absence of other shocks) this determines how quickly the company’s own relative price falls. When inflation is high, and a company’s relative price is falling rapidly, profits fall quickly and the company will review prices more frequently to compensate. State-dependent pricing models, however, are based on the assumption that there is no routine price reviewing.⁽¹¹⁾ Instead, prices will be fixed until there is a sufficiently large shift in market conditions to warrant a change.

Both theories predict that prices will remain unchanged for periods of time and then move in discrete jumps. But they may have different implications for the transmission of nominal shocks to the real economy. Under time-dependent pricing rules, the interval between price changes rises as inflation falls. As Ball, Mankiw and Romer’s (1988) menu-cost model shows, the effects of a monetary shock on real activity may therefore be larger and persist for longer at lower rates of inflation.⁽¹²⁾ With state-dependent pricing rules, any effects from nominal variables—interest

(10) The early time-dependent pricing models (such as Fischer 1977) were generally applied to the labour markets but subsequent models (such as Ball and Romer 1989) have extended the principle to product markets.

(11) State-dependent pricing rules were first articulated by Barro (1972) and developed in a series of papers by Sheshinski and Weiss (1977, 1983), Caplin and Sheshinski (1987), Caplin and Spulber (1987) and Caballero and Engel (1991).

(12) This result is confirmed by Yates and Chapple (1996).

rates, prices and money—on the real side of the economy are less likely to vary with the rate of inflation. State-dependent, or (S,s), rules imply that companies leave actual prices unchanged unless desired prices breach some upper or lower bound. The immediate effect of a shock to desired prices (perhaps caused by a money supply shock) will not depend on the rate of inflation, but on whether the shock takes the desired price outside the (S,s) bounds. Subsequently, though, if the shock to desired prices is in the same direction as the trend in the general price level, the (S,s) bounds will be breached *sooner* the higher the rate of change of prices. Alternatively, if the shock to desired prices is in the opposite direction to the trend in the price level, the shock will make itself felt on actual prices *later*. Of course, it may be the case, for reasons exogenous to the determination of the (S,s) bounds, that higher rates of change in general prices imply more and larger shocks to individual desired prices, in which case the (S,s) bounds will be breached more often, actual prices will change, and real quantities will not. But the effect of any *given size* of nominal shock on the real economy will still not vary with inflation.

If this is the case then, all other things being equal, a higher incidence of companies operating time-dependent price reviews could mean that the real effects of nominal shocks would increase at lower rates of inflation. But the extra ‘noise’ in the real economy that would result from the increased transmission of nominal shocks at low inflation has to be set against the substantial benefits of low inflation itself, not least the fact that with the price level rising more slowly, companies would need to change prices less often and pay fewer menu costs as a result.⁽¹³⁾

The survey suggested that time-dependent pricing was more common than state-dependent pricing, with 79% of the respondents reporting that they reviewed their prices at a specific frequency. 11% of companies said that they reviewed prices ‘in response to a particular event’, which we interpret as placing them in the state-dependent camp. 10% of companies implied that they operated both time and state-dependent pricing. This was not unexpected since the theories are not mutually exclusive; it is plausible to think of companies reviewing prices annually, but conducting additional reviews in response to extraordinary events. Kayshap (1995) found more support for state-dependent, rather than time-dependent rules in the United States. The findings of Carlton (1986) and Cecchetti (1986) for the United States were consistent with either type of price setting.

(13) Briault (1995) surveys the costs of inflation. Bakhshi *et al* (1997) present estimates of some costs and benefits of price stability in the United Kingdom.

Price reviews versus price changes

Charts 6 and 7 show that, in the year to September 1995, price changes were much less frequent than price reviews. The median number of times that prices were changed was twice a year, while the median company reviewed prices every month. So companies often reviewed prices but decided not to change them. Prices were possibly left unchanged because market conditions were unchanged. But perhaps they were unchanged because, even once companies had decided to incur the informational costs of reviewing prices, they thought there were extra costs of changing price lists (physical menu costs), or risks of sparking off a price war, or of breaching implicit or explicit contracts with loyal customers. So comparing the frequency of price reviews with price changes probably suggests that informational costs are not the only significant cost of changing prices: other costs may matter too. We will discuss these in more detail in Section 5.

Table B
The frequency of price changes

Author	Period	Prices	Frequency (implied number of changes every five years) ^(a)
Carlton	1957-66	US industrial	6
Cecchetti	1959-73	US news-stands	1
Blinder	1991	72 US companies	5
Kayshap	1953-87	US retail catalogues	4
Dahlby	1974-82	Canadian insurance	4
This survey	1995	654 UK companies	10

(a) Bank calculations from the other authors' published articles.

These results are interesting compared with previous research on the frequency of price changes (Table B). Respondents to the Bank survey changed prices on average at around twice the frequency of respondents to previous surveys, which were mostly conducted for the United States. A rough calculation from Cecchetti's (1986) data reveals that, on average, magazine prices over the period 1953–79 remained fixed for about five years. Carlton's (1986) study of Stigler and Kindahl's (1970) data implies an average period of price rigidity of around ten months. Blinder (1991) found that the typical company changed prices once a year. Kayshap's (1995) study of retail mail order catalogues found that, on average, prices remained fixed for fifteen months. Dahlby (1992) found that the mean length of pricing period in Canadian insurance premiums was about 13 months. However, it is important to note that the frequency of price changes

could be affected by the prevailing rate of inflation, as well as by factors specific to the different industries examined in each study.⁽¹⁴⁾ As a consequence, these results may not be strictly comparable.

How do companies' circumstances and characteristics affect price reviews and price changes?

Table C shows how the frequency of price reviews and price changes varied by sector over the year to September 1995. As expected, the frequency of price reviews of the median retailing company was much higher than in the median manufacturing company. But in construction and other services, where many products take time to deliver, the high frequency of reviews was surprising. One explanation might be that the 'product' tends to vary with each new transaction and that respondents are interpreting this as a price review.⁽¹⁵⁾ Differences also occurred in the median number of price changes across industries: for example, the median manufacturing company changed its prices twice during the year, while for retailing it was three times.⁽¹⁶⁾ However, we cannot directly infer that prices in the manufacturing sector are more sticky than those in retailing since the Bank survey did not ask about the *absolute size* of price changes. The same amount of price adjustment can arise if a company makes a large number of small adjustments or makes a single large adjustment.

(14) The Bank survey was conducted during the Autumn of 1995. In the twelve months preceding the survey, average UK twelve-month producer input price inflation was about 9% and producer output price inflation 5%. The Blinder survey was conducted during early 1991. At this time in the US, twelve-month crude material input price inflation was about -2%, and finished goods price inflation was around 3½%.

(15) For the construction and services sectors, a question about charging out of particular factors, like labour time to clients, may have been more appropriate.

(16) These differences between industries are broadly consistent with a survey of small companies published by the Lloyds Bank Small Business Research Trust (1995).

Table C
Factors influencing the median frequency of pricing reviews and changes in the year to September 1995

<i>Frequency of:</i>	Price reviews ^(a)	Price changes ^{(a)(b)}
Whole sample	Monthly	2
Industry		
Manufacturing	Quarterly	2
Construction	Weekly	3 or 4
Retail	Weekly	3 or 4
Other services	Monthly	1
Probability of no difference	(p=0.0001)	(p=0.0001)
Company size		
Small	Quarterly	1
Medium	Quarterly	2
Large	Monthly	2
Probability of no difference	(p=0.0070)	(p=0.3652)
Number of competitors		
0-5	Quarterly	1
6-10	Monthly	2
11 or more	Monthly	2
Probability of no difference	(p=0.0001)	(p=0.0001)
Market share		
up to 5%	Monthly	2
5-20%	Quarterly	2
20-40%	Quarterly	2
>40%	Quarterly	1
Probability of no difference	(p=0.0004)	(p=0.0041)
Percentage of long-term relationships		
0-40% ^(c)	Monthly	2
41-60%	Monthly	2
61-75%	Monthly	2
>75%	Quarterly	1
Probability of no difference	(p=0.0001)	(p=0.0647)

Note: As before, small companies are those with less than 100 FTE employees, medium companies are those with between 100-500 and large companies are those with more than 500 FTE employees

(a) The significance of differences between medians is based on a equality of populations Kruskal-Wallis rank-sum test.

(b) Number of changes during the previous twelve months.

(c) Includes those companies responding 'not applicable'.

Table C also shows that large companies reviewed prices more often than small companies: this difference was statistically significant, although there was no significant difference in the median number of price changes. The findings confirm those of Blinder (1991), who reported very little support for a pricing theory that he called 'hierarchies', which suggested that large companies' prices would be more rigid because of bureaucratic sluggishness. The observation that small companies review prices less frequently is interesting. At face value, it reveals something about the balance between two forces that we might think influence small companies. One argument is that small companies may be prevalent in an industry because the technology is such that their costs rise more steeply with output. So the penalty for not

changing prices in response to a change in costs is large. In these circumstances, prices would be more sensitive and reviewed more frequently than in larger companies. On the other hand, monitoring market conditions and devising pricing policies may be done more efficiently by large companies, which can spread the cost over more units of production. The finding that small companies review prices less frequently is consistent with our finding on the importance of cost mark-up pricing for small companies (described in Section 5): cost-based pricing implies that companies ignore fluctuations in demand, which should mean that prices are reviewed less frequently.

Companies operating in more competitive markets reviewed and changed prices more often: this was true whether competition was measured by the number of competitors, or by the market share of the respondent.⁽¹⁷⁾ A possible explanation is that the consequences of charging the wrong price are more serious in a competitive industry—since demand is more sensitive to price—and so companies have a greater incentive to check the appropriateness of their current price and are more sensitive to changes in market conditions. This finding is consistent with the work of Carlton (1986), who observed that US industrial prices were more rigid in concentrated industries. But other studies—using more aggregated data to look at the speed, rather than the frequency, of price adjustment—give conflicting results. For example, Weiss's (1993) study of Austrian manufacturing found that more concentrated industries adjusted prices more slowly in response to changes in costs, but more quickly in response to changes in demand. Kraft (1995) examined data on German manufacturing prices and found that prices in more concentrated industries adjusted more quickly to changes in costs or demand. Geroski (1992), using UK data, found the opposite.⁽¹⁸⁾

The results also showed that companies with a greater proportion of long-term customer relationships reviewed and changed prices less frequently than the others. This ran counter to the work of Carlton (1986), who found that prices tended to be more flexible the longer the buyer-seller association. Carlton argued that customers involved in shorter relationships with

(17) With respect to the number of competitors, all differences between price review frequencies were significant at the 5% level, whereas for price changes, companies with 0-5 competitors changed prices significantly less than others at the 5% level. For market share, there was a statistically significant difference between price reviews of companies with less than 5% of the market and those with more than 40%, and we found that those companies with more than 40% market share also changed prices less than all other categories, with differences significant at the 5% level.

(18) Weiss (1993) and Kraft (1995) provide a summary of other studies.

suppliers were more likely to use fixed-price contracts because of the fear that companies may exploit them by price changes. The Bank survey found the opposite: as discussed below, explicit contracts tended to be more important for companies with a greater proportion of long-term customers.

5 Explanations of price rigidity

The previous section provided evidence of considerable price stickiness across our sample of companies. A key motivation for our survey was to discriminate between alternative theoretical explanations that have been advanced for price rigidity. The next part of the survey addressed this question by applying a methodology used by Blinder (1991)—who surveyed US companies—to the United Kingdom. This approach involved outlining a number of popular theoretical explanations for price rigidity (in layman’s terms) and then asking companies to assess their importance.

Table D summarises the results of both the Bank and the Blinder surveys. The Bank survey first asked whether a company recognised a particular pricing theory as being important for its activities. If a theory was recognised, the company was then asked to rank how important it was on a scale of 1 (high) to 7 (low). The mean ranking given by those companies that recognised the theory is shown in the second column of the table. To make detailed comparisons with Blinder’s survey, the third column shows the scores given by Blinder’s respondents in the United States.⁽¹⁹⁾

(19) It should be noted that the mean scores for the Bank survey and Blinder’s survey are calculated using different scales and cannot be compared directly. In the Bank survey, low numbers are important (on a scale of 1–7). In Blinder’s original rankings, high numbers were important (on a scale of 1–4), but to make these rankings more comparable to the Bank numbers, they have been subtracted from four in Table D. Figures in italics show the priority companies gave to the different theories, with 1 being the highest and 11 the lowest priority.

Table D
The recognition and importance of different pricing theories^(a)

	Bank survey (UK)			Blinder's survey (US)	
	Percentage recognition	Mean rank ^(b)	Placing	Mean rank ^(b)	Placing
Constant marginal costs	53.8	3.1	6	2.44	10
Cost-based pricing	47.1	2.3	2	1.28	3
Implicit contracts	45.4	2.9	5	1.48	4
Explicit contracts	43.7	2.2	1	1.71	5
Procyclical elasticity	35.3	3.3	9	2.03	7
Pricing thresholds	34.4	2.8	4	2.03	8 ^(c)
Non-price elements	24.2	3.3	8	1.14	1
Stock adjustment	22.9	3.1	7	2.28	9
Co-ordination failure	22.0	2.5	3	1.15	2
Price means quality	18.5	3.6	10	2.55	11 ^(d)
Physical menu costs	7.3	3.8	11	1.72	6

(a) The bands divide the theories into five groups. Statistical tests show that within each group the proportions recognising each individual theory as important are not significantly different from each other, but are significantly different from the proportions recognising theories from the other groups.

(b) Low numbers indicate that a theory is important. The Bank survey is on a scale of 1-7, Blinder's on a scale of 1-4.

(c) Blinder ranks pricing thresholds below procyclical elasticity because a smaller percentage of companies gave this theory a rank of "3" or higher.

(d) Blinder ranked this 12th below another theory, "hierarchies", which we did not investigate.

Alternative theoretical explanations of price rigidity have very different policy implications. In some cases these theories suggest that a company's 'optimal price' (in other words, its profit-maximising price in a world of certainty and costless price adjustment) may deviate from its actual price due to costly price adjustment—in such cases prices are sticky because firms implicitly reason that the expected net present benefit of changing price is less than the expected cost. Other theories explain price rigidity in terms of the nature of company demand or cost conditions. In such cases rigidity may arise because the 'optimal' price faced by a company does not change much in response to changing market conditions. Clearly a combination of small changes in optimal price due to the structure of cost and demand conditions combined with the costs of price adjustment would reinforce the tendency for prices to be sticky over time. Finally some of the explanations are symptoms rather than causes of price stickiness, with shifts in market conditions accommodated by changes in stocks or product quality.

Constant marginal costs and cost-based pricing

The two most recognised theories of price rigidity were constant marginal costs and cost-based pricing. In the former, price rigidity arises from companies finding that their marginal cost and so their optimal price does not change much with changes in demand. Changes in demand may still influence prices but, as Hall (1986) pointed out, if there was a boom in demand and output increased, prices would increase by less than if variable costs per unit were rising as the company moved towards full capacity. Cost-based pricing, on the other hand, refers to companies that do not directly take changes in demand into account when setting prices. Companies operating cost-based pricing will only change prices if charges for raw materials, wage rates or some other costs change. Gordon (1981) and Blanchard (1983) showed how cost-based pricing can lead to considerable inertia in the supply chain as a whole, since one company's rigid final price becomes another's fixed-price, raw material cost. However, demand conditions in the economy will still influence prices indirectly through their impact on costs of inputs to production, and over time, demand may influence prices set by companies operating cost-based pricing rules as a result of feedback effects from changes in inventory levels.

The results on constant marginal costs offer one of the most marked contrasts between Blinder's survey and the Bank's. It was the least popular theory for Blinder's respondents but in the Bank survey, this theory received the most recognition, cited as important by 54% of respondents. However, as Table A shows, those that did recognise the theory as important did not rank it particularly highly (constant marginal costs was ranked sixth out of the eleven theories). Cost-based pricing comes second in the Bank's league table of theories, in terms of recognition and rank, with 47% of respondents citing it as important, and assigning it a rank of 2.3. In Blinder's survey, cost-based pricing was also important (third in his league table). The popularity of cost-based pricing might seem to contradict our earlier findings on the importance of market conditions in price determination. But market and cost-based strategies may co-exist. For example, in the long run prices may be tied down by a market-determined equilibrium but in the short run, companies may find it convenient to economise on the costs of frequent price reviews by using cost mark-ups as a pricing 'rule of thumb'.

Explicit or implicit contracts

A further reason for price rigidity is that transactions between companies and customers may involve either explicit or implicit contracts stabilising prices over a given period. Such contracts may provide insurance against uncertainty in market conditions by delivering stable prices. However, prices will not necessarily be rigid under either implicit or explicit contracts, since both can be renegotiated or reneged on (albeit with a cost in terms of time or goodwill).

Stiglitz (1984) argued that the prevalence of long-term relationships between companies and customers (which the Bank survey confirms—see Chart 5) was evidence that these kinds of contracts exist. Instead of inferring their existence, the Bank survey asked about such contracts directly. Both implicit and explicit contracts were recognised as important. In terms of rank, explicit contracts turned out to be the most important theory. In Blinder's sample, implicit and explicit contracts came fourth and fifth in his league table of theories.

Co-ordination failure

Collusion between companies, even if it is only implicit, may also make prices sticky. What economists have called co-ordination failure occurs when no company wants to be the first to change prices, even if it is in response to a genuine change in costs or demand. Each company worries that it might spark off a price war and become worse off as a result.⁽²⁰⁾ Blinder's study found this theory to be very important, ranking second in his list. But in the Bank study, the results were less clear: only 22% of respondents recognised co-ordination failure as important, though those that did so ranked it quite highly at an average of 2.5, putting it third in importance among the theories.

Procyclical elasticity

Rotemberg and Saloner (1986) and Shapiro (1988) put forward a theory suggesting that strategic interactions between companies could depend on the state of the business cycle. When demand falls, some companies may go out of business. If the number of companies falls significantly, this may increase the remaining companies' ability to co-ordinate their prices as well

(20) These ideas were articulated in theory by Stiglitz (1984), Ball and Romer (1991) and Cooper and John (1988).

as reducing price competition. This theory is known as procyclical elasticity, since it explains why the responsiveness (elasticity) of prices to changes in demand may dampen in a cyclical downturn. Like the theory of constant marginal costs, procyclical elasticity is an explanation for observed price rigidity rather than a cause of costly price adjustment. This theory was recognised as important by 35% of the sample, but was not scored highly by them. Blinder did not find that procyclical elasticity was rated highly either: it came seventh in his list of theories.

Pricing thresholds

Pricing thresholds may also inhibit companies from changing prices. For example, many companies price at £4.99 or £9.99 instead of £5 or £10. Companies may do this if they believe that increasing prices above these thresholds would lead to falls in demand that are out of proportion to the price increase. Pricing thresholds should mean that prices are more sticky upwards than downwards and will introduce non-continuities in the relationship between demand levels and prices. Kayshap (1995) tested the importance of this phenomenon in the United States. He found weak evidence that pricing thresholds were important. He observed that price changes tended to be slightly smaller when they crossed over 50-cent thresholds. In the Bank survey, pricing thresholds were recognised by 34% of companies, with a mean rank of 2.8. This places it fourth in the list of theories—more important than in Blinder’s survey, where pricing thresholds ranked eighth.

Non-price elements

Another possibility is that although observed prices are sticky, the underlying price varies as companies instead change quality, or delivery times, or the amount of after-sales service. Non-price elements were thought important by Carlton (1986), and Blinder’s survey found them to be the most important factor for his respondents. The Bank survey is much less supportive, recording a 22% recognition of non-price elements and a mean rank of 3.3, which puts it eighth in the list of theories.

Stock adjustment

In some ways, stock adjustment encompasses the other theories: companies can react to a change in market conditions in a number of ways, including leaving the market, changing prices or, in the short run, adjusting stocks. This idea is usually attributed to a paper by Blinder (1982). In the Bank survey 23% of respondents recognised this as an important factor in their price setting and, as in Blinder's survey, stock adjustment did not rank highly relative to the other theories. This is slightly perplexing, given the high levels of support for other price-stickiness theories, since stock adjustment is probably a symptom of other forms of price stickiness rather than a cause in its own right.

Price means quality

If companies think customers buy on the basis that price means quality, they may be unwilling to cut prices in case buyers think that the product has declined in quality.⁽²¹⁾ Quality signalling may be relevant for the luxury car market, or perhaps certain niche markets for clothes or food, but it is unlikely to be of widespread importance for most products. Both surveys confirmed this: quality signalling was recognised by 18.5% of Bank respondents, ranking it tenth in the list of theories. In Blinder's survey, this theory was the least important of all.

Physical menu costs

Menu costs theories derived originally from the idea that restaurants might be reluctant to change prices in response to a change in supply or demand because of the cost of re-printing menus or re-advertising prices. These costs could be called physical menu costs, as they refer to the resources needed to implement price changes.⁽²²⁾ Menu costs were found to be of little importance in Blinder's sample, and were even less so in the Bank's, with only 7% of companies citing them as important. Part of the reason may be that these costs are second-order relative to the other costs that companies have to bear: for example, the costs of being sufficiently aware of prices in the market and of anticipating consumer and competitor reaction to pricing policies.⁽²³⁾

(21) This idea was put forward in a paper by Stiglitz (1987).

(22) These costs were first discussed explicitly by Sheshinski and Weiss (1977), and then developed by Mankiw (1985) and Akerlof and Yellen (1985a).

(23) However, the theoretical literature on menu costs stresses that quite small menu costs can have large effects on economic welfare. Mankiw (1985) and Akerlof and Yellen (1985b) were the first to

6 The importance of company characteristics

As well as asking companies whether they recognised particular explanations of price rigidity, the Bank survey also obtained detailed information about company characteristics. In particular, companies were asked to specify the nature of their main product, allowing them to be categorised according to the 1992 Standard Industrial Classification. Companies were also asked about the size of their business, the number of competitors they faced in their main product market, their market share and the proportion of their customer relationships exceeding five years.

This section considers the effect of these variables on company recognition of price stickiness theories. The importance of each company characteristic is assessed using one-way analysis of variance and multiple mean comparison tests. Critical values are corrected using a Bonferroni normalisation to control for the fact that in multiple tests we need to restrict the chance of falsely rejecting each hypothesis.

Industrial grouping

Table E indicates that the importance of different theories of price stickiness varied considerably across the broad industrial groups: manufacturing, construction, retailing and other services (which includes transport, communications, business services and financial intermediation).

make this point. If a company faces small menu costs, making prices slightly more sticky than otherwise, the costs to the company are incurred by changing output back and forth as demand changes. But the costs to the economy also include those incurred by the company's customers, who cannot fully satisfy their demand for the good because the price is rigid. So although menu costs do not seem to be important in the Bank sample, they could still explain some of the observed real effects of monetary policy in the United Kingdom.

Table E
Recognition of different pricing theories by sector

<i>Percentage recognition</i>	Whole sample	Manufacturing	Construction	Retailing	Other services	F test values	Probability of no variation	Significant differences
		1	2	3	4			
Constant marginal costs	53.8	61.3	35.1	33.7	45.6	10.6	(p=0.00)	1&2,1&3,1&4
Cost-based pricing	47.1	49.9	40.5	43.4	41.8	1.1	(p=0.35)	NONE
Implicit contracts	45.4	47.1	16.2	48.2	45.6	4.6	(p=0.00)	1&2,2&3,2&4
Explicit contracts	43.7	43.9	73.0	25.3	50.6	8.9	(p=0.00)	1&2,1&3,2&3,3&4
Procyclical elasticity	35.3	37.8	13.5	26.5	38.0	4.0	(p=0.01)	1&2,2&4
Pricing thresholds	34.4	29.5	37.8	68.7	30.4	17.2	(p=0.00)	1&3,2&3,3&4
Non-price elements	24.2	29.0	10.8	12.1	20.3	5.5	(p=0.00)	1&2,1&3
Stock adjustment	22.9	23.7	21.6	30.1	16.5	1.4	(p=0.23)	NONE
Co-ordination failure	22.0	21.4	18.9	34.9	16.5	3.3	(p=0.02)	1&3,3&4
Price means quality	18.5	19.3	21.6	15.7	17.7	0.3	(p=0.84)	NONE
Physical menu costs	7.3	5.1	2.7	21.7	8.9	9.9	(p=0.00)	1&3,2&3,3&4

There was significant variation in the recognition of constant marginal costs across industries: 61% of manufacturing companies recognised constant marginal costs as important, which was significantly different from the proportions in construction (35%), retail (34%) and other services (46%). This variation probably reflects sectoral differences in production structures. If manufacturing production, for example, is more capital intensive then it would make sense that constant marginal costs are more important since in capital intensive industries, marginal costs will rise less rapidly with output up to the point of full capacity.

There was also some interesting variation in the importance of contractual agreements across industries. Recognition of explicit contracts was particularly high in the construction sector (at 73%) and particularly low in retailing (25%). This was as expected. Construction projects take a long time to come to fruition, and may be affected by uncertainties like the weather and the price of raw materials. Retailers, by contrast, often sell goods that can be inspected by the buyer before money changes hands, so there is little benefit from the insurance provided by an explicit contract. Perhaps because of the prevalence of explicit contracts, recognition of implicit contracts in construction was correspondingly lower (at 16%) than in the other sectors.⁽²⁴⁾

Pricing thresholds were recognised much more widely in retailing (69%) than in all the other industry groupings, where recognition was recorded at 29% for manufacturing, 38% for construction and 30% for other services. In retailing, most transactions are conducted with final consumers. Elsewhere, buyers tend to work for companies, so they might be less responsive to psychological factors like pricing thresholds.

Non-price elements were much less widely recognised by construction companies (11%) than by companies in manufacturing (29%). As discussed previously, explicit contracts were much more important for construction companies than for the other industrial groupings: if prices are more rigid because of this, delivery, after-sales service and quality may be the dominant mechanisms through which companies compete and adjust to demand conditions. And if these other elements are also inflexible (perhaps because explicit contracts rule this out), then changes in market conditions are more likely to result in these companies experiencing larger swings in output and employment than other companies. This accords with the above-average variability of construction employment and output in the whole economy.

(24) Manufacturing: 47%; retailing: 48% and other services: 46%.

The survey also showed that physical menu costs were much more widely recognised in retailing than in other sectors; 22% of retailers thought they were important, compared with 5% for manufacturing, 3% for construction and 9% for other services. Since, as discussed above, retailers tend to change prices most frequently, this result is not surprising.

Company size

Table F reports findings on the importance of theories of price stickiness across companies of different size. Survey respondents were asked to specify numbers of both full and part-time workers. Company size was categorised using numbers of full-time equivalent (FTE) workers, within which part-time workers have been treated as equivalent to 40% of a full-time worker.⁽²⁵⁾ For the purposes of comparison of the theories, respondents were split into small (below 100 FTE workers), medium sized (101-500 FTE workers) and large (over 500 FTE workers) companies.

Company size seemed to be a less significant influence than sector on company recognition of alternative pricing theories. But there was some evidence that cost-based pricing was more widespread in small companies: 58% of small companies recognised cost-based pricing as important, compared with 45% of medium-sized companies and 44% of large companies. This is consistent with the finding that small companies were also likely to review prices less frequently than large companies. As suggested above, one way of explaining this is that there may be economies of scale in devising sophisticated systems for monitoring market conditions. As a result, smaller companies might opt for simpler (perhaps cost-based) rules to guide price setting.

(25) This proportion is based on Labour Force Survey data on hours worked by part and full-time workers in the economy as a whole.

Table F
Recognition of different pricing theories by company size

<i>Percentage recognition</i>	Whole sample	Small	Medium	Large	F test values	Probability of no variation	Significant differences
		1	2	3			
Constant marginal costs	53.8	57.6	52.7	54.9	0.4	(p=0.67)	NONE
Cost-based pricing	47.1	57.6	44.8	44.0	3.4	(p=0.03)	1 & 2, 1&3
Implicit contracts	45.4	43.2	41.5	50.4	2.2	(p=0.11)	NONE
Explicit contracts	43.7	47.5	44.8	42.5	0.4	(p=0.65)	NONE
Procyclical elasticity	35.3	35.6	39.8	32.0	1.7	(p=0.18)	NONE
Pricing thresholds	34.4	34.8	31.1	36.1	0.7	(p=0.49)	NONE
Non-price elements	24.2	30.5	27.8	18.4	4.6	(p=0.01)	1&3,2&3
Stock adjustment	22.9	26.3	23.2	21.1	0.6	(p=0.53)	NONE
Co-ordination failure	22.0	19.5	23.2	23.3	0.4	(p=0.68)	NONE
Price means quality	18.5	23.7	14.5	20.3	2.6	(p=0.08)	NONE
Physical menu costs	7.3	10.2	7.1	6.0	1.1	(p=0.35)	NONE

Small companies also appear to be more ready than larger companies to vary non-price elements—such as delivery and service—rather than price. However, company size does not seem to have any significant impact on the importance of constant marginal costs. This is surprising, since we might have expected industries consisting of a few large companies, exploiting economies of scale, to be more likely to have relatively constant marginal costs than industries where production is less concentrated.

Market structure

Somewhat surprisingly, market structure variables—such as numbers of competitors faced by a company or its market share—did not generally appear significantly to influence recognition of pricing theories. Although there were some variations in recognition of theories across levels of competition, most of these differences were not significant at the 10% level.

(a) Number of competitors

The survey asked companies to indicate the number of direct competitors, on average, that they thought they faced in their main line of business. Companies split into roughly equal groups of high (0-5 competitors), medium (6-10 competitors) and low (more than 10 competitors) concentration—see Chart 3. The recognition of price rigidity theories by level of concentration is reported in Table G.

Both constant marginal costs and non-price elements appeared to be more important for companies with few competitors. The high recognition of constant marginal costs by companies with few competitors was as we might have expected since these companies are those most likely to be operating in industries where there are substantial fixed costs of production. The greater recognition of non-price elements in companies with a low number of competitors may indicate that they are more able to exercise market power and vary factors such as service or delivery times than companies in more competitive markets.

Table G
Recognition of different pricing theories by number of competitors

<i>Percentage recognition</i>	Whole sample	Concentration level			F test values	Probability of no variation	Significant differences
		High (none, 1-5) 1	Medium (6-10) 2	Low (11 or more) 3			
Constant marginal costs	53.8	59.8	55.5	47.7	3.3	(p=0.04)	1&3
Cost-based pricing	47.1	45.5	50.2	45.9	0.6	(p=0.56)	NONE
Implicit contracts	45.4	47.9	42.1	45.9	0.7	(p=0.49)	NONE
Explicit contracts	43.7	47.4	41.2	42.7	0.9	(p=0.41)	NONE
Procyclical elasticity	35.3	33.5	37.8	35.0	0.4	(p=0.65)	NONE
Pricing thresholds	34.4	30.6	34.0	38.6	1.5	(p=0.22)	NONE
Non-price elements	24.2	24.9	30.6	17.7	4.9	(p=0.01)	2&3
Stock adjustment	22.9	18.7	26.3	23.6	1.8	(p=0.17)	NONE
Co-ordination failure	22.0	20.1	23.4	22.7	0.4	(p=0.69)	NONE
Price means quality	18.5	19.1	21.5	15.0	1.6	(p=0.21)	NONE
Physical menu costs	7.3	5.3	9.6	6.4	1.6	(p=0.20)	NONE

Table H
Recognition of different pricing theories by market share

<i>Percentage recognition</i>	Whole sample	Low		High		F test values	Probability of no variation	Significant differences
		5% or below 1	5.01% to 20% 2	20.01% to 40% 3	above 40% 4			
Constant marginal costs	53.8	50.8	56.4	61.5	61.5	1.3	(p=0.27)	NONE
Cost-based pricing	47.1	47.7	40.5	44.4	51.4	1.0	(p=0.38)	NONE
Implicit contracts	45.4	41.5	50.0	41.9	50.5	1.2	(p=0.32)	NONE
Explicit contracts	43.7	46.2	38.1	47.9	42.2	1.0	(p=0.42)	NONE
Procyclical elasticity	35.3	33.9	37.3	41.0	37.6	0.5	(p=0.72)	NONE
Pricing thresholds	34.4	40.0	34.1	23.1	25.7	3.5	(p=0.02)	1&3,(1&4 at 10.2%)
Non-price elements	24.2	22.3	23.0	31.6	31.2	1.6	(p=0.19)	NONE
Stock adjustment	22.9	23.9	21.4	23.1	23.9	0.1	(p=0.97)	NONE
Co-ordination failure	22.0	30.0	23.0	26.5	11.0	4.5	(p=0.00)	1&4,3&4
Price means quality	18.5	19.2	16.7	18.8	16.5	0.2	(p=0.92)	NONE
Physical menu costs	7.3	5.4	7.1	6.0	6.4	0.1	(p=0.95)	NONE

(b) Market Share

The number of competitors that a company faces is a somewhat crude measure of the degree of market power that it may be able to exercise. An alternative measure of the degree of competition is market share. Companies were asked to specify the market share of their main product. Table H reports the recognition of price stickiness theories by companies with market shares of 0-5%, 5-20%, 20-40% and over 40%.

As in the case of number of competitors, we do not find many significant differences in recognition of theories across levels of market share. But pricing thresholds seem to be a more important factor for companies with low market shares: companies with substantial portions of the market may have less need to retain or attract customers by keeping prices below psychologically significant levels. Also, companies in less competitive markets seem to experience fewer problems with co-ordination failure, possibly suggesting that market leaders do not have to worry about triggering price wars if they can count on other companies falling into line. Economic theory would suggest a more subtle relationship: that companies in very competitive industries take their prices from the market, and cannot engage in price wars with other companies, so there is no co-ordination failure. Companies in very concentrated markets with few competitors may well engage in strategic behaviour, jostling with other companies for market share. But it should be relatively easy for this activity to be co-ordinated, without sparking off a price war. So theory expects co-ordination to be most likely to fail in industries between these two extremes. Part of the reason why our survey failed to pick up this relationship may be due to the fact that we looked only at bi-variate correlations.

Length of customer relationships

The survey also showed us whether companies' recognition of pricing theories was influenced by the nature of customer relationships. Table I reports the recognition of price stickiness theories by companies where 0-40%, 41-60%, 61-75% and over 75% of customers were engaged in relationships exceeding five years.

Table I**Recognition of different pricing theories by tenure of customer relationships**

<i>Percentage recognition</i>	Whole sample	Short tenure		Long tenure		F test values	Probability of no variation	Significant differences
		n/a or 0-40%	41-60%	61-75%	> than 75%			
		1	2	3	4			
Constant marginal costs	53.8	46.9	52.6	61.1	58.9	2.5	(p=0.06)	1&3
Cost-based pricing	47.1	53.8	48.7	43.1	43.8	1.5	(p=0.21)	NONE
Implicit contracts	45.4	36.6	48.0	47.2	48.4	2.0	(p=0.12)	NONE (1&4 at 18.1%)
Explicit contracts	43.7	49.0	40.1	49.3	39.6	1.9	(p=0.14)	NONE
Procyclical elasticity	35.3	31.7	38.2	41.0	33.9	1.1	(p=0.34)	NONE
Pricing thresholds	34.4	42.1	27.6	25.7	36.5	4.0	(p=0.01)	1&2,1&3
Non-price elements	24.2	24.1	25.7	29.2	21.4	0.9	(p=0.43)	NONE
Stock adjustment	22.9	25.5	19.7	26.4	20.3	1.1	(p=0.37)	NONE
Co-ordination failure	22.0	26.9	22.4	25.7	14.1	3.5	(p=0.02)	1&4,3&4
Price means quality	18.5	22.1	12.5	19.4	19.8	1.7	(p=0.16)	NONE
Physical menu costs	7.3	10.3	5.3	6.3	7.3	1.1	(p=0.37)	NONE

Table I indicates that pricing thresholds were generally more recognised by companies with short-term customer relationships. This is not surprising since we would expect short-term customers to be more susceptible to the psychological influence of pricing points than long-term customers who make repeat purchases and accumulate expertise. Moreover, co-ordination failure was less of a problem in companies with many customers in long-term relationships: 14% of companies with more than 75% of customers in relationships longer than five years recognised co-ordination failures as a problem, compared with 27% of companies with up to 40% of customers in these relationships. This may be because companies reason that price wars are much less likely to succeed if there is a high degree of customer-company loyalty.

There was also some evidence that companies involved in longer-term relationships with customers attach greater importance to implicit contracts.⁽²⁶⁾ This does not agree with the spirit of work by Carlton (1986), which showed that prices were more rigid when company-customer relationships were shorter. He suggested that both parties were more prepared to enter into fixed-price contracts early in their relationship, when there had been no time to build up trust, although he did not have any data on whether prices were governed by contracts or not.

7 What factors drive prices up and down ?

As well as investigating the issue of price rigidity, the survey also examined the factors which were most likely to lead companies to raise or lower their prices. A key question is whether, faced with upward or downward shocks of similar magnitude, companies are more reluctant to cut prices than to raise them. If prices are more sticky downward than upward, then this would mean that a tightening in monetary policy could have a larger, short-run impact on unemployment than a loosening of policy of the same size.⁽²⁷⁾

Previous work on price asymmetries used mostly aggregated data and produced conflicting results. For example, DeLong and Summers (1988) inferred from their results in the United States that prices were more sticky

(26) Explicit contracts do not appear to vary significantly in *recognition* across tenure. However, in terms of their *importance* on a scale of 1-4 (not reported here) companies with over 75% of their customer relationships lasting for longer than five years ranked the theory at 1.8, considerably higher than the 2.3 for those with less than 40% of customers in such long-term relationships.

(27) Downward stickiness may itself be generated by periods of prolonged inflation: if prices always tend to go up, then price cuts may be hard to interpret or accept. If this is the case then the best cure for downward stickiness is price stability.

downwards than upwards. Cover (1992) confirmed this using the same US data. But Ravn and Sola (1995) found no evidence of asymmetry for the United Kingdom. Other international work showed that it took larger output losses to eliminate each extra unit of inflation. This is consistent with asymmetries in the response of prices to upward and downward shocks.⁽²⁸⁾

Evidence using data on individual prices is also conflicting. Carlton (1986) found no evidence of excessive downward stickiness in the US price data collected by Stigler and Kindahl (1970). Blinder (1991) found that the speed of adjustment to positive and negative demand and cost shocks was no different. Using New Zealand data, Rae (1993) found no evidence of downward stickiness in product prices. Hall and Yates (1997) and Yates (1995) supported this for prices and wages (respectively) in the United Kingdom. One of the few studies that showed evidence of downward rigidities was a survey of employees in the United States by Kahneman *et al* (1986), which reported that respondents preferred money wage increases of 5% with 12% inflation to money wage cuts of 7% with no inflation.

The survey asked companies to rank those factors most likely to push prices up or down. It found that there were substantial differences between the factors that influenced price increases and those that influenced price decreases (Table J). First, many more companies said that cost rises were likely to push prices up than said that cost reductions were likely to push prices down. Second, a rise in demand seemed less likely to lead to a price increase than a fall in demand was to lead to a price cut.

These asymmetries may, to an extent, provide information about the relative incidence of changes in costs and demand. For example, if a company has not recently experienced cost decreases, it might be less likely to suggest that cost decreases could lead to a fall in prices. But these asymmetries may also point to the importance companies place on strategic interaction with competitors and on their desire to preserve market share. One scenario that may be consistent with our results is that when companies contemplate a price cut, they consider the probability of provoking a price war. If changes in costs are either specific to each company and/or harder to monitor by other companies in the market, then a price reduction prompted by a fall in costs may be interpreted as an aggressive act to gain market share by competitor companies, and a price war might result. So companies might be more reluctant to cut prices in response to a fall in costs. On the other hand, demand changes may be more common to all companies and/or easier to

(28) See Ball, Mankiw and Romer (1988), Yates and Chapple (1996) and Laxton *et al* (1995).

monitor, so price cuts in response to a fall in demand might be easier to implement without threatening a price war. When contemplating a price increase on the other hand, companies may focus on the effect on their customer base. If there are significant company-customer relationships, then companies might find it easier to bargain for price increases that result from cost increases, which the company cannot do anything about, than from demand increases, which are to do with the tastes and incomes of its customers.

There was other evidence from the survey of strategic behaviour. For instance, Table J shows that companies were much more likely to match rival price falls than they were to follow rival price rises⁽²⁹⁾ and were also more likely to cut prices in response to a fall in market share than to raise prices to exploit a higher market share.

Two other asymmetries emerge from the survey. First, there is weak evidence from Table J that interest rate rises are more likely to lead to price rises than interest rate falls are to lead to price reductions.⁽³⁰⁾ And second, three times as many companies stated that prices never fall as stated that they never rise. This could indicate that prices are sticky downward, but more probably it reflects the fact that inflation has been positive throughout recent history, so price falls are less likely.

(29) We might have expected these effects to increase as companies experienced less competition and strategic interaction between them became more important, but there was no evidence of this.

(30) The direct effects of interest rates on costs may be a more immediate influence on individual company prices than the more general effects of monetary policy on economic activity.

Table J
Factors leading to a rise or fall in price

Percentages citing factor as first preference

	Materials costs		Rival prices		Demand		Prices		Interest rates		Market share		Productivity	
	Increase	Decrease	Rise	Fall	Rise	Fall	Never rise	Never fall	Increase	Decrease	Higher	Lower	Fall	Rise
Whole Industry	64	28	16	36	15	22	4	12	3	1	2	11	1	3
Manufacturing	70	29	17	37	11	18	4	14	1	1	2	12	1	4
Construction	46	32	5	27	41	49	5	5	5	0	8	3	0	5
Retail	60	31	22	40	11	19	1	6	4	2	2	6	0	1
Other services	47	20	10	30	32	34	4	9	9	4	1	13	3	4
Company size														
Small	70	31	13	35	12	25	3	13	3	2	3	8	1	5
Medium	68	31	17	34	15	22	3	14	4	1	0	10	1	3
Large	59	25	17	38	17	23	5	8	2	1	3	13	0	2
Number of competitors														
0-5	64	30	17	34	14	17	3	14	1	1	2	9	1	3
6-10	66	27	20	40	14	21	3	14	2	1	2	13	0	3
11 or more	64	29	12	35	18	30	6	7	3	1	2	10	1	3
Percentage of long-term relationships														
0-40% ^(a)	59	28	16	39	21	30	3	11	3	1	4	11	1	4
41-60%	66	27	17	35	15	25	3	10	3	1	2	11	1	4
61-75%	70	31	17	40	15	20	3	8	1	1	0	6	1	2
>75%	62	30	15	31	13	16	6	17	3	2	3	13	0	4

(a) Includes those companies responding 'not applicable'

This question not only permitted us to assess the extent of asymmetry in the response of prices to shocks, but also provided information on how prices were set more generally and a cross-check on earlier questions about pricing theories. For example, the prevalence of cost-based pricing noted earlier is consistent with the fact that (as shown in Table J) 64 per cent of all companies said that a cost increase was the factor most likely to provoke a price increase. This result is consistent with the popularity of cost-based pricing observed earlier, which came second in the league table of pricing theories. It also accords with other work which found that prices were more sensitive to cost than demand conditions.⁽³¹⁾ Of course, it is possible that this result reflects the relative variability of costs and demand at the time the survey was conducted rather than the sensitivity of prices to costs or demand, but the result is still very striking.

8 How do companies respond to demand booms?

In Section 5 we noted that 24% of companies recognised non-price elements as an important factor in price setting: rather than change prices, they might change delivery times, for example. The survey also asked about these factors more directly, by posing the question: *‘What action do you take when a boom in demand occurs and this demand cannot be met from stocks?’* Table K summarises the results.

By far the most popular response was to increase overtime working. Only 75 companies (12%) said that increasing prices would be their most important response. This concurs with the responses to the Workplace Industrial Relations Survey (WIRS) question (on which the Bank’s question was based): Haskel *et al* (1995) reported that 8% of WIRS respondents would change prices in response to an increase in demand. 51 respondents (8%) said that increasing capacity would be their most likely response to a shift in demand. The overall impression is that for many companies quantity rather than price adjustment is the likely response to a temporary increase in demand.

(31) Sweezy (1939); Neild (1963); Godley and Nordhaus (1972); and more recently Geroski (1992).

Table K
Response to demand boom

Percentage citing response as first preference

	More overtime	More workers	Increase price	More capacity	More sub cons	Longer delivery	Other
Whole sample	62	12	12	8	7	7	4
Industry							
Manufacturing	77	11	7	7	4	7	2
Construction	32	27	41	5	30	5	3
Retail	27	8	15	7	2	10	15
Other services	42	17	18	15	13	4	6
Company size							
Small	60	12	9	9	13	9	4
Medium	70	13	8	5	6	9	3
Large	58	12	15	10	4	4	6
Number of competitors							
0-5	63	12	10	9	6	10	5
6-10	71	11	9	6	6	5	2
11 or more	55	14	16	9	8	6	6
Percentage of long-term relationships							
0-40%	52	17	17	7	13	11	2
41-60%	65	10	12	8	7	2	5
61-75%	69	10	9	7	2	8	2
>75%	67	12	8	10	4	7	5

Taken at face value, Table K shows that there is as much (if not more) flexibility in overtime, employment or capacity as there is in prices, even though the short-term costs of changing overtime, employment or capacity are probably greater than the menu costs—physical and informational—of changing prices. The fact that prices still seem to be rigid means that other factors, perhaps related to competition with other companies or implicit/explicit contracts with customers, must also be more important than menu costs. However, it is possible that companies interpreted the term ‘demand boom’ as a permanent increase in demand rather than a temporary one (as intended), which would mean that, in the long run, we might expect some combination of price, capacity and employment increases, depending on the cost conditions in each industry.

9 Conclusions

To recap, the survey found that prices were determined primarily with regard to market conditions but that cost-plus mark ups were important for many companies. The survey found that price reviews and price adjustments were not continuous; prices changed on average only twice a year. Companies typically reviewed prices at regular time intervals rather than responding to particular events, implying that time-dependent pricing rules were more common. The survey showed that competition increased the frequency of price reviews - as did Carlton (1986) - but that long-term relationships with customers might reduce price flexibility. Although physical menu costs did not seem to be important, the more general costs of changing prices were an important explanation of price rigidity. Companies reported that implicit and explicit contracts and cost-based pricing rules of thumb were widespread. In contrast to Blinder's survey, constant marginal costs were very important for Bank respondents' pricing decisions, but non-price elements were not.

The survey also found substantial differences between the factors that pushed prices up and those that pushed prices down, although the degree of flexibility up or down was unclear. Finally, our results showed that most companies seemed likely to increase overtime and capacity in response to a boom in demand, rather than change prices. This suggests that, in the short-run at least, companies were more likely to adjust quantity rather than price.

There are also responses to other questions in the survey that we have yet to consider: about wage-bargaining arrangements, discounting policies and the procedures for pricing new products. But the material presented so far helps to demonstrate that the reality of price setting is a long way from 'classical' models of price setting where markets are costlessly and instantaneously cleared, and that taking account of short-run price frictions could be important in explaining macroeconomic performance. As we have discussed, this has been evident from research using aggregate data. The value of a survey of individual companies is that it can help to resolve some of the theoretical disputes between economists, particularly when these theories generate similar predictions for aggregate data: aggregate data can tell us that prices may be 'sticky' but cannot tell us why, whereas surveys can. If these theories imply different macroeconomic and microeconomic policy responses, then surveys of this kind are even more important.

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