Price-setting behaviour in the United Kingdom: a microdata approach

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This article discusses recent work at the Bank of England using large databases of individual price quotes to investigate price dynamics in the United Kingdom. Understanding the dynamics of prices is important for policymakers concerned with meeting an inflation target. Based on price quotes underlying ONS aggregate price indices, consumer prices changed, on average, once every five months between 1996 and 2006, while producer prices changed once every four months between 2003 and 2007. Higher frequency supermarket price data covering the period from 2005 to 2008 suggest that prices change more often than this. There are considerable differences in the behaviour of prices between different types of products: for example, goods prices change more often than services prices. The individual price-level data are not clearly supportive of any one theory of price-setting.

Introduction

This article summarises the key findings from recent research work at the Bank of England which examines price-setting behaviour in the United Kingdom using large databases of individual price quotes — often referred to as 'microdata'. This research complements other recent work at the Bank of England using survey data, as discussed in the 2008 Q4 *Quarterly Bulletin* (see Greenslade and Parker (2008)).

How prices behave is a key question for policymakers who are setting monetary policy to meet an inflation target. If prices take time to adjust, this allows changes in monetary policy to affect real economic activity via changes in real interest rates and monetary aggregates, at least in the short term. Understanding more about price dynamics is important in judging what the appropriate monetary policy response is to developments in the economy.

The Bank of England targets an annual inflation rate in the consumer prices index (CPI) of 2% a year. Given that this aggregate price index is a weighted sum of individual prices, changes in those individual prices can have important implications for both the overall price level and for relative prices within the aggregate. So learning more about how often individual prices change and how much they change by is important for monetary policy makers.

Prices might be sticky, or slow to adjust, because of the presence of constraints, often referred to as 'nominal rigidities'. Economic models typically include some type of mechanism to incorporate these nominal rigidities. A number of mechanisms have been proposed. These can be categorised under two main headings: 'time-dependent' and 'state-dependent' pricing models.

In a time-dependent model, the probability of a price change depends only on the time since the previous change. A simple example proposed by Calvo (1983), assumes homogeneous firms have a constant probability of changing their price in each period. Alternative time-dependent models include 'staggered contracts' in which prices are fixed for the duration of a contract but contracts overlap in that they do not all start and end at the same time (Taylor (1980)). In a state-dependent model, the decision to change prices depends on the state of the economy and the market faced by the firm. Firms are typically assumed to face a cost to adjusting their prices. Examples of these costs include fixed costs of changing price — so-called 'menu costs' (Mankiw (1985)), or a disutility associated with making large price changes if firms fear that making such changes may upset their customers (Rotemberg (1982)). Examining how actual prices behave may help to shed light on which of these theoretical models are more relevant to the real world.

The work described in this article uses three large databases of individual prices to examine the facts about how often prices

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The ONS Virtual Microdata Laboratory (VML)

The ONS collects a large amount of data to produce statistics about all aspects of the economy and society. The microdata that underlie many of the aggregate statistics produced by the ONS are a potentially valuable resource to researchers. But because of the confidentiality issues relating to information collected about individual people or firms it is not possible to make this type of data widely available. The Virtual Microdata Laboratory (VML) was launched in January 2004 with the aim of allowing researchers access to data while also maintaining confidentiality and security. Initially only business survey data were available, but the number of data sets stored in the VML has expanded considerably since then. The microdata that underlie the consumer and producer price indices used in this article were first made accessible via the VML in late 2007.

The VML is located on ONS premises and allows no data or results to be taken into or out of the laboratory directly by researchers. There is no access to the outside world via email or the internet for those working in the laboratory and all outputs have to be cleared by ONS staff before they are released to researchers to ensure they contain no confidential information. Access is only granted for a valid statistical purpose and all researchers are given training and vetted. The VML has been used by over 400 trained researchers from a variety of backgrounds since its inception. These include members of ONS staff, academics and researchers from a range of government departments and other institutions such as the Bank of England. Ritchie (2008) provides further details and summarises work carried out in the VML.

change and how much they change by. Two of these micro-level data sets are produced by the ONS and they underlie the consumer and producer price indices.(1) Both of these data sets have been made available for the first time for use in research work. The third is a database of UK supermarket price quotes or so-called 'scanner data' from the point of sale. Past studies in this field for other countries have used both price quotes underlying official inflation measures (see Bils and Klenow (2004), Dhyne *et al* (2005)) and scanner data (Chevalier *et al* (2000), Kehoe and Midrigan (2007)). But there is no such previous work for the United Kingdom using either approach. The research described in this article attempts to fill this gap in the literature.

Investigating how individual prices behave using large databases of price quotes addresses similar issues to the recent Bank of England pricing survey discussed in the 2008 Q4 *Quarterly Bulletin*. Both approaches have their relative merits. The microdata analysis has the advantage of using much larger data sets to establish the facts about how a broader range of prices actually behave. The largest micro data set discussed in this article contains over 11 million observations, whereas the survey is based on around 700 responses. The databases of individual price data also enable the examination of how prices behave at different points in time rather than just in one particular period. But surveys can be used to ask firms about why they change their prices and how they respond to different events, as well as gathering information about how often prices typically change. Using surveys, it is also possible to ask firms how often they review their price as well as how often they change their price. Later in the article the results from these two approaches are compared.

The remainder of the article is structured as follows. First it describes the three data sets in a little more detail. It then summarises the results, starting off by discussing how often prices change before looking at whether the likelihood of a price change varies over time. This is followed by some analysis of the size of price changes and the relationship between the frequency and size of price changes.

The data

Consumer price data

On the second or third Tuesday of every month, the ONS collects data on the prices of individual consumer goods and services. These raw data are then weighted together and aggregated to form the monthly CPI. The ONS makes the microdata underlying the CPI available to researchers via its Virtual Microdata Laboratory (VML). The box above describes the VML in more detail.

The sample for consumer prices used in this article is very large — it includes just over 11 million price quotes recorded between 1996 and 2006, covering 600,000 different items. The same individual items are not present in all periods since the sample is regularly updated to ensure it remains representative. Only the locally collected data that make up the CPI — where ONS price collectors go into shops and record selling prices — were available. A set of centrally collected data — where the ONS collects national prices from particular companies — were not readily available. The locally collected data make up around two thirds of the aggregate CPI by weight. The box on page 30 describes how the microdata were used to estimate how often prices change.

(1) This work contains statistical data from ONS which is Crown copyright and reproduced with the permission of the controller of HMSO and Queen's Printer for Scotland. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research data sets which may not exactly reproduce National Statistics aggregates.

Estimating how often prices change

Estimates of how often consumer prices and producer prices change were calculated using the microdata underlying these series. The data provided by the ONS contain identifiers that classify an individual price quote according to its exact product type, date of collection and the location in which the price was collected. Using these identifiers, a time series of price quotes for each individual item was constructed. This was then used to identify whether a price change occurred for each item in a particular month of the data. The results were aggregated across the sample to calculate how many prices changed in that month. Each individual price quote was then weighted to calculate an average figure for that month. The weights used were the weights of each individual item within either the locally collected part of CPI or the overall PPI. The CPI weights are based on expenditure, while the PPI weights are based on sales.

The ONS collects larger samples of price quotes for some groups of products where it believes that it is necessary to produce a reliable estimate of the average price, for example where there is a lot of diversity within a product group. Weighting the ONS data avoids biasing the results towards these types of products, making them more representative of the prices faced by the average consumer or charged by producers.

Similar techniques were used to estimate how often supermarket prices change. Here the weights used were based on sales. The data were heavily weighted towards fresh products (57% of the sample) so results are reported both including and excluding these items.

Producer price data

The ONS collects and aggregates data on producer prices each month in a similar manner to consumer prices — although one notable difference is that producer prices are gathered by asking firms about their 'average' prices over the month rather than the price on a single day.

The producer price data examined are individual manufacturing output price quotes, which are aggregated together by the ONS to form producer prices indices (PPIs). The sample includes around 430,000 individual producer price quotes collected between 2003 and 2007, covering approximately 18,000 products and 9,000 firms. On average, around 7,000 prices a month are collected.

Producer prices are those charged by firms actually producing goods rather than the prices charged by retailers selling the goods to consumers. Examining producer prices allows for an analysis of how prices behave at an earlier point in the supply chain.

Supermarket price data

Although being able to examine the price quotes underlying the official inflation data is very useful, these are not the only microdata available. This analysis also examines prices recorded at the point of sale — scanner-level data. While these data may be less comprehensive than price data compiled by national statistical offices, they have a much higher frequency of observation. Prices used to calculate inflation indices are typically only collected once a month. They therefore give no indication about what happens to prices within each month. If prices change from week to week, this volatility will be automatically removed from the monthly data.

A database of weekly scanner data from supermarkets in Great Britain was kindly made available to the Bank by market research company, Nielsen.(1) This particular anonymised data set included data from 230 supermarket stores located throughout Great Britain, covering the country's largest retailers. Just over 280 distinct products were included in the data set; but as not all stores stock all products, some products appear intermittently. The individual products were chosen both with consideration to data availability, and to try to get a broad range of different types of goods. The data set covers three years of sales on a weekly frequency, from February 2005 to February 2008. In all, there were approximately 5½ million individual price quotes, or roughly 35,000 different price observations each week. The data are average prices for each week. This means that temporary changes in prices, such as special promotions or selling damaged goods more cheaply, were captured by the data.

How often do prices change?

Table A summarises how often prices change in the three data sets. On average, 19% of consumer prices change each month. This implies an average duration between price changes of approximately five months. Around 7% of the price quotes in the UK consumer price data are identified as either being temporarily discounted sale prices or prices recovering from a sale in the previous month.(2) Excluding

(1) Nielsen is a market research company that provides clients with analysis of sales trends and promotional impacts. To provide this service they collect data from a nationwide network of Electronic Point of Sale (EPoS) checkout scanners which represent sales at 65,000 supermarket and convenience stores in Great Britain.

(2) Sale prices are identified by ONS price collectors as temporary price reductions where the item is likely to be available at the normal price in the future. Sale prices are only recorded as sales if they are available to everybody: therefore money-off coupons and loyalty card discount are excluded. Prices are not adjusted for temporary increases in quantities or multi-buy offers.

these observations relating to sales, the proportion of consumer prices changing each month falls to 15%. Consumer goods prices change more often than the prices of services, an average of 24% of goods prices change each month compared to only 9% for services. The results suggest that UK consumer prices change slightly more often than in the euro area, where 15% of prices were found to change each month (Dhyne *et al* (2005)). But UK consumer prices appear to change less often than in the United States, where around 26% of prices are estimated to change each month (Bils and Klenow (2004)). These cross-country comparisons are all made using results that include sale prices.

Table A How often do prices change?[a]

Price measure	Sample	Percentage of prices changing	Implied duration between price changes
Monthly CPI microdata[b]	**1996 to 2006**	**19% a month**	**5.3 months**
CPI goods	1996 to 2006	24% a month	4.2 months
CPI services	1996 to 2006	9% a month	11.1 months
All items excluding temporary discounts	1996 to 2006	15% a month	6.7 months
Monthly PPI microdata	**2003 to 2007**	**26% a month**	**3.8 months**
Weekly supermarket data	**Feb. 2005 to Feb. 2008**	**60% a week**	**1.7 weeks**
Excluding fresh products	Feb. 2005 to Feb. 2008	40% a week	2.5 weeks
Excluding fresh products and price reversals	Feb. 2005 to Feb. 2008	27% a week	3.7 weeks

Sources: Nielsen, ONS and Bank calculations.

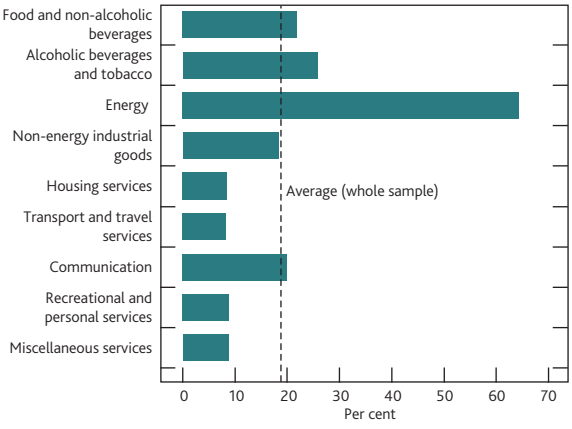
(a) All figures are weighted. See the box on page 30 for further details on how the percentage of prices changing was calculated.
(b) Locally collected data only.

Overall, the producer price results are similar to the findings on CPI goods prices. The PPI only covers goods prices, so a more natural comparison is with CPI goods rather than the whole of CPI, which also includes services. On average, 26% of producer prices change each month, which compares to 24% of consumer goods prices. The finding that prices charged by goods producers change with similar frequency to those charged for retail goods suggests that few pricing frictions exist between the production and retail sectors in the United Kingdom.

Approximately a quarter of UK producer prices changing each month is consistent with evidence from the United States where a similar proportion of producer prices were found to change each month (Nakamura and Steinsson (2007)). However, it implies that UK producer prices may be a little more flexible than in the euro area where only 21% of producer prices are estimated to change each month (Vermeulen *et al* (2007)).

Weekly supermarket prices appear to change much more frequently than is implied from analysing the prices used in the construction of the CPI and PPI indices.[1] The data suggest that, excluding fresh products, about 40% of prices change each week, or the average duration of prices is around two and a half weeks. The sample was heavily weighted to fresh products (57% of the sample), whose prices change frequently, so excluding these products may give a better read on underlying price flexibility. This is a lower duration than the CPI retail goods data, but of course this is based on higher frequency data. There are a number of possible explanations for this result. The first is that the weekly supermarket data are picking up large numbers of temporary promotions that are not captured in the monthly CPI data. Excluding all price changes that are direct reversals of the previous change — a proxy for temporary promotions — the share of prices changing each week (excluding fresh products) falls to 27%. Second, the supermarket sample is predominantly food items, and food products within the CPI change price slightly more frequently than the average for all products (**Chart 1**). Third, the CPI data cover prices from a much wider range of shops than just large supermarkets and price-setting behaviour may not be the same among all types of retailers. Nevertheless, the high levels of flexibility observed in the weekly scanner data suggest that UK prices may change more often than in the monthly ONS microdata because, by construction, the most prices can change in the ONS micro data sets is once a month.

Chart 1 Percentage of UK consumer prices that change each month by component (1996–2006)[a]



Sources: ONS and Bank calculations.

(a) Uses locally collected data only.

Comparison with price-setting survey

There are some similarities between these results based on microdata and those from the recent Bank of England price-setting survey (Greenslade and Parker (2008)). A common result across the microdata work and the price-setting survey is that consumer goods prices change more frequently than services prices. The price-setting survey

(1) Due to the terms associated with accessing the data it was not possible to identify prices collected in supermarkets explicitly within the CPI microdata. See the box on page 29 for further details.

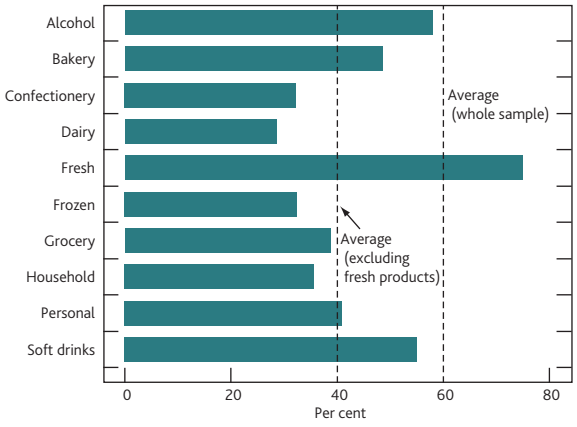
found that the median service sector firm changes price once a year, which is consistent with the average of eleven months between changes in CPI services prices from the microdata.

There are also some differences between the microdata and the survey results. The survey found that on average retailers change price once a month, compared with just over four months for CPI goods prices based on the microdata, and less than one month for the supermarket data.(1) And the producer price microdata suggest that UK manufacturing firms change prices more frequently (once every four months) than is suggested by the price-setting survey, which found that the average manufacturing firm only changes price annually.

Price changes across sectors and product groups

As noted above, consumer goods prices change more often than services prices. But there are also differences in how often prices change within these categories (**Chart 1**). In particular, the prices of energy items, predominately petrol in the locally collected CPI microdata, change the most frequently.(2) The evidence of heterogeneity is also clear in the supermarket data (**Chart 2**) and in the producer price data (**Chart 3**). In the supermarket data the prices of fresh products (which also have the largest weight) change the most often, and in the producer price data, energy products change price the most frequently (as in the consumer price data).

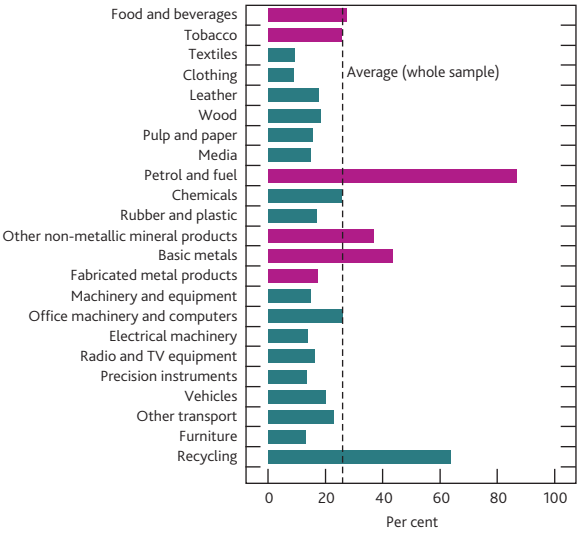
Chart 2 Percentage of UK supermarket prices that change each week by product category (2005–08)



Sources: Nielsen and Bank calculations.

For producer prices, those sectors that use a high proportion of primary inputs — agriculture, metals and energy — tend to exhibit higher frequencies of price change than average (the magenta bars in **Chart 3**). The prices of these commoditised inputs typically can change on a daily basis, and this appears to be reflected in companies' output prices. The only sector with a very high proportion of prices changing each month that uses less primary inputs is recycling. Although the inputs to this industry come from across the economy, the output is a type of commodity and therefore output prices charged will be closely linked to prices in commodity markets. The

Chart 3 Percentage of producer prices that change each month by industry (2003–07)(a)



Sources: ONS and Bank calculations.

(a) The magenta bars are industries which have more than 25% of inputs from agriculture, energy extraction and supply, iron, steel and non-ferrous metals.

relationship between commodity-related input prices and output prices is consistent with the Bank's price-setting survey (Greenslade and Parker (2008)), which found increases in raw material prices to be the second most important driver (after increases in labour costs) of price increases.

Does the probability of price changes vary over time?

It is interesting to look at how the likelihood of price changes varies over time to give some idea as to how sensitive the results are to the time period used, and to help shed light on whether time-dependent pricing models provide a good explanation of how prices are set. In its simplest form, a time-dependent model implies the probability of a price change is the same in each period. There are two ways to explore the predictions of this model in the data. The first is to look at the frequency of price changes in different periods. The second is to draw so-called 'hazard functions' which plot the probability of a price change against the time elapsed since the previous change.

Frequency of price changes over time

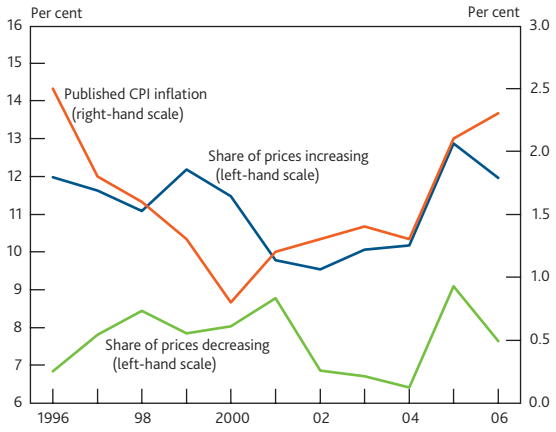
It is well known that there is seasonal variation in prices. That is clear in the microdata: for example, more consumer prices change in January than in any other month of the year as firms reduce prices as part of the January sales. Excluding all sale prices, consumer prices are most likely to change in April. That could reflect changes in duty and/or firms changing prices to

(1) Supermarkets are not explicitly identified in the pricing survey.
(2) The sample of energy prices is mainly made up of petrol and diesel price quotes. Household gas and electricity prices are collected centrally by the ONS and are not therefore part of the locally collected data used here.

coincide with the start of a new financial year. Producer prices are also most likely to change in January and April. Consumer and producer prices appear to change least often in November and December.

The average share of consumer prices changing each month varies between 16% and 22% in different years of the sample. For producer prices, the annual average proportion of prices changing each month ranges between 24% and 28%. In the CPI microdata, which spans the longest time period of the three data sets (1996 to 2006), there is some evidence of a correlation between the average share of prices increasing each month and the aggregate inflation rate they underlie (**Chart 4**).(1) However, there is no sign of a relationship between inflation and the share of prices decreasing.(2) Similar relationships hold for producer prices, albeit over a shorter time horizon. The share of supermarket prices changing each week also varies over time.

Chart 4 Annual average percentage of UK consumer prices that change each month and CPI inflation rates



Sources: ONS and Bank calculations.

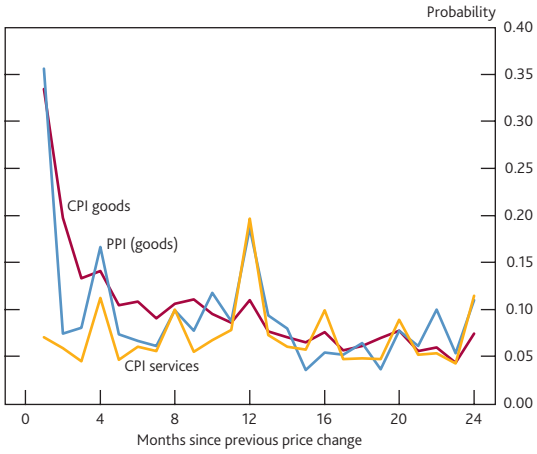
The variation in the frequency of price changes over time is not consistent with the predictions of a simple time-dependent pricing model.

Hazard functions

Hazard functions show how the probability of a price change depends on the time elapsed since the previous price change. Consumer goods prices are most likely to change in the month after they previously changed (**Chart 5**), and the probability of a price change falls as more time passes since the price last changed. The spike at one month may in part be picking up temporary price promotions. However, the hazard function for consumer services prices looks very different: it is broadly flat with a notable spike at twelve months — suggestive of annual price reviews. The hazard function for producer goods prices has a large spike at one month and slopes downwards, broadly matching the consumer goods price data, although the one major difference is that it also has a spike at twelve months.

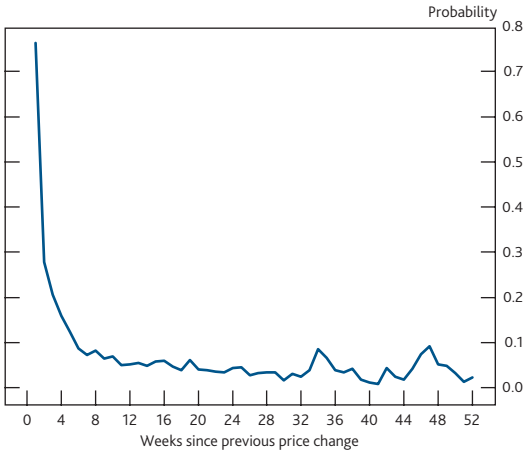
In the supermarket price data, the probability of a price changing is very high if that price also changed in the previous week (**Chart 6**). After the first week, the probability of a price change then declines. The shape of the supermarket price hazard function is broadly similar to that for the CPI goods data except that prices change on a much more regular basis.

Chart 5 Consumer and producer price hazard functions



Sources: ONS and Bank calculations.

Chart 6 Supermarket price hazard function



Sources: Nielsen and Bank calculations.

A simple time-dependent pricing model would suggest a broadly flat hazard function, implying that the probability of a price change depends only on when the price last changed. The downward-sloping hazard function for goods would appear to be inconsistent with that model. The hazard functions for each of the goods components all have a similar downward slope, but it is also possible that the decreasing hazard functions could result from aggregating heterogeneous price-setters within components (Álvarez *et al* (2005)). The hazard function for services is relatively constant in each period except for an additional annual pricing review for some

(1) The correlation coefficient is 0.6.
(2) The correlation coefficient is 0.0 to 1 decimal place.

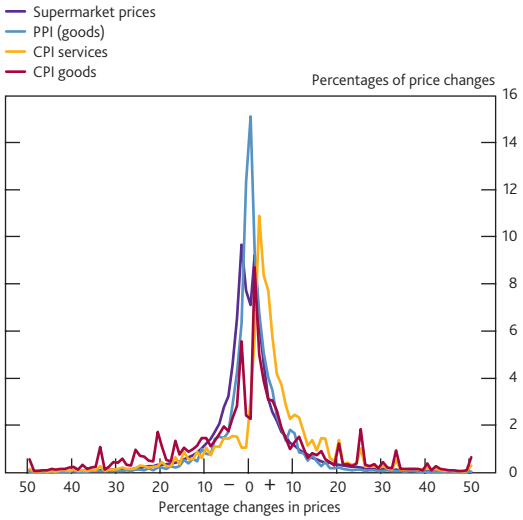
firms, which is more consistent with a time-dependent pricing model.

How large are price changes?

Analysing the size of price changes provides further information about how individual prices behave. It may also be useful to help determine whether firms face costs in adjusting their prices, as is assumed in some state-dependent pricing theories. Few small price changes might suggest that fixed costs of price adjustment — or menu costs — are important. By contrast, if firms face disutility from making large price changes that would suggest the majority of price changes should be small. And studying the distribution of price changes may also help to shed light on the extent of downward nominal rigidities — constraints which prevent firms from reducing prices — in product markets. The existence of such rigidities would be consistent with there being few falls in prices, particularly small falls.

Across all three data sets the median price change is an increase of between 0% and 2%. For each data set, the distribution of the size of price changes around the central estimates is wide with a number of large price changes (**Chart 7**). But the distribution is not uniform: there are a significant number of price changes that are relatively small and close to zero.

Chart 7 Distribution of the size of changes in prices[a][b][c]



Sources: Nielsen, ONS and Bank calculations.

(a) Price changes for each distribution are grouped into 1 percentage point intervals. The lines join up the data points for each interval.
(b) The distribution only includes observations where the price changes.
(c) The sample periods used are not the same for each data set. The CPI data cover 1996 to 2006, PPI uses 2003 to 2007 data and the supermarket data cover 2005 to 2008.

The proportion of small price changes is particularly high for producer prices. There have tended to be more increases and fewer decreases in consumer services prices than in goods prices, but that may just reflect higher rates of services price inflation over the sample period. The distribution of the size of supermarket price changes looks broadly similar to the distribution of the size of consumer goods price changes. However, there is a higher proportion of smaller price falls in the supermarket data. This might suggest that temporary promotions — where price changes are likely to be relatively large — cannot fully explain why weekly supermarket prices appear to change so much more frequently than CPI goods prices. It could also reflect using average prices in the supermarket data where short-term price reductions, for example to sell off stock approaching its sell-by date, could explain some of the small changes in supermarket prices. This is relevant for fresh products which make up a significant proportion of the sample.

State-dependent pricing models typically assume that firms face a small fixed cost to adjusting their prices or face a disutility associated with making large price changes. The large number of relatively small price changes that occur in all data sets imply that small fixed costs of price adjustment may not be important for many firms. Also, the significant number of large price changes that are present in the data are not consistent with those firms receiving disutility from making large price changes. The evidence suggests state-dependent pricing models may not explain price-setting behaviour in the majority of firms.

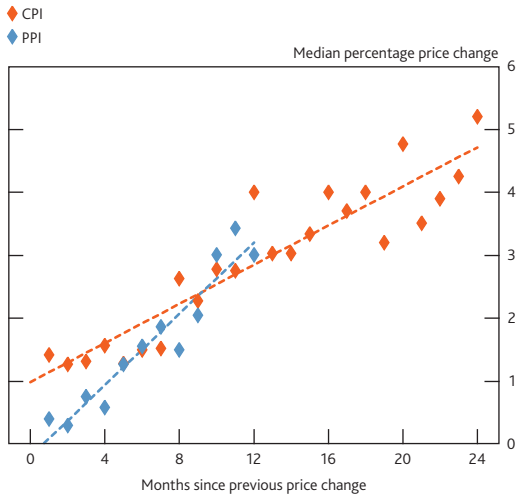
Evidence on the extent of downward nominal rigidities

Over a period where inflation rates have been positive it is reasonable to expect there to be more price increases than decreases (as is shown in **Chart 4** for consumer prices). But the data still show a large share of price changes are price cuts. Around 40% of all CPI and PPI price changes were decreases, while price falls account for 50% of price changes in the supermarket data. Excluding the effects of temporary sales, approximately 35% of all consumer price changes were still price cuts. The large share of price changes that are price falls and the large proportion of price cuts that are smaller than 5%, suggests there is limited evidence to support the presence of downward nominal rigidities in product markets in the United Kingdom.

Is there a relationship between the frequency and size of price changes?

Having examined the frequency and magnitude of price changes separately, this section considers linkages between the two. If prices can be set in each period there is no reason to expect price changes to be larger if more time has passed since the price last changed. But if some constraint exists which only allows or incentivises firms to set prices at infrequent intervals, there is more scope for a firm's actual price to differ from its optimal price as the duration since the previous price change increases. Examples of such constraints might include contracts of fixed length or costs of price adjustment.

Chart 8 Size of price changes and duration since the previous price change[a][b]



(a) The dashed lines show lines of best fit.
(b) PPI data are not shown beyond one year due to the small sample size.

Consumer prices that change more frequently tend to do so by less (**Chart 8**). This relationship is particularly strong for services prices.

This relationship between the frequency and magnitude of price changes also holds in the producer price data, at least for periods of up to one year. Beyond one year the producer price sample size is much smaller which makes it more difficult to test this hypothesis. However, in the supermarket price data prices that change less frequently do not tend to change by more. This may be related to prices changing much more frequently in the weekly supermarket data, which means price durations tend to be short in this data.

Conclusion

Pricing rigidities are an important part of the monetary transmission mechanism. Understanding more about how prices behave can shed light on the nature of these rigidities and can help policymakers determine how best to set monetary policy to achieve the inflation target. This article has summarised the evidence on the behaviour of individual prices in the United Kingdom. Price quotes underlying both the ONS consumer and producer price indices were used alongside a data set of more frequent weekly price data from supermarkets. Evidence from the ONS microdata implies that consumer prices changed, on average, once every five months between 1996 and 2006, while producer prices changed once every four months between 2003 and 2007. Higher frequency supermarket data, which cover the period between 2005 and 2008, suggest that prices change more often than this.

In all data sets there are clear differences between the proportions of prices changing in different sectors. Consumer goods prices change more frequently than services prices. Producer prices change more frequently for goods that use a high proportion of commodities as raw material inputs. The distribution of the size of price changes is wide, but a large number of price changes are relatively small.

The Bank of England price-setting survey described in the 2008 Q4 *Quarterly Bulletin* found that firms use both time and state-dependent pricing rules. The results presented in this article are also not clearly supportive of any one pricing theory. Indeed, the heterogeneity in pricing behaviour across sectors implies that there may not be a single theory that can explain how all prices are determined.

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