Are there downward nominal rigidities in product markets?

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Abstract

This paper tests for the presence of a downward floor to prices by examining the hypothesis that as mean inflation falls, the skewness of price changes rises. Using tests for Granger-causality between the mean and skewness of inflation, the paper concludes that on balance there is no convincing evidence of downward nominal rigidity in retail or producer prices in the United Kingdom.

1 Introduction

Economic theory provides several reasons why the optimal rate of inflation may be greater than zero. For example, measured inflation might overstate actual inflation;(1) or the authorities may want to stimulate the economy by having negative real interest rates, which is impossible at price stability since nominal interest rates are bounded at zero (the 'Summers' effect).(2) This paper focuses on the possibility that there might be some inherent downward stickiness in the prices of goods and services. This kind of downward stickiness in *nominal* prices could mean that a little inflation 'greases the wheels' and allows *real* (ie relative) prices to fall when necessary.

Previous research into downward rigidities in prices has adopted three broad approaches. There are surveys of individual price-setters, such as Hall *et al* (1997); or wage-setters, such as Kahneman *et al* (1986). There are also studies that look at the separate response of real quantities to upward and downward monetary shocks, such as De Long and Summers (1988). Other papers, such as Laxton *et al* (1995) or Yates and Chapple (1996), investigate whether the Phillips Curve relationship is stronger or weaker at lower rates of inflation.

This paper takes an alternative approach. We look for evidence of downward nominal rigidities in the correlation between mean inflation and the skewness of changes in product prices, drawing on an idea previously exploited by Bryan and Cecchetti (1993) and Rae (1993) among others. We find no convincing evidence of the existence of downward nominal rigidities in our data.

2 Theories of downward price stickiness

There are many theoretical models of both nominal and real stickiness in prices. But they provide few compelling arguments for why this stickiness should hinder nominal price cuts more than it does price rises.

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(1) See Oulton (1995), Boskin (1996) or Cunningham (1996).
(2) These issues are discussed more fully in Summers (1991), Konieczny (1994), Yates (1995) and Bakhshi *et al* (1997).

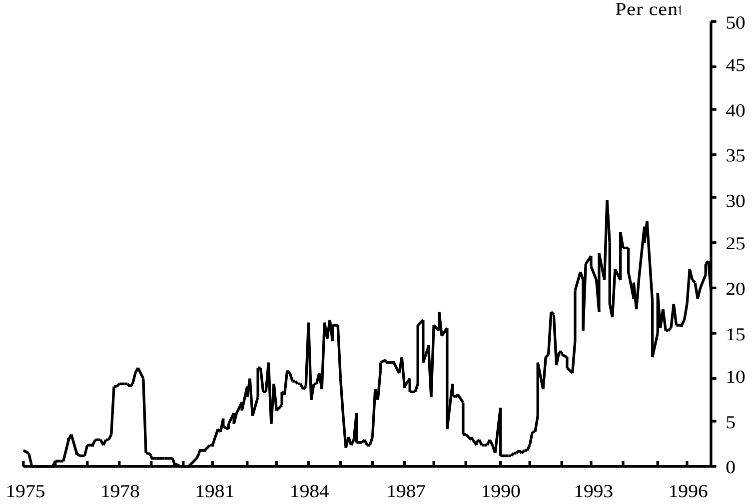
One idea, suggested by Stiglitz (1987), is that consumers use prices as a signal for quality in the face of limited information about the goods they are buying. Consumers may buy no more (or perhaps even less) of a good when its price falls, as they think it to be of lower quality than before. If this is true, companies may be reluctant to pass on a fall in costs in their product prices.

Hall *et al* (1997) examine the importance of this theory in the United Kingdom. This study reports the results of a survey that asked companies to rank the relevance of alternative theories of price-setting behaviour to their circumstances. Only 18% of companies recognised this theory as relevant to their price-setting decisions, making it one of the least popular theories of price stickiness. But if it is true that 18% of prices are affected by quality considerations, this would, in our view, be a significant enough proportion to generate a downward nominal rigidity important for policy.

Another possible explanation for downward price stickiness is that consumers may not be used to nominal price cuts when the general price level is rising. As a result, they may not be able to respond efficiently when they occur and companies will be even less inclined to cut prices in the first place.

The evidence does not support this explanation. Chart 1 shows that since 1992, the proportion of prices falling (year on year) within the Retail Price Index (RPI) has fluctuated between about 10% and 30%. This echoes Quah (1994), who found many examples of goods in the United Kingdom whose nominal price has fallen throughout an era of positive inflation. Other evidence comes from Hall *et al* (1997), who asked companies what factors were likely to lead to price rises or price falls. 14% of manufacturing companies replied that ‘prices never fall’, compared with 4% who said that ‘prices never rise’. This could be evidence of downward price stickiness. But it could just reflect the fact that the survey itself was conducted at a time when annual producer output price inflation was around 5% and retail price inflation was about 2_%; so price cuts were quite naturally less common than price increases. And it is also worth noting that downward stickiness of this sort is likely to disappear in a prolonged period of price stability; in this case the costs imposed by eliminating inflation would not persist in the long run.

Chart 1
Frequency of price cuts (weighted proportions)



A final reason for downward nominal stickiness might be strategic behaviour between companies. Suppose that prices in an industry are set by agreement above the competitive (marginal cost) price. If (nominal) costs are on a downward trend. Incumbent companies in the industry will need to reduce prices in line with costs to successfully deter entry by potential new companies. But if these cost reductions are also hard to monitor and not perfectly synchronised across the industry, each individual firm will be reluctant to cut prices for fear that its rivals will assume that it is trying to gain market share rather than maintain the entry threat. Hall *et al* (1997) found that companies were far less likely to cut price in response to a fall in their costs than to raise prices in response to a rise in costs. But they would rapidly respond to a rival price fall; the net result is downward nominal price stickiness. In these circumstances, inflation may allow simultaneous real cuts in product prices without threatening the agreement. But this is an argument that emphasises the welfare-improving effects of zero inflation: price stability could bring about a once-and-for-all increase in competition if this is how companies actually behave.

3 Testing for downward price stickiness

We present a test of downward nominal rigidities in retail and producer prices in the United Kingdom, based on the behaviour of moments of the cross-sectional distribution of price changes. Our hypothesis is that if there is downward nominal rigidity in prices, the skewness of price changes should be *negatively* related to the mean inflation rate across goods. And variations in the mean price change should lead to changes in the skewness of the distribution. This idea is illustrated by the example in Table A and Chart 2.

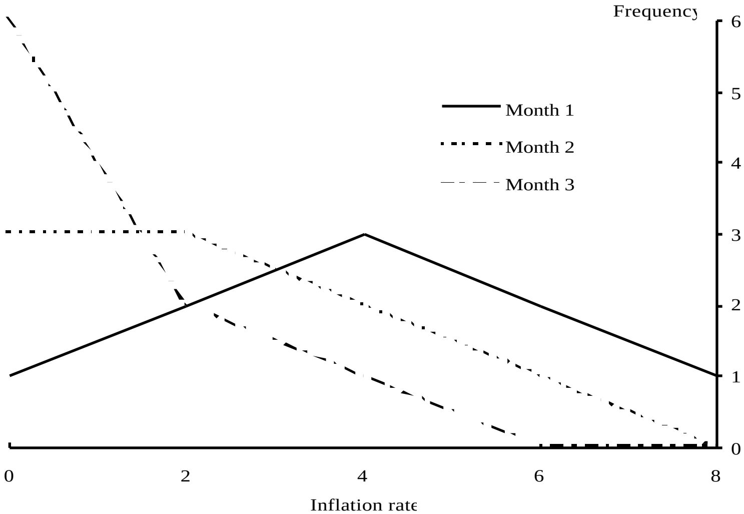
Table A shows inflation rates for three months for goods *a* to *i*, and the mean and skewness of the distribution of all price changes (goods are assumed to carry the same weight). In month 1, there is a symmetric distribution of inflation rates around the mean price change of four, so skewness is zero. In month 2, a monetary contraction means that the desired price change for each good falls by two percentage points. For some reason price cuts are not possible, so the contraction increases the number of goods whose price does not change. The net effect is a reduction in mean inflation and an increase in the skewness of price changes. A further monetary contraction in month 3 requires another two percentage point cut in inflation rates; mean inflation falls again, and skewness rises further.[3] So with a downward nominal rigidity, we would expect to observe a *negative* correlation between mean inflation and the skewness of inflation rates across sub-components: as inflation falls, the proportion of the distribution of prices coming up against the zero price change floor rises, and *vice versa*.

(3) In each case we have assumed that there is some implicit monetary accommodation: the reduction in aggregate inflation is less than the full two percentage points.

Table A
The impact of a downward nominal rigidity on the skewness and mean of inflation

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	Mean	Skewness
Month 1	0	2	2	4	4	4	6	6	8	**4**	**0**
Month 2	0	0	0	2	2	2	4	4	6	**2.2**	**0.5**
Month 3	0	0	0	0	0	0	2	2	4	**0.9**	**1.5**

Chart 2
The impact of a downward nominal rigidity on the distribution of price changes

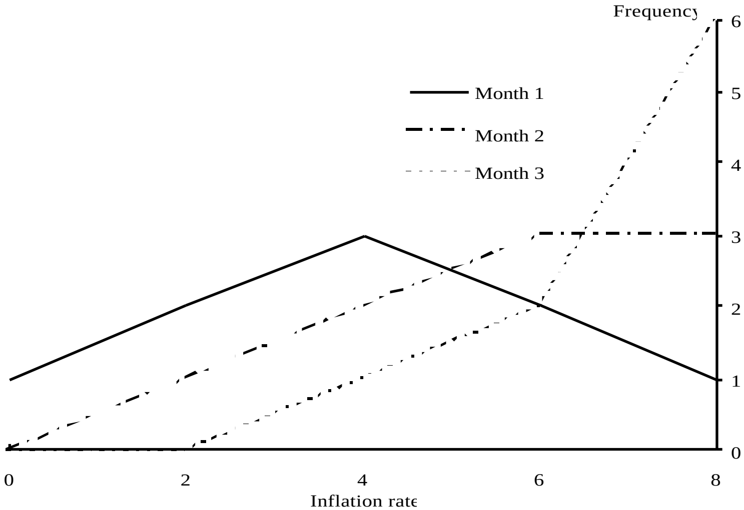


Acceptance of our test hypothesis could equally indicate the presence of upward nominal rigidities. Consider Table B and Chart 3. Here, for some reason, inflation rates of greater than eight are not allowed. Months 2 and 3 see successive increases in the inflation rate of two percentage points for each good. The net effect is that skewness falls and inflation rises—again, there is a negative correlation.

Table B
The impact of a upward nominal rigidity on the skewness and mean of inflation

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	Mean	Skewness
Month 1	0	2	2	4	4	4	6	6	8	**4**	**0**
Month 2	2	4	4	6	6	6	8	8	8	**5.8**	**-0.6**
Month 3	4	6	6	8	8	8	8	8	8	**7.1**	**-1.5**

Chart 3
The impact of a upward nominal rigidity on the distribution of price changes



Since our test cannot distinguish between downward and upward nominal rigidity, we need recourse to theory. To our knowledge, Kayshap (1995) is the only reference in the literature to the possibility that prices may be sticky upward. He restates what is probably a very old idea, that price increases above certain thresholds (such as £2.99, £3.99) will have disproportionately large effects on demand. As a result, companies stick below these thresholds until the costs in terms of lost profits are too great to bear. Hall *et al* (1997) found that this phenomenon was recognised by 34% of companies in their survey; it was particularly important in the retail sector, with 68.7% recognition. Any significant negative correlation in the data could therefore indicate an inherent upward, rather than downward, nominal rigidity.

Even leaving aside this problem of inference, there are other possibilities that we need to consider. First, our test may be subject to some simultaneity bias: skewness may cause inflation as well as *vice versa*. Ball and Mankiw (1995) developed a menu-cost model of price setting, where skewness involves large shocks to some desired prices and small (opposite) shocks to others. In the short run, small adjustments are not made and the skewness shows up in higher mean inflation. In other words, mean inflation and skewness will be positively correlated, with the increase in skewness causing an increase in inflation.

Yet another consideration is that skewness in the distribution of actual prices may be caused by skewed shocks to relative demand, or to costs, and not just by changes in the rate of inflation.

Given these two points, we would ideally wish to write down a simultaneous structural model of the inflation and skewness process, involving all independent influences on each. In the absence of such a model, we run Granger-causality regressions between the mean and the skewness of inflation, in which we posit that the contemporaneous value for skewness is caused by lagged values of inflation and skewness. The exclusion of the contemporaneous term in inflation from the set of independent variables avoids the possibility that the inflation terms could be caused by the dependent variable. But it does mean that we are departing from theory, as currently stated, which would predict that there are contemporaneous effects running both ways. To justify the lagged effects, we need to appeal to menu-cost models (which motivate the causation from skewness to inflation) and assume that there is some staggered time-dependence in price setting. The inclusion of lagged values of skewness as explanatory variables is simply an imperfect way of picking up separate effects on contemporaneous skewness aside from inflation.

It is also possible that the relationship between mean inflation and its skewness may be stronger the closer mean inflation is to zero. In a very high inflation regime, there may be no correlation at all between the mean and skewness of price changes, as any downward nominal rigidity may not bite: the correlation would only emerge at lower rates of inflation. For this reason, our empirical tests in Section 4 consider how the correlation between the mean and skewness of the distribution of price changes varies across ‘low’ and ‘high’-inflation periods.

It may also be the case that the standard deviation of price changes is positively correlated with the mean rate of inflation. This would mean that even if there are downward nominal rigidities, the standard deviation of price changes will fall with inflation, reducing the chance that these rigidities will bite. In general, we would expect the power of our tests to be less the higher is the correlation between the mean and the standard deviation.[4] Nonetheless, this should not affect the sign of the correlation. And provided there is less-than-perfect correlation between the mean and the standard deviation, we have some (albeit a reduced) chance of detecting a relationship. Moreover, Chart 1 showed that the chance of observing price cuts does vary with inflation. This evidence is not conclusive, but suggests some constancy in the shape of the distribution of desired price changes. If this is the case, the chance that the desired price change for a given good is negative should vary with the inflation rate.

A final consideration is raised by Bryan and Cecchetti (1996). They point out that in small samples of kurtotic price change distributions, there may be a positive bias in the observed correlation between the mean inflation rate and skewness. This problem is most acute at short horizons: over longer horizons, sampling errors are likely to be less of a problem. In Section 4, therefore, also examine the sensitivity of observed correlations to the time horizon over which price changes are measured.

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(4) We are grateful to Peter Westaway for making this observation.

4 Empirical results

This section considers whether there is any evidence of downward nominal rigidities in price-setting behaviour in the distribution of retail and producer price inflation. In particular, we test the hypothesis that downward nominal rigidities would imply a negative correlation between mean inflation and the skewness of component inflation rates, with (in our case, *Granger*) causality running from mean inflation to skewness.

Section 3 has already suggested that we should explore how our results vary across different inflation regimes and across measures of inflation calculated over different time horizons. Some further questions arise when we come to consider the data we have available for our tests.

First, we are forced to use price data on aggregates of goods, rather than individual goods prices: we use monthly data on components of the Retail and Producer Price Indices as compiled by the Office for National Statistics. Would this aggregation obscure or exaggerate price rigidity? On the one hand, if the component aggregate price stays the same, this could mean that price increases are balanced out by price decreases; observing no change in the aggregate would exaggerate the prevalence of price rigidity. But on the other hand, if just one price within a component of the index falls, our aggregate component index will not record a zero price change; from this we might infer that prices are flexible, when in reality they are not.

A further difficulty arises over the choice of weighting scheme for component prices. Our baseline experiment weights component retail price indices by their share in family expenditure, and producer price indices by standard manufacturing sales weights. We use fixed weights for fear that changes in weights alone could induce temporary skewness into the distribution. But there is also a theoretical case for dropping differential weights entirely. Suppose that the world was characterised by downward nominal rigidities in most, but not all, sectors. Using weights might mean that we would not pick up a significant relationship unless the sectors, where rigidities were biting, were those with sufficiently high expenditure weights. There is no reason to expect ‘constrained’ sectors always to be those with high weights.

These problems in selecting an appropriate measure of price change and the theoretical issues considered in Section 3 suggest that sensitivity analysis is at a premium. As a baseline, our empirical investigation of retail price inflation takes data on the moments of twelve-month inflation rates of 64 components of the retail price index during the period January 1975 to April 1996: each component is weighted according to its share in family expenditure. But we also conduct a series of experiments to test for the robustness of our results to variations in the data. In particular, we consider how our results vary across ‘low’ and ‘high’-inflation periods; across measures of retail price changes over one month rather than twelve months; across variations in the level of aggregation of our retail price data, by using an index constructed from 13 rather than the original 64 components of our baseline index; and across weighted and unweighted data.

Correlation analysis

Time series of our main measures of twelve-month mean inflation and the cross-sectional standard deviation and skewness of component inflation rates (Charts 4, 5 and 6) give a general picture of the distribution of price changes over time. There was considerable volatility in the distribution of price changes in the first half of our sample: twelve-month inflation exceeded 20% on several occasions, and these rises were associated with increases in the cross-sectional standard deviation of component price changes. Mean inflation and the dispersion of component inflation rates were both lower in the second half of our sample. In contrast, the skewness of component price changes seems to have been less closely associated with the level of mean inflation: periods of high asymmetry in component inflation rates have been associated with both high and low mean rates of inflation.

Chart 4
Moments of 12-month weighted RPI

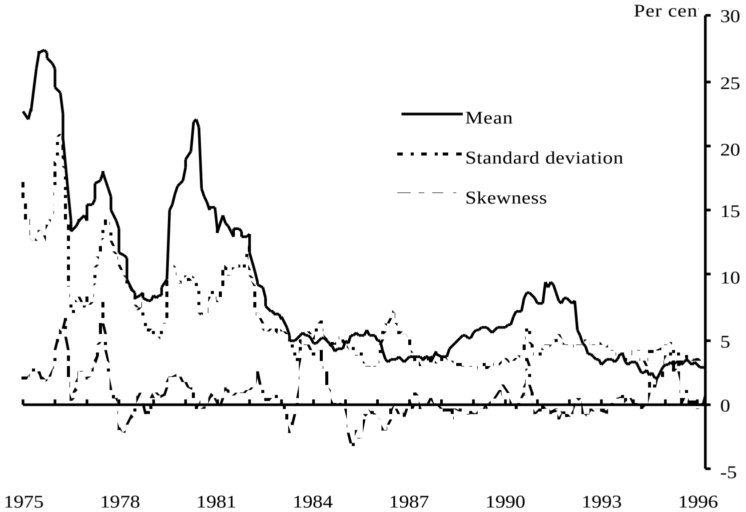


Chart 5
Moments of 12-month aggregated RPI

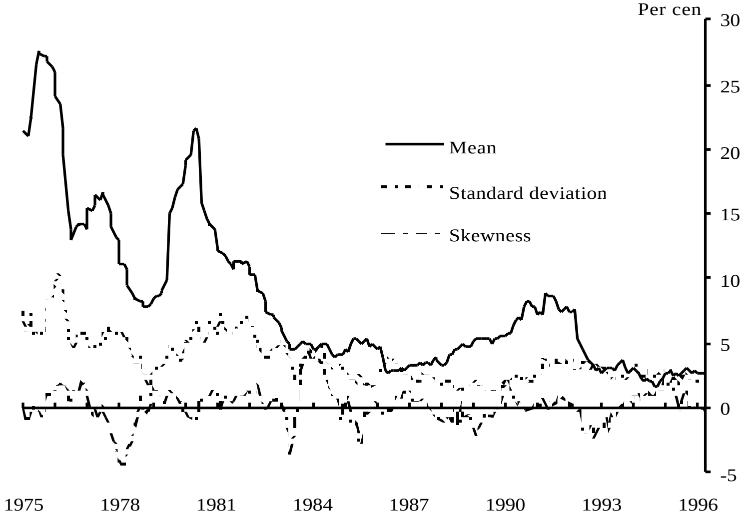
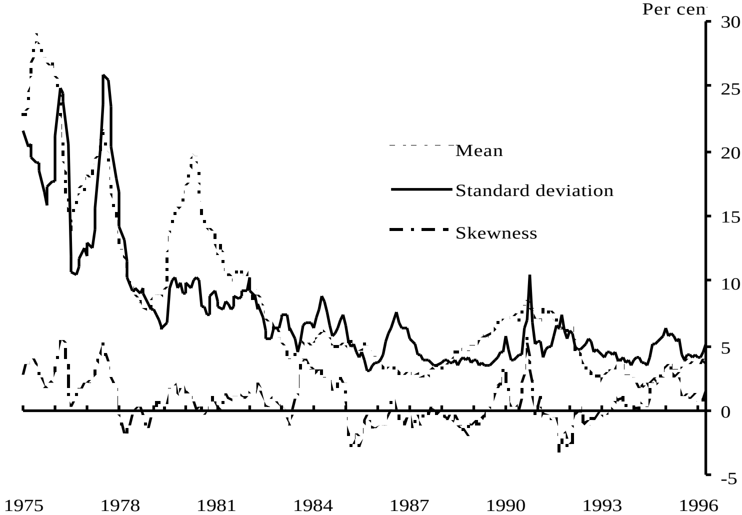


Chart 6
Moments of 12-month unweighted RPI



Summary correlation coefficients (Table C) confirm the positive relationship between mean retail price inflation and the standard deviation of component price changes for our baseline measure of inflation. This relationship holds for each experiment, but appears to be stronger in the 'high'-inflation period. As noted above, a strong positive association between mean inflation and the dispersion of component inflation rates might lower the power of our test to identify downward nominal rigidities. But evidence of price falls over time suggests that there is sufficient variation in the distribution of price changes to ensure that the zero price floor would bite.

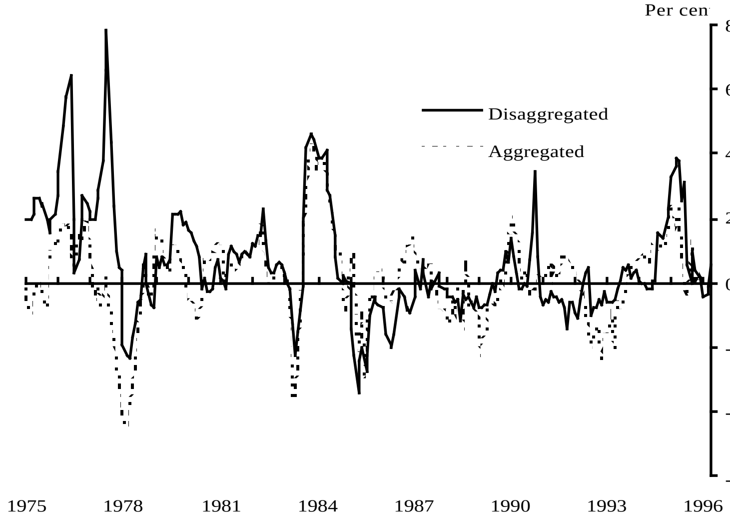
In contrast with the findings of Ball and Mankiw (1995) for consumer price inflation in the United States, our UK data suggest a weaker association between mean inflation and the skewness of component inflation rates than between inflation and the standard deviation of these rates. In addition, there is generally a positive correlation between mean inflation and skewness, in contrast with our expectation if there were downward nominal rigidities. But aggregation of our data tends to reduce the degree of correlation;

Table C
Correlation coefficients for moments of RPI

Experiment			Mean and skewness	Mean and standard deviation	Mean and kurtosis
Baseline	**12-month weighted disaggregated inflation**	*Level*	0.44	0.87	0.29
		Change	0.22	0.46	0.14
A: Aggregation	**12-month weighted aggregated inflation**	*Level*	0.00	0.78	-0.13
		Change	0.06	0.27	-0.02
B: Measure of price change	**1-month weighted disaggregated inflation**	*Level*	0.32	0.69	-0.07
		Change	0.27	0.61	-0.18
C: Weighting	**12-month unweighted disaggregated inflation**	*Level*	0.49	0.88	0.35
		Change	0.32	0.47	0.19
D: Sub-samples	**'High' inflation**	*Level*	0.51	0.68	0.20
	January 1975 to March 1982	*Change*	0.24	0.51	0.16
	'Low' inflation	*Level*	-0.05	0.23	-0.05
	April 1982 to April 1996	*Change*	0.23	0.16	0.06

as might be expected, skewness tends to be reduced by aggregation of our data (Chart 7). And in the period of ‘low’ inflation, we find a weak negative correlation between mean inflation and skewness. This may indicate that the impact of nominal rigidities is only apparent in our correlations when inflation is low, as we suggested in our earlier discussion.

Chart 7
Skewness by level of aggregation



Note that we have also presented correlations involving kurtosis. Rae (1993) pointed out that it is easy to confuse skewness with kurtosis and *vice versa* in small samples. We find that there is some evidence of negative correlation between mean inflation and the kurtosis of component price changes, but the relationship is weak. Finally, the correlations between differences in the moments of inflation are presented as a (rather crude) way of accommodating possible non-stationarity. First-difference correlations corroborate earlier findings and are again generally contrary to what we would expect if downward nominal rigidities had an important influence.

Testing for Granger causality

Before conducting bivariate Granger-causality tests between the mean rate of inflation and the skewness of component inflation rates, we examined the integration properties of the data. Table D reports results of augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for stationarity. In general, it seems safe to assume that the moments of RPI inflation are I(0).

Table D
Stationarity tests for the movements of retail and producer prices

		ADF		PP	
January 1975 to April 1996		***c***	***c, t***	***c***	***c, t***
RPI	*mean*	-2.86	-2.64	-2.19	-2.57
	standard deviation	-3.37	-3.42	-3.08	-3.71
	skewness	-2.72	-2.65	-3.71	-3.90
	kurtosis	-2.45	-2.68	-4.42	-4.70
January 1980 to March 1995					
PPI	*mean*	-2.67	-1.87	-4.50	-3.60
	standard deviation	-2.88	-2.54	-4.40	-3.65
	skewness	-0.53	-0.62	-1.59	-1.02
	kurtosis	-0.79	-1.21	-2.98	-3.37

McKinnon's critical values

	5%	**10%**
Without trend	-2.87	-2.57
With trend	-3.43	-3.14

Table E reports results of formal tests of our hypothesis, that mean inflation should Granger-cause the skewness of the distribution of component price changes, under the assumption that our data are stationary. The table reports the results of separate regressions, testing for the existence and direction of any relationship between mean and skewness, and mean and kurtosis, for each variant measure of inflation. The table records the probability that lagged values of the independent variable can be excluded from a regression of the dependent variable on twelve lagged values of itself and the independent variable. We also record the sign of the sum of the coefficients on the independent variables to illustrate whether the long-run relationship is a net positive or negative one.

Table E
Granger-causality results for RPI

Experiment	Dependent variable : Independent variable :		Skewness mean		Mean skewness		Kurtosis mean		Mean kurtosis	
Baseline	**12-month weighted disaggregated**	Level	0.24	(+)	0.10	(-)	0.44	(+)	0.29	(-)
		Change	0.33	(+)	0.08	(-)	0.43	(+)	0.29	(-)
A: Aggregation	**12-month weighted aggregated**	Level	0.86	(+)	0.37	(-)	0.99	(+)	0.78	(+)
		Change	0.83	(-)	0.34	(+)	0.98	(-)	0.58	(-)
B: Measure of price change	**1-month weighted disaggregated**	Level	0.00	(+)	0.00	(+)	0.05	(+)	0.01	(+)
		Change	0.30	(-)	0.08	(-)	0.04	(+)	0.00	(+)
C: Weighting	**12-month unweighted disaggregated**	Level	0.19	(+)	0.03	(-)	0.53	(+)	0.10	(-)
		Change	0.15	(+)	0.03	(-)	0.35	(+)	0.14	(-)
D: Sub-samples	**'High' inflation *January 1975 to March 1982***	Level	0.53	(+)	0.94	(-)	0.96	(+)	0.80	(-)
		Change	0.70	(+)	0.86	(-)	0.88	(+)	0.90	(-)
	'Low' inflation *April 1982 to April 1996*	Level	0.85	(+)	0.00	(-)	0.91	(+)	0.43	(+)
		Change	0.75	(-)	0.00	(-)	0.80	(-)	0.34	(+)

We also report results for regressions of changes as a simple means of accommodating possible but, as Table D shows, unlikely non-stationarity.

The results offer little support for the existence of downward nominal rigidities. We can accept the zero restriction on lagged variables of mean inflation at the 10% level for most measures of price change. The sole exception is one-month inflation, where we find evidence of two-way causality between mean and skewness, and mean and kurtosis of component inflation rates. Since the sign of the sum of coefficients is typically positive for this measure of price change, we take this as evidence of general price stickiness during a one-month period—potentially supporting of Ball and Mankiw (1995)—rather than evidence of downward nominal rigidities.

There is generally much stronger support for Granger causality from skewness of component inflation rates to mean inflation than *vice versa*: lagged values of skewness are significant at the 10% level in regressions of most variant measures of mean inflation on lagged values of itself and lagged values of skewness. This again suggests that Ball and Mankiw's model, where skewed shocks to relative prices lead to inflation because actual prices only adjust to large shocks, is plausible for the United Kingdom.

Table E also reveals an interesting difference between the results for our sub-samples. There is strong evidence that skewness Granger-causes mean inflation in periods when inflation is low, but no evidence of any causality in the high-inflation period. This is consistent with the menu-cost model that underlies Ball and Mankiw (1995). In their model, the frequency at which prices change—and thus the length of time during which a skewed shock to relative prices can affect inflation—will depend on the rate of inflation itself. But it is also possible that this shows that our techniques are not sophisticated enough to disentangle causality running from skewness to inflation from that running from inflation to skewness. If this is the case, then it is not inconceivable that the low-inflation experiment is showing some evidence of a downward nominal rigidity at work.

It is also noticeable that aggregation reduces the probability of Granger causality in either direction between mean and skewness, and mean and kurtosis. As pointed out above, aggregation of our data tends to dampen the skewness of component price changes. This finding perhaps indicates that our use of official price indices rather than individual price data may be obscuring the impact of downward nominal rigidities to some extent. Our experiments with one and twelve-month inflation rates are less conclusive. Over one month there is some evidence of general price stickiness, but there is no indication of inherent downward nominal rigidities in pricing setting behaviour. And contrary to Bryan and Cecchetti (1996), there is no sign of a small-sample bias towards a positive number in the mean-skewness correlation.

Producer price inflation

If we cannot find downward nominal rigidities in retail markets, can we find them in the markets for intermediate goods? There are a number of reasons why we might expect nominal rigidities to be more likely in intermediate product markets. First, quality uncertainty—one of the possible sources of downward nominal rigidity discussed in Section 2—might be less of a problem further back up the supply chain. Other things being equal, goods become more homogenous further up the supply chain. Arguably, a greater proportion of raw material purchases are acquired repeatedly. Companies tend to have individuals who specialise in search and become experts in assessing the products they buy. In contrast, retail consumers are arguably generalists across the whole basket of goods. Another consideration is that the potential for strategic interaction—another possible source of downward nominal rigidity discussed earlier—varies across the supply chain, although we have no priors as to how.

Our baseline data for producer price inflation covers 127 sub-components of the index during the period January 1980 to March 1995. Chart 8 shows time series for the mean inflation rate, and for the standard deviation and skewness of component price changes. Summary correlation coefficients (Table F) again suggest a strong positive relationship between mean inflation and the standard deviation of component price changes. Although there is a weak negative relationship between mean inflation and the skewness of component inflation rates for our baseline measure, the relationship is positive for twelve-month unweighted and one-month inflation rates. Our results for the relationship between mean and kurtosis support the existence of downward nominal rigidities more strongly.

Chart 8
Moments of twelve-month weighted PPI

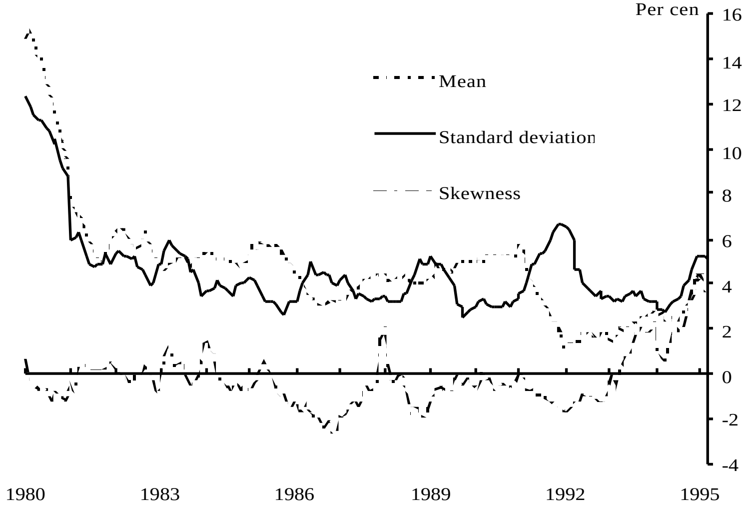


Table F
Correlation coefficients for moments of PPI

Experiment		**Mean and skewness**	**Mean and standard deviation**	**Mean and kurtosis**
12-month weighted	*Level*	-0.02	0.76	-0.07
	Change	*0.21*	*0.16*	*0.08*
12-month unweighted	*Level*	0.10	0.76	-0.98
	Change	*0.17*	*0.29*	*0.02*
1-month weighted	*Level*	0.30	0.63	-0.15
	Change	*0.11*	*0.50*	*-0.23*

But regression results (Table G) provide little evidence to support Granger causality from either mean to skew or mean to kurtosis. To begin with, Table D showed that mean PPI inflation was I(0) during our sample period, but skewness seemed to be I(1): this makes any relationship between the two of the sort caused by downward nominal rigidities unlikely. We looked at Granger-causality results anyway, invoking the assumption that it was perhaps just the small sample that makes the mean and skewness of PPI inflation appear to be of different orders of integration. What we see is that only in the case of one-month inflation is there evidence of causality. But as was the case for one-month retail price inflation, we find that the causality is bi-directional. If this is evidence of anything at all, bearing in mind the time series properties of the data, then we take it as an indication of general price stickiness during this time period, rather than a sign of downward nominal rigidities.

Table G
Granger-causality results for PPI

Dependent variable Independent variable *Experiment*		Skewness mean		Mean skewness		Kurtosis mean		Mean kurtosis	
12-month weighted	**Level**	0.91	(+)	0.66	(-)	0.59	(+)	0.92	(+)
	Change	*0.87*	*(-)*	*0.71*	*(+)*	*0.71*	*(-)*	*0.89*	*(+)*
12-month unweighted	**Level**	0.70	(-)	0.87	(+)	0.49	(+)	0.95	(+)
	Change	*0.66*	*(-)*	*0.59*	*(+)*	*0.88*	*(-)*	*0.82*	*(+)*
1-month weighted	**Level**	0.04	(+)	0.03	(+)	0.32	(+)	0.10	(+)
	Change	*0.27*	*(-)*	*0.38*	*(+)*	*0.07*	*(+)*	*0.38*	*(+)*

5 Conclusions

Our investigation offers scant support for the notion that there are downward nominal rigidities in consumer prices or in producer prices.

Our findings may be consistent with theories of price stickiness more generally. Bi-variate tests show some positive causality from skewness to inflation, which supports the work of Ball and Mankiw (1995), who suggested that skewness of shocks to desired prices might contribute to mean inflation in the presence of menu costs of making small price adjustments. But we would be wary of putting too much weight on this finding, since these regressions omit many variables commonly thought to be part of the inflationary process in the short and the long run. Bryan and Cecchetti (1996) also caution against making inferences about this menu-cost model, which they show are subject to small-sample biases. There are also other caveats to bear in mind: the fact that ideally we would have liked to use data on individual goods prices; that the correlations vary from high to low-inflation regimes; that our tests may not be able to disentangle two-way causality between the moments of inflation. It is therefore conceivable that there is downward nominal rigidity, but that we have simply not detected it.

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