

Micro Foundations of Macroeconomic Price Adjustment: Survey Evidence from Swedish Firms^{*}

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Abstract

This paper reports the results from a survey on price-setting behavior of a large random sample of Swedish firms. The median firm adjusts the price once a year. State-dependent and time-dependent price setting are about equally important. The paper sums up the evidence from this and two similar large-scale surveys on UK and US data. The four highest ranked explanations for price rigidity in this study (implicit contracts, sluggish costs, explicit contracts and kinked demand curve) have close correspondents among the top-five places in both the other studies as well. The results point to the importance of long-term relations to customers as a basis for rigid prices (the estimated share of sales that go to regular customers is more than 80 percent).

Keywords: Nominal rigidity; Price-rigidity; Price-setting; Real rigidity; Time-dependent pricing; State-dependent pricing.

JEL classification: D40; E30; L11.

^{*} We thank Alan Blinder, Anthony Yates, Jonas Agell, Bengt Assarsson, Nils Gottfries, the editor Paul Evans, two anonymous referees and seminar participants at the Stockholm School of Economics and Sveriges Riksbank for valuable comments. A special thanks to Anders Vredin for encouraging the project and to the survey participants, without whom this paper could not exist. Financial support from Sveriges Riksbank and Jan Wallanders and Tom Hedelius Foundation is gratefully acknowledged. Part of this research was conducted when Friberg visited the economics department at Princeton, which he thanks for its hospitality. The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Executive Board of Sveriges Riksbank.

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1. Introduction

The response of prices to monetary and other shocks plays a crucial role for how these shocks impact the macroeconomy. The micro evidence on price adjustment that can be used to guide our thinking on how prices adjust is however remarkably limited (see Taylor 1999 for an overview). A few studies examine price setting by a single firm or in a single market (for instance cover prices of magazines in Cecchetti 1986; prices in mail-order catalogs in Kashyap 1995; gasoline retail prices in Asplund et al 2000; orange juice in Levy et al 2002). These studies typically find that prices are rigid and that fixed costs of adjusting prices are a workable description of price adjustment, but they also document a number of inconsistencies with fixed adjustment costs. A somewhat broader data set is found in Carlton (1986), where prices of industrial commodities are examined, with similar findings. The small number of micro studies makes them a rather weak foundation for macroeconomic modeling. It is an ingenious idea to gather data by examining posted prices in mail order catalogs or on magazine covers, but can we trust that results from these consumer markets extend to other markets?

Partly as a reaction to this, an alternative empirical approach has been adopted in Blinder, Canetti, Lebow, and Rudd (1998) (hereafter BCLR) on US data (in part reported in Blinder 1991, 1994). The idea is to ask firms direct questions, expressed in laymen's language, on how they reason and act when they set their prices.¹ An important aspect of the methodology is that the questions are put to a random sample that is designed to be representative of GDP. A similar set of questions have since been put to a large number of UK firms by Hall, Walsh, and Yates (2000) (hereafter HWY), although the sample was non-random.

In this paper we investigate the price-setting behavior of Swedish firms based on more than 600 questionnaire responses from a random sample, designed to be representative of Swedish price-setting behavior. As discussed by BCLR, the approach taken – to try to convey complex theories to practitioners and ask about their importance – is controversial. Responses might be very sensitive to for instance the wording of questions, order in which they appear and the setting in which the questions were answered.² Even positive reviewers of the BCLR book,

¹ A number of older antecedents exist, typically using smaller non-random samples; see BCLR and HWY for references. A Swedish antecedent is Assarsson (1989) who interviewed 48 manufacturing companies. A parallel literature uses similar methods to investigate reasons for wage rigidities and other aspects of the labor market; see for instance Campbell and Kamlani (1997).

² It should be noted that research based on surveys is common in other social sciences and there exists a large body of knowledge on how to ask and interpret questions; see for instance Weisberg et al (1996).

such as Ball (1999), remain cautious in their trust of the results regarding the more complex questions that ask firms to evaluate various propositions with regard to how they act and think when changing prices. Indeed such caution is well founded and the motive for BCLR to use structured surveys based on a random sample was to allow for statistical testing and replication. As they note (p. 47): “The ability to replicate research findings is the essence of scientific inquiry; it is how you distinguish a fluke from a fact”. Will additional questionnaires using the same approach but with different wording, different samples and under different circumstances produce similar results? If so our confidence in the results should strengthen. Indeed that seems to be the case. The picture painted by our study is in many ways very similar to that of BCLR and HWY. All three studies suggest that prices are quite rigid. In this study the median firm adjusts the price once a year. The four explanations for price rigidity that are ranked highest by the respondents in our study (implicit contracts, sluggish costs, explicit contracts and kinked demand curve) are found among the top-five places in terms of importance in both the other studies as well.³

While we see the present paper’s perhaps main contribution as supporting the methodology and results in BCLR, there are also a number of important differences. Since the survey underlying BCLR was conducted in 1990-92 there is scope for updating the list of theories and issues that we ask about.⁴ For instance, we ask about theories on price adjustment that are based on capital market imperfections. These theories have received considerable theoretical attention and our respondents do indeed assign them a relatively important role. Our list of theories is mainly based on the presentation in one of the leading graduate textbooks, Romer (1996). While previous studies chose not to include questions about theories that in any way implied that firms were colluding (notably the theory of the kinked demand curve and implicit collusion in repeated games à la Rotemberg and Saloner 1986) we decided to ask about these theories, since they have received so much theoretical attention.

A few words about the macroeconomic setting are appropriate before proceeding. After going through a severe recession in the early 1990s, Sweden, at the time of the survey (spring 2000) had an essentially stable economic environment with GDP growth of 3.6 percent, a

³ The wording of questions differ between studies. What we call sluggish costs is represented by two questions in the previous two studies and they ask about coordination failure rather than the closely related notion of the kinked demand curve.

⁴ HWY test the same set of theories as do BCLR.

budget surplus of 4.1 percent of GDP, inflation of 1.4 percent and an open unemployment rate of 4.7 percent (all figures are averages for 2000). Monetary policy was conducted under a floating exchange rate and with a 2 percent inflation target.

The plan of the paper is as follows. In Section 2, the survey is presented briefly. Section 3 then addresses the questions of how rigid prices are and when they change. Section 4 reports results on the different theories of price rigidity and examines the cyclical variability of markups and the reasons for changing the price. The study ends with a discussion of what we believe to be fruitful directions for future research.

2. Survey design and some background characteristics

The population from which our sample was drawn consists of all Swedish firms with more than 5 employees and only excludes the sectors where price setting is fully decided by political means and sectors whose products do not have a price.⁵ A questionnaire was sent by mail to the 1285 firms that had been sampled. The survey was conducted by Statistics Sweden (the national bureau of statistics) and accompanied by a cover letter signed by the governor of the Swedish central bank (Sveriges Riksbank), both of which may have contributed to the relatively high response rate of 48.7 percent.⁶ To make sure that our sample included large firms, and to be able to compare behavior across groups, the population was stratified according to size and whether the firm was in the manufacturing or the service industry.

Given that the sample was stratified we weigh results to calculate estimates of the population mean. To estimate the behavior of the average firm we weigh the stratum means with the share of the stratum in the total population (in terms of the number of firms). Furthermore, the pricing decisions of very large firms are more important for the economy than are those of a local supermarket. In addition we therefore multiply each response with the turnover from domestic sales for the respective firm to weigh the results (see the Appendix for further details on how the survey was conducted and how the weighing is performed). We focus on the turnover weighted

⁵ Firms with fewer employees are not considered since a large number of these companies exist mainly because of tax reasons and do not run any specific business. Examples of excluded companies are residents' associations, public service and defense, social services, education and health (in contrast to practices in some other countries, these are publicly funded in Sweden).

⁶ As shown in the Appendix, the response rate was lower for smaller firms as well as for service-producing firms. The fact that the sample mean is constructed by weighing stratum means with the shares of the stratum in the total population avoids possible selection problems due to underrepresentation of small and service-producing firms,

results when analyzing the answers to the questions. These results should give a fairly accurate view of the importance of firms' price-setting policies for the Swedish price level.

Several questions asked respondents to indicate how important various considerations were when, for instance, deciding whether to adjust the price. The alternatives were "very important", "moderately important", "of minor importance" and "totally unimportant".⁷ These are converted into a numerical scale where 4 corresponds to "very important" and 1 to "totally unimportant". The mean rank that we report in the paper is the weighted average of these 4 alternatives.

When asking about prices we have to deal with the fact that most firms sell many types of products, at home and abroad, with and without rebates and with different service content. In close correspondence with BCLR and HWY we ask firms to have the actual Swedish transactions price of their main product to their main type of customer in mind when answering the questions. The alternative of asking about several different products was likely to reduce the response rate considerably and asking about some average price level for the firm's products would cloud the picture with respect to the qualitative nature of the price-setting decision. Nevertheless, we were concerned with how well the pattern for the main products corresponded to the price-setting patterns for other products. We therefore included a final question of whether the firm judges the answers to be representative also of its other products. 90.2 percent of the firms either agreed to this or reported that they sell only one product.⁸ Some further issues on data quality are discussed in the Appendix. On the whole, the answers appear thoughtful, internally consistent and correct.

Before turning to the main focus of the study – how firms set their prices – it is worth reporting the results of some background questions. Table 1 presents an overview of the

provided that the respondents are representative within each stratum. Unfortunately, we have not been able to investigate this latter assumption.

⁷ Relatedly, some questions asked respondents to indicate the extent to which they agree with a given statement (regarding for instance reasons for not adjusting price). The alternatives were "agree totally", "agree to some extent", "agree only to a small extent" and "do not agree at all"

⁸ Care must be taken, however, when drawing conclusions about, for example, the rigidity of the aggregate price level merely on the basis of questions about the price setting of firms' main product. As indicated by the result on the question about synchronization of price reviews within firms (reported in Section 3), a fairly large number of firms report that they review only one price at the time. This suggests that price changes of a given firm are spread over time. This in turn indicates that although the price of the main product tends to be quite rigid, successive price changes of firms' other products will make the aggregate price level less so.

distribution of sales by type of customer, the firm's relation to the customers, and its competitive situation.

Table 1 about here

The estimated average proportion in the population of sales that are made to regular customers – those with which the firm expects to do business again – is 86.2 percent. It is hard to exaggerate how large this proportion is; the turnover weighted proportion of sales going to regular customers is 60 percent at the 10th percentile, 90 percent at the median and 100 percent at the 90th percentile. The typical customer is another firm; the average share of sales that goes to other companies is 67.7 percent, and a further 9.6 percent of sales are directed at other companies within the same concern or group. The average share of sales that were directed at households was only 13.7 percent. This is similar to the findings of BCLR where 20.8 percent of sales were directed at consumers and 70.4 percent at business. The turnover weighted estimate of the proportion of firms which perceive that they have no competitors within their main line of business is 4.3 percent, while the proportion that claim to have 12 competitors or more is 27.5 percent. This leaves some two thirds of firms with 1-11 competitors, that is to say, in markets that we typically think of as oligopolistic.

To sum up, while standard theory focuses on an arms-length one-time sale by a manufacturer to consumers under the assumption of monopolistic competition, the results here indicate that the typical transaction is between two firms who expect to do business again in an oligopolistic market. Before proceeding, it is worth emphasizing that an overwhelming majority of the firms report that they indeed have the possibility of setting prices: 90.6 percent of respondents answered that "the company can set the price itself" rather than picking the alternative "the price is set by a parent company/group or otherwise outside of our company".

3. When do prices change?

How often do prices change?

We asked the firms "How many times a year does the price of your main article/service change?". The estimated turnover weighted proportion of firms in the population that adjust the price of their main product once per year was 40.3 percent, and an additional 27.1 percent adjust prices

less than once per year. This well in line with previous micro studies of price rigidities – indeed, in his summary of findings on price adjustment Taylor (1999) notes that prices change on average once a year. Compared to the survey studies by BCLR and HWY the price changes somewhat less frequently. In BCLR about half of firms changed prices once per year or more seldom whereas the corresponding number in our study is close to 70 percent. In HWY the median firm changed price two times in the year preceding their study (conducted in September 1995). One reason for the somewhat divergent results is that we expect the frequency of price changes to be correlated with inflation, which was below 1.5 percent at the time of our study, whereas it was around four percent at the time of the studies of both BCLR and HWY.

A further reason for the somewhat divergent results may be that large firms, which tend to adjust prices more frequently, are over-represented in the sample of HWY.⁹ We have experimented with regressions that examine how the number of price changes relate to market structure variables. For instance, running an ordinary least squares regression of *NP* (a measure of the number of price changes per year) on *LARGE* (dummy variable equal to 1 if the firm has more than 200 employees), *MANUF* (dummy variable equal to 1 if the firm is in manufacturing sector), *VARIA* (dummy variable equal to 1 if the firm estimates that more than 50 percent of costs are variable), *REGUL* (the reported share of customers that the firms classified as regular customers), *HOUSE* (the reported share of customers that are households) and *HCONC* (dummy variable equal to 1 if the firm reported to have 3 competitors or fewer) yields (with t-statistics in parentheses):

$$\begin{aligned}
 NP = & \quad 4.28 & +0.54*LARGE & -0.46*MANUF & +0.29*VARIA & +0.002*HOUSE \\
 & (7.50) & (2.87) & (2.38) & (1.58) & (0.51) \\
 & & -0.015*REGUL & -0.73*HCONC & +\text{error term.} \\
 & & (2.31) & (3.21) & \\
 & \text{Nobs= 613} & & \text{Adj. R}^2=0.05 & & (1)
 \end{aligned}$$

Firms tend to adjust their prices more frequently if they are large, are not in manufacturing, have a large share of variable costs, have relatively few regular customers and operate in markets with

⁹ BCLR also study larger firms; their sample excluded firms with less than USD 10 million in sales.

more than just a couple of competitors. The share of sales to households seems virtually unrelated to the number of price changes.

We have examined many of the questions to see if we could relate the responses to observable structural variables such as those used in equation (1). In general, the explanatory power of such regressions relating conduct to structure is low. This should come as no surprise; rather it is typical of cross-sectional studies on industry data (see for instance Bresnahan 1989 and Schmalensee 1989 for discussions). The reason is that markets differ along so many lines, for instance with regard to the cost structure, the nature of the strategic interaction and shape of demand curves, that we should not expect to find stable relations between a few variables such as the number of competitors and the extent of price rigidity in cross-sectional data. Some of the structural effects seen in regression (1) seem relatively robust however, in particular that large firms adjust more frequently (found in BCLR and HWY) and that firms in more concentrated markets adjust more seldom (found for instance in Carlton 1986). Explanatory power in regressions, such as the above, can be raised by adding variables that capture firm conduct or beliefs (for instance use of written contracts, or how highly different explanations of price rigidities are rated) it then becomes difficult to view these additional explanatory variables as exogenous. In any case the motivation for this work is to understand the prevalence of different types of behavior and we predominantly focus on the aggregate picture that emerges.

Price reviewing: Time versus state-dependent pricing rules

The stability of prices indicates that there are costs associated with changing them. The two main approaches to model price adjustment when it is costly to change prices, time-dependent and state-dependent price setting, have different implications for *when* prices adjust. A firm is said to follow a *time-dependent rule* if it changes its price at certain time intervals. These intervals may be fixed as in the original staggered contract model developed by Taylor (1980) or, in order to simplify the mathematics, stochastic as in Calvo (1983). On the other hand, under a *state-dependent rule*, the price is adjusted when the deviation between the current price and the optimal price has become large enough to make the gain in profit from adjusting price outweigh the cost

of adjustment.¹⁰ Thus, a fundamental difference between the two types of rules is that when events motivate a price change, a state-dependent rule predicts an immediate response, provided the shock is sufficiently large, whereas under a time-dependent rule firms will wait until the "time has come".

While models based on time-dependent pricing rules tend to be fairly tractable and generate well-behaved dynamic adjustment paths of the price level to innovations in nominal money, the impact in models based on state-dependent pricing is in general more complex and allows for a wide range of outcomes. The extreme case being the neutrality result of Caplin and Spulber (1987), where a small number of firms making large adjustments leads to money being completely neutral.

Also under a time-dependent rule the price will change only if this is indeed motivated by changed economic conditions (a price change will always occur on an exogenous date, but not necessarily on *all* such dates). Thus, the relevant question in the survey concerns the reviewing of prices rather than actual changes and the results are reported in Table 2.

Table 2 about here

The estimated turnover weighted proportion of firms that reviewed prices at specific intervals was 23.1 percent and a further 21.7 percent reviewed mainly at specific intervals. We interpret this as 44.8 of the firms following a time-dependent rule under normal conditions. An estimated 47.2 percent followed state-dependent reviewing under normal conditions.¹¹ Finally note that including the firms that mainly review at specific time intervals but also in response to particular events gives a total of 68.9 percent that follow a state-dependent rule if sufficiently significant events occur. The result that firms will deviate from time-dependent pricing when shocks are sufficiently large is intuitively reasonable, but has, to our knowledge, not been documented before.¹²

¹⁰ The seminal paper is Barro (1972). Later examples of studies that model state-dependent pricing are Sheshinski and Weiss (1983) and Caplin and Leahy (1997).

¹¹ The estimated turnover weighted proportion of firms that reviewed prices at least daily was 19 percent and a further 28.2 percent reviewed in connection with special events. Clearly, 44.8 and 47.2 do not add up to 100, the remainder of firms specified "other" in response to this question.

¹² In HWY, 10 percent of the companies said that they did a mixture of time- and state-dependent pricing. However, in BCLR and HWY, the questions on time- and state-dependent pricing are not framed in a way that allows for a change of price-setting rule in the case of significant events. HWY note, however, that it is hard to believe that time-dependent price-setters "would not review or change prices in response to an event, if that event was associated with a dramatic enough change in the state or the environment." (p. 432, footnote 12).

Our results thus point to a more important role of state-dependent pricing than previous survey studies at first suggest; in BCLR and HWY 60 percent and 79 percent, respectively, report that they use time-dependent rules. One could speculate that Sweden's low-inflation environment at the time of the survey, with little need for recurrent inflation-driven nominal price adjustments, helps explain this pattern. Further, BCLR (p. 90) note that, for several of the firms that responded following time-dependent rules, answers on other questions indicate that they actually follow state-dependent rules: "the fraction with meaningful periodic price reviews declines to about 40 percent of the total". Lastly, HWY's question asked whether prices were reviewed at a specific frequency or in response to particular events. The firms that review daily (19 percent in our study) would then have been likely to answer "at specific intervals" and contribute to raising the proportion who follow time-dependent reviewing relative to our results.

We also examined if the decision to follow state- or time-dependent price setting could be explained by market structure, using the same explanatory variables as in Equation (1). Being in the manufacturing sector, having a greater share of customers that are households and a greater share of regular customers are all associated with a statistically significant higher probability of using time-dependent price setting. Being in a tight oligopoly is associated with a statistically significant lower probability of using time-dependent pricing. When strategic interaction is important it is not surprising that firms want to be prepared to change prices as soon as competitors take some actions. Again, predictive power of the regressions is low (pseudo R^2 is 0.05), as is really to be expected from the empirical literature on industrial organization.

Synchronization of price reviews

For the firms that use time-dependent price reviewing, a yearly interval is the most frequently used with a turnover weighted proportion of 65.9 percent as also seen in Table 2. The second most chosen frequency is quarterly price reviews, which is indicated by 15.3 percent of the turnover weighted observations. Given the prevalence of yearly price reviews their specific timing is of interest: do most firms review prices in a certain month or are price reviews evenly spread across the year? There turns out to be a considerable bunching of the price reviews over the year; 44 percent of the firms that specified a month reviewed prices in January or December. The timing of reviews may partly be driven by that new government regulations and taxes often

take effect on January 1. 16 and 11 percent reviewed in October and November, respectively, with the rest of the months receiving more or less equal shares, except July that no one specified. While there is thus considerable synchronization among the firms that use yearly price reviewing, it should be kept in mind that the importance of synchronization is tempered by the fact that many firms use state-dependent price setting or review quarterly. Nevertheless, the stated concentration of price reviews to the turn of the year is consistent with the observed monthly changes in the consumer price index, the mean (1980-2001) absolute change in the consumer price index in January was 1.25 percent, compared to 0.52 in an average month.

Synchronization within firms

Results regarding synchronization within firms point to a bimodal distribution. The turnover weighted proportion of firms that review one price at a time is 41.4 percent while 38.3 percent review the prices of all their products, or most of their products, at the same time. So a large extent of synchronization and no synchronization are about equally prevalent. The proportion of firms that reviewed most prices at the same time was much larger among smaller firms. This fits well with the findings of Lach and Tsiddon (1996), who in their study of price changes in grocery stores find high synchronization within firms.

Why was this time interval chosen for price reviews?

We also asked the firms who followed a time-dependent rule to rank various explanations for the chosen time interval of reviews. The results are reported in Table 3.¹³

Table 3 about here

A two-sided t-test rejects that explanations have the same mean rank at the one percent level of significance. Fear of disturbing customer relations and low frequency of shocks were clearly the most important reasons for the chosen time intervals. These findings are consistent with the ranking of different theories of price rigidities that we now turn to.

¹³ Note that the number of observations differs between questions, because the number of firms answering “not applicable/do not know” or abstaining from marking an answer differ. In general the questions that received lower scores also had a somewhat higher share of firms answering “not applicable/do not know” or abstaining. In Table 2

4. Theories of price rigidity

The survey contains a section where the respondents are confronted with different theories on price rigidity and asked how well these theories describe the situation in their firm. Of course, conveying central aspects of theories by translating them into short non-technical statements is difficult. Nevertheless, as argued at length by BCLR, if a particular theory for rigid prices is important, we expect price setters to recognize the chain of reasoning associated with that theory.

Early criticism of (fixed) costs of nominal price adjustment as a reason for price rigidity noted that these adjustment costs often needed to be implausibly large to motivate rigid prices. The new Keynesian economics of the 1980s taught us that menu costs may be relatively small to individual price setters, yet may cumulate to have large macro effects (see Mankiw, 1985). More generally, menu costs do not need to be large for the price to be unchanged even in the face of relatively large monetary shocks if firms have little incentive to adjust their prices when aggregate output changes. Following the presentation in Romer (1996), one may think of a firm that is deciding whether to change its price in the face of a fall in aggregate demand with prices of other firms held fixed. The fall in demand means that the profit function, which is a function of the (relative) price, shifts down. Unless the profit function shifts in a perfectly parallel fashion a new price will be optimal. The closer the new optimal price is to the old one, the smaller are the incentives for the firm to change its price. The responsiveness of the profit-maximizing price to changes in aggregate demand is often referred to as the degree of real rigidity. The firm's incentive to adjust its price also depends upon the curvature of the profit function. If the profit function is relatively flat, moving to the new optimum makes little difference in terms of profits. A prime candidate for making the profit function relatively flat around the optimum is that costs are stable around the optimum.

On a general level we were interested in whether costs of adjusting the nominal price or low incentives to adjust the price were seen as the main reason for not changing prices. We therefore asked "Assume that you notice that there has been a slight increase in demand for your main article/service. What is normally the strongest argument for leaving the price unchanged?". The respondents were given the following alternatives: i) it is too costly to change

the number of observations should be set in relation to the total number of potential respondents for this question, the

the price (re-labelling, new price lists, etc.) ii) it is important not to diverge from the prices of competitors, and iii) it is better to leave the price unchanged as long as the costs do not change. An overwhelming majority chose one of the latter two alternatives, with more or less equal shares given to each of these explanations. In fact, the turnover weighted estimate of the proportion that considered actual costs of changing prices to be the most important factor was 0.2 percent! Thus, perhaps not very surprisingly, costs of nominal price adjustment do not in themselves appear to be a main reason for leaving prices unchanged. Note though that even though menu costs are judged relatively unimportant in the price change decision they may be non-trivial, as indeed found in a study of supermarket pricing by Dutta et al (1997).¹⁴

We now turn to the detailed run-through of the different theories. The respondents were asked to rank how important each of the statements meant to capture the different theories are in explaining why prices might be sluggish. The average, turnover weighted results are reported in Table 4.

Table 4 about here

The dashed lines indicate that a two-sided t-test rejects the hypotheses that the explanations immediately above and below the line have the same mean rank at the 5 percent level of significance. In the table, we have also made an attempt to classify the different theories as reflecting either *costs* of adjusting the nominal price (nominal rigidity) or *low incentives* to adjust the relative price (here for short referred to as real rigidity).

According to the theory of *implicit contracts*, transaction costs induce firms and customers to enter into implicit agreements that stabilize prices when demand fluctuates. This idea is closely related to work by Okun (1981) on what he called “the invisible handshake”, which, in turn was based on work aimed at explaining wage rigidity.¹⁵ Even though Okun appears to have intended the implicit contract theory to apply to nominal rather than real prices, this is by

352 firms that followed a time-dependent price setting rule.

¹⁴ We also asked questions aimed at uncovering the nature of adjustment costs - whether firms mainly see them as fixed in the size of the price change, increasing in the size of the price change (as in Rotemberg, 1982) or a combination of the two (as in Slade, 1998). Fixed adjustment costs were seen as the most important (90.5 percent of the ones who answered) but the question appears to have been conceptually hard and a full 43.7 percent answered "do not know/not relevant". Similarly a question on whether the fixed costs varied over time (as in Caballero and Engel, 1993) appears to have been hard (15.3 percent answered "do not know/not relevant"). 49 percent answered that adjustment costs were stable over time and a further 30.7 that they varied but too little to influence the pricing decision.

¹⁵ See for instance Azariadis (1975).

no means obvious.¹⁶ Typically, customers are assumed to care about real, or relative, prices and not nominal ones. However, in our survey we asked if a price change risks damaging the relation to customers, *even if competing companies also change their price*. This addition was made primarily as a way of separating this motive for price stickiness from the theory of the kinked demand curve where a price increase results in a substantial loss of sales due to a higher relative price. Thus, firms appear to believe that customers appreciate that the nominal price is stable and that they may be discontented even if the price relative to that of competitors are unchanged. One reason why this version of implicit contracts still may not be accurately regarded as a nominal stickiness is that even if the relative price with respect to the closest competing firms does not change, the price relative to other products and services may. In Table 4 we therefore report the theory in both columns. The fact that fear of disturbing customer relationships is an important consideration when setting prices is not surprising given the large share of customers that are regular. The mean turnover weighted score given to the implicit contract theory is 3.06 for the firms with at least 90 percent sales to regular customers, whereas the mean score is 1.94 for the firms with less than 10 percent of their sales to regular customers.

The theory that we have chosen to call *sluggish costs* is represented by the statement “the costs of the firm’s inputs do not vary much over the business cycle which imply that the price of the firm’s output does not change much either”. Thus, it embodies two hypotheses: that the costs of inputs is an important determinant of the firm’s price-setting decision and that these costs do not fluctuate much with changes in aggregate demand. In one way this is no explanation to price stickiness; it basically argues that some prices are stable because other prices – those of inputs – are. Nevertheless, it suggests that input-output linkages among firms along a multi-stage production process may play an important role in explaining aggregate price rigidity.¹⁷

The third highest score is given to renegotiation costs of *explicit contracts*, which clearly can be regarded as a nominal rigidity. Of course, explicit contracts explain nominal price stickiness in a trivial way and beg the question why such contracts are used in the first place. In a set of background questions we further investigated the use of explicit contracts. We asked "Approximately how large a part of the sales of your main article/service are through contracts

¹⁶ See BCLR (p. 150).

¹⁷ This idea is explored in, e.g. Basu (1995).

signed in advance that specify e.g. a particular quantity and/or particular sales price for a specific period of time?" The use of written contracts appears widely spread, the estimated turnover weighted proportion of firms that have at least three quarters of their sales specified through written contracts is 48.2 percent. Of the firms that do use written contracts 65.5 percent use contracts that specify both price and quantity and a further 32.1 percent use contracts that only specify price. Most firms respond that their typical contract is valid for a maximum of one year - the turnover weighted proportion that is valid half a year or less is 36.2 percent and a further 46.0 percent are valid 7-12 months. Only some 2 percent of firms responded that a contract covered two years or more. Also note that even though the common use of contracts appears to be an important source of price rigidity it need not imply that prices are unchanged during the contract period; 29.5 percent of firms (turnover weighted proportion) responded that the price specified in a contract was typically indexed to inflation or to some cost index. Finally, it should be stressed that an important proportion of firms make little use of written contracts, 18.7 percent do not sell through written contracts at all and a further 16.8 percent have only 1-25 percent of their sales through written contracts.

Among the theories that more explicitly involve interactions between competitors, the *kinked demand curve* gets the highest score. The argument is that the firm assumes the worst when considering which price to set. If it raises its price, it expects that other firms will not follow suit and that it hence will lose market shares. If, on the other hand, it cuts its price, it assumes that competitors will promptly do the same. Even substantial changes in marginal costs may then not induce a change in price. A suggested explanation to the kinked demand curve is imperfect information among customers that make existing customers more responsive to price increases than prospective new customers to price decreases; see, for example, Stiglitz (1979) and Woglom (1982).

The fifth highest rank is given to *countercyclical cost of finance*. The idea is that capital market imperfections make the cost of finance higher in recessions, when firms' cash flow and credit worthiness are lower; see, for example, Kiyotaki and Moore (1997). This contributes to keeping marginal costs, and thereby prices, up in a downturn. The relatively high score given to this explanation may partly be explained by the credit crunch that Sweden experienced in the early 1990s, which is still likely to be a fresh memory.

A closely related reason for the firm to keep prices high when demand is low may be *liquidity constraints*. This theory combines the assumption that the stock of customers that a firm has responds only gradually to price changes, with an assumption that capital market imperfections create liquidity constraints. A reduced cash flow during a recession may cause a firm to keep its price up, sacrificing future customer stock because liquidity constraints make today's revenue extra valuable; see, for instance, Gottfries (1991) or Chevalier and Scharfstein (1996).

Pricing thresholds is a theory based on consumer psychology. Retailers often price at, for example, SEK 49.95 instead of SEK 50. Apparently, they assume that the product they offer will sell considerably better to a price marginally lower than some specific, presumably psychologically significant, figure. Hence, they may be reluctant to change the price, even in the face of an increase in demand. While hard to reconcile with the standard versions of rational consumer behavior, the explanation nevertheless appears to carry some weight as an explanation of price rigidities.

The theory we have called *shifting customer clientele* suggests that the elasticity of demand is procyclical because the composition of customers differs over the business cycle; see, for example, Bills (1989). The assertion in the questionnaire is based on a model in which firms have both loyal customers with low price elasticities and occasional customers with higher price elasticities. The loyal customers tend to stay put even during a cyclical contraction, which implies that the price is kept relatively high.

The theory called *deviation from implicit collusion* suggests that it is more tempting to defect from a collusive agreement when demand is relatively high - in consequence markups have to be kept lower in booms to maintain sufficient incentives for implicit collusion; see, for instance, Rotemberg and Saloner (1986) and Rotemberg and Woodford (1991, 1992). Of course, it may be problematic to ask firms straightforward questions related to collusion, even though implicit collusion in itself is not illegal.¹⁸ In the questionnaire we hence used the formulation "Price wars are more common when demand in the economy is high, which contributes to keeping the price down during a boom", which we believed to be fairly uncontroversial.

Price stickiness may also emanate from so-called *thick-market effects*, both on the demand side and the supply side. On the *demand side*, the idea is that consumers tend to increase

¹⁸ This was also the reason why BCLR and HWY did not ask about this theory.

their search activity when they shop more intensively, that is, during periods of high economic activity; see Warner and Barsky (1995). A reason may be that there are economies of scope in search. As a result, the elasticity of demand is greater in peak period, which tends to keep prices down. On the *supply side*, it is assumed that when economic activity is high, it is easier for the firm to sell its products and to find suitable subcontractors. This tends to keep costs, and hence prices, down in booms.¹⁹

Low scores are given to two menu-costs theories of the more traditional type. *Physical menu costs*, such as printing of new price lists and notifying retailers, gets a mean score between "totally unimportant" and "of minor importance". An often suggested alternative, *information-gathering costs* (see, e.g., Ball and Mankiw 1994), scores even lower.

Throughout we have seen that there is a high correlation between our findings and the results of BCLR and HWY for US and UK data, respectively. The last two columns of Table 4 report the ranking of theories in these two studies. The precise wording aiming to capture different theories differ somewhat as do the set of theories tested.²⁰ Interestingly, however, the four most highly ranked theories in our study are found within the top five places in the other studies as well, given our interpretation of how their theories are related to the ones we are presenting (notes to Table 4 explain the differences). Implicit and explicit contracts, sluggish costs and the kinked demand curve are the explanations for rigid prices that firms judge to be the most important.

Thus, the studies paint a very similar picture. The risk of disturbing customer relations by changing the price is a central source of price rigidity. In addition, interaction with competitors matters in that a single firm appears to be reluctant to raise its price ahead of other firms. Explicit contracts fixing the price for a certain period are an important reason for nominal price stickiness. In addition to these demand-related reasons, limited variability of costs is a key explanation of stable prices over the business cycle. While even this short list may appear to indicate that everything but the kitchen sink is important, we argue in our concluding discussion that there may be a pretty precise lesson in the answers.

¹⁹ The classic reference is Diamond (1982).

²⁰ HWY note that some of the suggested explanations in their and BCLR's studies actually are symptoms rather than causes of price stickiness, e.g., the hypothesis that firms in the short run adjust stocks rather than prices. In the set of theories used in this study we have in particular included a number of potential sources of real rigidity from Romer (1996). We also excluded some of the theories that scored the lowest in BCLR's study, for instance "judging quality by price".

On the cyclical behavior of the mark-up

The test of theories above draws on two related literatures – one looking at reasons for how costs of adjusting nominal prices imply no, or only a gradual adjustment, of the price to a new equilibrium following a shock. These theories encompass the whole nominal rigidities camp but also include the kinked demand curve. The other set of theories focus explicitly on how the profit-maximizing markup develops over the business cycle. For instance, even if there were no costs of adjusting prices, the optimal markup might be lower in a boom. The markups would then be countercyclical. The issue of whether markups are countercyclical or procyclical (lower or higher in booms) is important since procyclical markups would tend to dampen fluctuations in economic activity whereas countercyclical markups would amplify fluctuations. While many of the models explicitly predict countercyclical markups, for instance the relatively highly ranked countercyclical cost of finance, the test of the theories above do not give us any conclusive evidence on the cyclical behavior of markups. For instance, countercyclical costs of finance may exert an important upward pressure on prices in a recession but this may be more than outweighed by other factors.

In anticipation of this, the respondents were asked to rank how well a number of statements described the development of markups over the business cycle. Let us first note that marginal cost is difficult to estimate, except for very simple production technologies, and that firms pricing decisions often tend to be based on average variable cost.²¹ For this reason we are unwilling to draw any strong conclusion about how markups over *marginal* costs develop over the business cycle based on the answers to this question. An increase in marginal costs is clearly associated with an increase in average variable costs, but the relation between marginal and average variable costs is not necessarily one-to-one. For instance, if we increase quantity so that we move from a relatively flat section of the marginal cost curve to a steeply upward sloping section, marginal cost will rise sharply whereas average variable costs will only gradually reflect the higher marginal costs.

²¹ BCLR had some doubts about the responses regarding marginal costs, with only slightly more than 10 percent of firms saying that marginal costs were increasing in quantity. One could hypothesize that problems with the concept are not so much that business people do not understand the concept of marginal costs, after all any MBA has had at

The most common practice seems to be to use a constant mark-up, changing the price proportionally when costs change. Second came procyclical markups and interestingly, countercyclical markups was given the lowest mean rank, in the middle between "agree only to a little extent" and "do not agree at all". A two-sided t-test rejects the hypotheses that the alternatives have equal rank at the 5 percent level of significance.

Table 5 about here

The results are consistent with a sizeable literature that finds that markups over average variable costs are procyclical or independent of the business cycle (see for instance Domowitz et al 1986, Machin and Van Reenen 1993 or Ghosal 2000). The result can also be consistent with countercyclical markups over marginal costs if many respondents, as one might suspect, have average variable costs in mind when answering the question. Following the logic above, marginal costs will vary at least as much as average variable costs over the business cycle so if markups over average variable costs are constant, markups over marginal costs will be countercyclical. Despite this, the low rank of the countercyclical markup surprised us; in their survey Rotemberg and Woodford (1999) interpret the evidence as generally supporting countercyclical markups (over marginal costs).

A more definite resolution of whether markups over marginal cost are pro- or countercyclical is likely to emerge only through a considerable number of studies of industries with a very simple cost structure so that one can be reasonably sure that good data on marginal costs exist, or by using structural models to estimate markups without using cost data (see for instance Genesove and Mullin 1998 for an application and evaluation of this method).

Why do prices change?

We also asked firms to rank the importance of different motives for actually changing the price. While not necessarily linked to price rigidity we felt that this was an important aspect for understanding the decision to adjust prices. The results are reported in table 6. As before the cases where a two-sided t-test rejects, at the 5 percent level of significance, that two explanations have the same mean rank are separated by a dashed line. The pattern that emerges is well in line

least some exposure to economics. Rather, we expect them, just as empirical economists, to have difficulty estimating the marginal cost for all but the simplest techniques.

with standard economic theory. Changes that affect demand or marginal cost get the highest scores. It is also notable that changes in the consumer price index per se have little importance. To the extent that consumer price index matters it does so predominantly through cost and demand channels.

Table 6 about here

The highest score is given to price changes by competitors. As indicated by the background characteristics reported in Section 2, the typical firm operates in an oligopolistic market. We should hence not be surprised that interaction with competitors is important for the decision to adjust prices.²²

5 Discussion

The results from our random sample indicate that the typical sale is to another business and to a regular customer. It is likely that there is at least some form of relation specific investment on the buyer's side – for instance choosing a new supplier would mean retraining of staff and adjusting machinery and work patterns. Having made such relation specific investment, the buyer is vulnerable to ex post opportunism by the seller unless the parties contract on all contingencies ex ante. This is known as the holdup problem and has been extensively studied within contract theory.²³ A partial solution to the holdup problem is written contracts – you commit to sell to us at the following price. Such contracts are incomplete and trust and reputation take on important roles. Based on the survey evidence it seems like the logic underlying incomplete contracting has the potential to go a long way towards explaining price rigidity. All the highest ranked theories of price rigidity would coincide well with such a view. The theories of implicit contracts and kinked demand curve are both consistent with the notion of a stock of customers, a group that have made some relation specific investment. Explicit contracts are clearly also compatible with this notion, and if the firms input side looks anything like the output side, such contracts imply that costs will be relatively stable. An important role for implicit contracts in explaining price rigidity is also

²² As in several other cases we ran regressions to see if results could be related to structural variables. Indeed, firms that report having more competitors are more likely to give reply that price changes by competitors are "very important" for the decision to change price. As in other regressions relating to structure explanatory power is low.

²³ See Battigalli and Maggi, 2002 for a recent analysis. A related literature examines switching costs in consumer markets; see Klemperer, 1995.

consistent with the very detailed case study of pricing by a single firm conducted by Zbaracki et al (2000).

There thus appears to be much to be said for basing models of rigid prices on a contract theory approach. More explicitly incorporating incomplete contracting problems into general equilibrium models might be much to ask, but we believe that an understanding of these underpinnings would be fruitful in that we might conclude that time-dependent price-setting rules or convex adjustment costs can be convenient modeling tricks but that the search for the costs of adjustment might be futile. Instead, a shift towards issues such as verifiability (are you trying to take advantage of me by raising the price or have your costs really gone up so that you need to share the burden?), constraints on pricing set by outside options and renegotiation of nominal contracts seems motivated. In a holdup framework, a price hike that is not very clearly linked to an increase in costs may signal that the seller is trying to take advantage of the lock-in produced by the buyer's relation specific investment, whereas a lowering of prices might attract few new other customers in the short run since they are locked in with their respective suppliers.

Questionnaires have similarly suggested that incomplete contracts may be an important explanation for why wages are rigid (see for instance Campbell and Kamlani 1997). This has fruitfully been followed up in theoretical work by Macleod and Malcomson (1993) and in experimental work by Fehr and Falk (1999). We believe that similar approaches may hold much in store for price rigidities as well.

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Appendix. Methodological issues and data quality.

The survey was conducted by Statistics Sweden March-May 2000. The questionnaire was formulated by the authors with Statistics Sweden providing input on the design of questions. Data collection and sample design were handled by Statistics Sweden. The sample was stratified according to the number of employees and manufacturing/service industry, Table A1 illustrates. The total number of firms sampled was 1300 and the questionnaire sent to 1285 firms (15 of the sampled firms had no sales, had merged or ceased to exist).

Table A1. The sample

<i>stratum</i>	<i>population size</i>	<i>sample size</i>	<i>response rate</i>
5-19 employees, manufacturing	7 803	200	45.5
5-19 employees, services	30 900	195	34.9
20-199 employees, manufacturing	3 817	198	50
20-199 employees, services	7 349	196	45.9
200-999 employees, manufacturing	467	198	63.1
200-999 employees, services	449	199	48.2
>999 employees, manufacturing	91	50	58
>999 employees, services	87	49	57.1
Total	50 963	1285	48.7

The questionnaire was sent out to firms on March 14 2000, accompanied by a cover letter signed by the governor of Sveriges Riksbank. A follow-up letter was sent after two weeks and a further follow up three weeks thereafter.

Mean Rank

Since sampling fractions differ across strata we need to adjust for this when estimating the population mean \bar{Y} , which is calculated as (see for instance Cochran, 1977)

$$\hat{\bar{Y}} = \frac{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * y_i}{N}$$

where $h=1,2,\dots,8$ represent strata, N_h is the population size in stratum h , N is the total number of firms in the population, n_h is the number of responses in stratum h and y_i is the response given by firm i .

As discussed we also want to weigh the answers with a measure of firms' importance for the development of the price level. We use turnover from domestic sales (these are based on the reporting of value added tax) as a weight, and thus estimate $\bar{Y}' = \bar{Y} * \text{domestic turnover}$. We do not have the total turnover from domestic sales for the population and this also has to be estimated, yielding the following expression for the estimated population mean,

$$\hat{Y}' = \frac{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * y'_i}{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * domesticturnover_i}.$$

Proportions

We are also interested in describing the proportion of firms that specified an alternative, such as 50 percent of firms adjusted price once per year. Here as well we need to adjust for the differential sampling fractions across strata so that the estimated proportion in the whole population that specified alternative k is

$$\hat{p} = \frac{\sum_{h=1}^H \frac{N_h}{n_h} * a_{hi}}{N}$$

where a_{hi} takes the value 1 if the firm has specified alternative k and 0 otherwise. We also estimate the proportion weighted by domestic turnover, specified as

$$\hat{p}' = \frac{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * a_{hi} * domesticturnover_i}{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * domesticturnover_i}$$

The representative product

As discussed we ask about the most important product. How is this likely to influence the inferences about the stickiness of prices and the nature of price adjustment that one can draw from our study? As discussed in footnote 8(?) it is clear that on a quantitative level the average price level of many firms is likely to be less sticky than the prices of their individual products since not all prices are reviewed at same time. What about the qualitative nature of price adjustment? As discussed in Section 2, 90.2 percent of firms claimed that the answers given were representative also of their other products - this indicates that results are not likely to be seriously misleading with respect to the pattern of price adjustment. Theory, and therefore many of the questions, focuses on relatively simple standardized products with fixed prices. One may fear that this entices firms to answer for particularly simple products or to adjust their answers so as to fit within our economist framework. An indication of the latter is that quite a few firms which in the first questions answered that their main product was a non-standardized article or service and that the price is set individually for each transaction went on to answer the rest of the questions in much the same way as other firms. However, the option "not applicable/do not know" was given and appears to have been used when our theory didn't match the firms views of their reality. For instance a question on the functional form of adjustment costs (as reported in footnote 15(?)) almost half of respondents said "not applicable/do not know". This is one instance where nuances are liable to be lost because of the questionnaire format. Lastly, the main implication of firms answering for "too simple products" is likely to be a further strengthening of the qualitative

conclusions of this survey - that complex interaction with consumers is a central feature of price-setting.

The quality of responses

Let us further address the quality of responses. One issue relates to whether respondents misinterpreted questions and if cognitive factors such as the sequencing of questions led respondents to particular answers. One check on the quality of the answers is to see if responses to different questions are mutually consistent, and to see if the story that they tell makes sense. There are some puzzling cases. For instance, 27 firms answered that they had no competitors in their main line of business, but four of these firms nevertheless claimed that price changes by competitors had been a very important reason for changing prices in recent years. There may have been competitors that have recently gone out of business, which would make these answers consistent, but one may also worry that respondents for instance answer for their firm on one question and for the concern in another.

Nevertheless, for the most part we find that answers are indeed consistent. For instance, 200 firms claimed in question 4 that they review prices yearly and in question 10, 192 of these firms stated that they changed prices on average once a year or more seldom.²⁴ Also, as we argue below, the picture that emerges is consistent with what has been found in previous studies using different wording of questions, a somewhat different set of theories, different sequencing and different methods of collecting data (BCLR used personal interviews).

Another concern regards the care that respondents exercised when answering: did they just jot down some figures or are they indeed both knowledgeable and make an effort to answer correctly? One way to examine this is by using the figures on turnover from domestic sales as well as total turnover that were included in the data set from statistics Sweden. We asked respondents about the closely related question, “approximately how large a percentage of the sales of your main article/service is in Sweden and how large a percentage abroad?”. While there are a number of outliers, the answers to our question match the turnover data from Statistics Sweden (based on the tax accounting of value added tax) closely. The mean difference between the reported export share in the survey and the export share in the turnover data is 2.5 percentage points. At the 10th percentile the difference between the two figures is -6.3 percentage points and at the 90th percentile the difference is 16.8 percentage points. We take this as a comforting indication that the respondents on average not only know their company well, but also exercise care in filling out the questionnaire.

²⁴ 164 of the firms changed yearly, 28 less than once per year and 5 gave “other” as response. That leaves us with only three apparently contradictory answers; two that claimed to change price on average twice per year and one that claimed to change 5-8 times per year.

Table 1. Average responses to background questions

Question in the survey	Alternative	Percentage share (turnover weighted)
Does the company have the possibility to set the price of the main product itself, or is it entirely set by, for instance, a parent company/group or otherwise outside of the company?	sets price itself	90.62
	price set by parent...	9.06
	no response	0.32
How many competitors does your company have within your main field of operations, in your opinion? Please count only those companies with which you feel you are in direct competition. If your company is, for instance, a tobacconist, you should only count the companies within your region, town or district that you consider direct competitors!	none	4.32
	1	20.01
	2	1.3
	3	23.15
	4	3.83
	5-8	16.51
	9-11	3.31
	>12	27.55
Please give an approximate description of how the sales of your main article/service are distributed between households,...	Category	Mean share (turnover weighted)
	households	11.59
	companies and divisions within our own group	4.78
	other companies	72.65
	other types of customers	9.54
Approximately how large a percentage of the sales of your main article/service is to <i>regular</i> customers, with whom you will do business again, and how large a percentage is to occasional customers?	regular customers	86.16
	occasional customers	12.39

Table 2. Frequency of price reviews

Question in the survey	Alternative	Percentage share (turnover weighted)
How often do you actively review the price of your <i>main article or service</i> and consider whether it should be changed or not?	daily (or more often)	19.04
	review at specific time intervals	23.12
	review mainly at specific time intervals, but also in connection with special events (e.g. a drastic change in the price of inputs)	21.68
	review made in connection with special events	28.19
	other	7.05
How often do you review prices according to a specific time interval?	every week	3.92
	every month	8.14
	every quarter	15.32
	once a year	65.95
	every second year	0.019
	other	6.63
Do you review the prices of several articles and services at the same time, when making the price review?	all prices reviewed at the same time	23.14
	most prices reviewed at the same time	15.28
	some prices reviewed at the same time	13.75
	only one price reviewed at a time	41.4
	sell only one article	3.02

Table 3. The importance of different explanations for the chosen interval of price reviews (turnover weighted rank).

*Question: Why have you chosen this particular time interval for reviewing the price?
How well do the following statements agree with the situation in your company?*

Statement in survey	mean rank	std dev	nobs
The price could not be changed more often without risk of disturbing customer relations	3.48	0.73	309
The factors influencing the price do not change often enough to motivate reviewing the price more often	3.03	0.74	313
It would be too costly in time and/or money to gather relevant information and discuss price-setting decisions more often	1.97	1.07	295
We do not determine the time interval ourselves; it is set by the parent company/group, an authority, etc.	1.70	0.68	270

Table 5. The importance of statements regarding the markup (turnover weighted)

Question: The price of an article/service can be expressed as a percentage markup on the variable cost of producing an additional unit (the marginal cost). How well do the descriptions below of the markup on the main product agree with circumstances at your company?

	Statement in survey	Mean rank	std dev	Nobs
Constant markup	The markup is relatively constant, when costs change, the price is changed to a corresponding degree.	3.01	0.74	497
Procyclical markup	When demand increases, the variable costs rise less than the price the company can charge for the article/ service, i.e. the markup increases	2.52	0.85	466
Markup varies over time but not in any systematic relation to demand	The markup varies over time, but not in any systematic way in relation to demand	2.38	0.80	465
Countercyclical markup	When demand increases, the variable costs increase more than the price the company can charge for the article/service, i.e. the markup declines	1.55	0.71	466

Table 4. The importance of different theories on price stickiness (turnover weighted rank)

Question: There are a number of theories as to why companies sometimes choose not to change the price or only change the price slightly. Here are a number of theories presented in brief. How important are these theories when it comes to explaining potential price inertia and price adaptation in your company during economic booms and economic recessions?

Theory	Statement in survey	Mean rank				Blinder et al (US)	Hall et al (UK)
		Nominal	real	std dev	nobs		
Implicit contracts ^a	Customers prefer a stable price and a change could damage customer relations, even if competing companies also change their prices	3.00	3.00	0.82	523	4	5
Sluggish costs	The cost of the company's inputs does not change much over the business cycle, which contributes to the price of the company's article/ service remaining roughly the same		2.45	0.81	463	2, 9 ^b	2, 6 ^b
Explicit contracts	The price is regulated in formally-written contracts that are costly to renegotiate	2.27		1.10	460	5	1
Kinked demand curve	The price is sticky because the company loses many customers when it is raised, but gains only few new ones when the price is reduced		2.17	1.00	486	1 ^c	3 ^c
Countercyclical cost of finance	In a recession the costs of the company's external financing, e.g. bank loans, increase. This contributes to keeping the price up during recessions		2.08	0.76	461	-	-
Liquidity constraints	In a recession, when demand is weak and cashflow is low, the price may need to be kept up to cover costs and finance current investment projects		1.85	0.75	471	-	-
Pricing thresholds	Psychological "thresholds" for the price exist. The article/ service is assumed to sell much better at, e.g. SEK 49.95 than at SEK 50.05.	1.85		1.05	467	8	4
Shifting customer clientele	The customer mix changes over the business cycle so that when there is a recession, the company loses the least loyal customers, while more loyal customers remain. As the latter are less price sensitive, the price can be maintained during a recession		1.75	0.87	450	7	9
Deviation from implicit collusion	Price wars are more common when demand in the economy is high, which contributes to keeping the price down during a boom		1.68	0.88	460	-	-
Thick-market (supply-side)	When there is a high level of economic activity, the company's costs for reaching customers and/or finding suitable sub-contractors decline. This contributes to keeping the price down during booms		1.60	0.75	454	-	-
Physical menu costs	There are "physical" costs connected with price changes, e.g. printing of new price lists, cost of notifying retailers, etc.	1.54		0.68	475	6 ^d	11
Thick-market (demand-side)	When there is a high level of economic activity and customers buy a lot, they have a greater tendency to compare prices. Customers are thus more sensitive to price changes in booms than in recessions		1.50	0.75	475	-	-
Information-gathering costs	It is costly in terms of time and/or money to gather relevant information for	1.40		0.70	491	6 ^d	-

pricing decisions

Note: ^a Since it is not clear whether implicit contracts in the form implied by the question in the survey is best characterized as a nominal or a real rigidity it is reported in both columns. ^b The formulations capturing "sluggish costs" in BCLR and HWY, are "price increases are delayed until costs have risen" (called cost-based pricing) and "variable costs are roughly constant as production rises" (called constant marginal costs). ^c BCLR and HWY essentially use the formulation that "firms tend hold back price changes, waiting for other firms to go first" in describing a theory called co-ordination failure. We assume that this hypothesis is approximately captured by the flat upper part of the kinked demand curve where "the firms will loose a lot of customers when raising the price". ^d BCLR use a definition, "costly price adjustment", which covers both of the hypotheses "decision-making costs" and "physical menu costs".

Table 6. The importance of different causes for changing the price (turnover weighted)

Question: Why does the price of the main article/service change? How important have the factors below, inside and outside of the company, been in setting prices in recent years?

Statement in survey	Mean rank	std dev	nobs
Price changes by competitors	3.27	0.75	524
Changes in costs for foreign inputs	3.05	1.01	476
Pressure from important customers	3.04	0.86	497
Changes in demand for article/service	3.01	0.87	518
Changes in costs for (other) [not labor or capital] domestic inputs	3.00	0.95	507
Changes in taxes and charges	2.98	0.98	506
Changes in capital costs	2.76	1.08	521
Directives from parent company, group, authority, etc	2.38	0.90	357
Exchange rate changes	2.24	1.09	485
Changes in wage costs	2.11	1.06	537
Sales campaigns	2.02	0.97	463
Changes in consumer price index	1.89	0.79	481
We routinely raise prices at regular intervals	1.52	0.63	290