Empirical evidence on the Post Keynesian perspective of price stickiness

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Abstract: This paper examines the Post Keynesian proposition that prices don't react quickly to changes in supply and demand to restore equilibrium — "price stickiness". Although under certain circumstances, prices do adjust quickly to shifts in supply or demand, it is considered to be a contingent, instead of a planned, strategic situation. To explore whether price stickiness is indeed an essential feature of real-world product markets, the paper discusses the reasons for the existence of stickiness in prices and multiple theories based on assumptions of price stickiness. Using Post Keynesian pricing theory, this paper explains sluggish price adjustment from a Post Keynesian perspective. Finally, surveys on price-setting behavior of firms conducted by researchers at the Bank of England (Hall, Walsh, and Yates, 1997), the Bank of Sweden (Apel, Friberg, and Hallsten, 2004) and the Bank of Canada (Amirault, Kwan, and Wilkinson, 2004) are reviewed and compared to demonstrate whether the results are consistent with the Post Keynesian perspective.

Key words: price stickiness, Post Keynesian price theory, price adjustment, price-setting behavior

1. Introduction

When one observes prices in markets, one finds out that in many markets prices don't react consistently to the change in the economic environment, as they don't adjust quickly when market demand or supply changes. For instance, the prices of newspapers and magazines don't go up just because a piece of news is highly demanded by people on a certain day (Cecchetti, 1986); fares of public and private transportation, like buses and taxis, don't rise when the weather changes; restaurants don't frequently adjust their menu prices in response to daily jumps in demand (Ball, Mankim, and Romer, 1988); wages, the labor price, are rarely cut by firms when sales fall (Akerlof, and Yellen, 1985). The fact that prices don't react quickly to shifts in supply or demand to restore equilibrium is referred to as "price stickiness" in the economic literature.

Sluggish price adjustment is a normal phenomenon in actual markets, and there exist numerous theories to explain price instability. The aim of this paper is to provide a Post Keynesian explanation of price stickiness and employ surveys conducted on the price-setting behavior of firms to show whether the empirical findings corroborate the Post Keynesian perspective.

This paper extends the Post Keynesian view of pricing by presenting methodological approaches adopted by Post Keynesians and neoclassical economists. There is a rift between neoclassical and Post Keynesian economists with regards to analysis tools. Neoclassical economics offer theoretical accounts of pricing based on optimizing behavior under conditions of full information. Post Keynesians, however, reject this kind of methodology. They utilize an open-system approach to analyze economic phenomena,

emphasizing the use of critical realism to conduct analysis under conditions of uncertainty. Due to the application of different methods of analysis, it is not surprising that these two schools show distinct views on pricing. Post Keynesians state that price changes incline to respond to cost changes. Then four pricing procedures that business enterprises usually use to set their product prices are illustrated. The stickiness in prices can be explained in the price-setting process.

In the empirical part of the paper, surveys carried out by the Bank of England, the Bank of Sweden, and the Bank of Canada are reviewed. These surveys examine how firms set and adjust prices. Examining the survey results, we intend to find out if they are consistent with the Post Keynesian perspective.

The paper proceeds with the following framework. Section 2 offers explanations for the existence of price rigidity, lists multiple theoretical explanations of price stickiness and gives a brief summary for each of them. Section 3 presents the Post Keynesian view of price stickiness by discussing Post Keynesian methodology, its pricing view and its core assumptions. Section 4 reviews surveys conducted by the central bank of three countries and sets up a comparison of the survey results. Section 5 concludes.

2. Reviewing and organizing the sticky price assumption

The question is "What causes stickiness in prices or why are prices sticky?" There are a number of popular theoretical explanations that have been advanced for price stickiness. Some of the explanations are well recognized by companies. In some cases, firms incur the costs of setting new prices, gathering information, making decisions, communicating

and negotiating information with customers (Zbaracki et al, 2003), so that they will not promptly vary their prices in light of demand and cost change. This is certainly the case when the costs are significant in comparison with the profit made after the change in prices. Thus price stickiness arises. Consider for instance shoe retailers who are thinking of cutting down their prices to get rid of their stock so as to make room for newly-fashioned shoes; the costs of printing flyers and changing price tags are large. On the condition that the expected cost is greater than the expected net present benefit of changing price, retailers would rather choose to stay put (Kashyap, 1995). Information costs also account for the fact that price changes lag behind changes in demand. Any firm confronts the problem of taking time and money to aggregate relevant information that reflects systematic fluctuations in demand. The costs of communicating information internally occur to large companies with various departments. Meanwhile, communicating and negotiating new prices with buyers are the costs that can't be neglected. This explanation has been developed to the theory of costly price adjustment. In other cases, price stickiness arises due to asymmetric information between two sides of the deal — buyers and sellers. There are several examples related to asymmetric information: The seller of a used car knows more about the condition of the car than the buyer (Akerlof, 1970); consumers know more than insurance companies about their individual health risks (Rothschild, and Stiglitz, 1976); job applicants know more than their employers about their ability to function in a corporate setting (Spence, 1973); a stock market dealer knows less than a firm's management about the value of the firm's stock; a company and its regular customers know the prices that it charges, but potential

customers are not aware of its prices (Kling, 2001). Typically it is the seller that knows more about the product than the buyer, so the seller usually uses the information advantage against the buyer to obtain extra revenue beyond the true value of the product. Such problem can be solved by price stickiness. If prices are fully flexible, then the buyer doesn't know if the variation is truly consistent with the demand fluctuation. If instead prices change slowly, the information advantage sellers have over buyers will vanish. Thus consumers are in favor of slow changes in prices. The firm may choose to stick to its price when demand changes, because it will not be able to attract enough new business for the price fluctuation to be profitable. This explanation has been developed by the theory of implicit contracts. In the following we will explore each of the theoretical explanations of price rigidity and give a brief description of them.

Theories based on assumptions of price stickiness have varied over time (Gwin, and Vanhoose, 2005). During the 1960s and 1970s, the assumption of widespread price stickiness and the importance of sticky prices were accepted and dominated in the economic field. With the emergence of new classical macroeconomics in the late 1970s, the extent and importance of these Keynesian theories suffered attack, since over the periods between late 1970s and middle 1980s, the early rational-expectations and real-business-cycle theories assumed widespread price flexibility and provided conclusive evidence to confirm its presence. Theories of sticky price lost their dominance. However, the occurrence of a Keynesian counter-revolution in 1990s brought these Keynesian theories back to their preeminent position, for they regained economists' acceptance and attention. Up to now, price stickiness has been generally considered as a normal

phenomenon and has been employed in monetary policy analysis.

There exist various theories of price rigidity based on market interactions, customer antagonism and psychology, stability of contract, avoidance of price leader and physical price adjustment costs. We follow Blinder's list (Blinder et al, 1998). A wide range of these theories are provided below to get a comprehensive view of sluggish price adjustment.

Constant marginal cost

Usually, firms' marginal costs are supposed to be increasing. Yet, there exist firms whose marginal costs are constant, that is, their marginal cost curve is rather flat, almost horizontal up to the point where full capacity is reached. So are their supply curves and a tiny change in price is supposed to cause a drastic jump in supply. Shifts in demand will lead to changes in product quantity rather than in prices since the profit-maximization price exists at the point where marginal cost equals marginal revenue (Hall, 1986). Thus, price doesn't change much in response to a shock in demand for firms the product of which can be provided at a constant marginal cost.

Cost-based pricing

Companies make pricing decision on the basis of costs of inputs, such as labor wage and raw materials (Blinder, 1998). As these costs don't change much, prices that depend on them will not change. Particularly in the multi-stage production process for a final product, short delays in any one of these stages can accumulate to long delays.

> 'A different idea holds that prices depend mainly on the costs of labor and of materials and supplies that companies buy from other companies. Firms are thought to delay price increases until their costs rise, which may take a while. But then they raise selling prices promptly.' (Blinder, 1998, page 327)

Costly price adjustment

Costs associated with price adjustment can be a source of price stickiness (Ball, and Mankiw, 1994). Firms are ready to adjust prices in response to changes, but they face physical and information costs in the adjustment process. The existence of these costs prevents firms from changing prices very often.

'The most important costs of price adjustment are the time and attention required of managers to gather the relevant information and to make and implement decisions.' (Ball and Mankiw, 1994, page 142)

Coordination failure

According to a theory put forward by Hall and Hitch (1939) and Sweezy (1939), no company wants to be the price leader, who goes first in the price change. It usually waits other companies to take actions first. Either kind of price change will put the company at a disadvantage: an increase may take the risk of losing customers and market shares to its competing companies; while a decrease may cause price competition and eventually the firm becomes worse off (Ball, and Romer, 1991). The lack of coordination in the simultaneous actions among firms leads to rigidity in prices.

'The next idea is that firms would often like to raise their prices, but are afraid to get out of line with what they expect competitors to charge. They do not want to be the first ones to raise prices. But, when competing goods rise in price, firms raise their own prices promptly.' (Blinder, 1998, page 332)

Explicit contracts

To attract customers choosing their product, firms have signed formally-written contracts with their customers to offer constant prices over a specific period (Blinder, 1998). Restricted to such fixed-price contracts, firms would rather not adjust prices.

Implicit contracts

Firms expect to develop long-term relationships with their customers. So in light of the fact that price changes may antagonize customers, firms will choose to stabilize prices.

'Another idea has been suggested for cases in which price increases are not prohibited by explicit contracts. The idea is that firms have implicit understandings with their customers - who expect the firms not to take advantage of the situation by raising prices when the market is tight.' (Blinder, 1998, page 322)

Non-price competition

In response to the change in demand or cost, firms instead vary prices, they choose to change product features, such as product quality, customer service, warranty terms, delivery lags and promotional efforts (Blinder, 1998). Although prices remain fixed, the underlying price does change.

'According to the last idea we want to investigate, firms don't cut prices much when demand falls because price is just one of several elements that matter to buyers. More frequently, they shorten delivery lags, make greater selling efforts, improve service, or improve product quality' (Blinder, 1998, page 334)

Pricing points

Price points also relate to price rigidity (Bergen, Kauffman, and Lee, 2005). We often observe that most firms in retail industry set their prices with certain endings, for example 9 cents, 99 cents, 9 dollars and 99 dollars. Firms find out that customers are psychologically sensitive to these price points, for if the price rises above these endings, demand will drop drastically. Thus firms would not react to small shocks at once.

Procyclical elasticity

When the business cycle is in a cyclical downturn, many firms may fail and go out of business. The survivals' capability of coordinating their prices and reducing price competition will increase. But these firms may not reduce their prices, because customers

have less of a tendency to compare prices during recessions, demand may become less elastic to price, so customers are not sensitive to price changes (Rotemberg, and Saloner, 1986).

Quality signal

Firms rarely reduce their prices because they fear that customers may incorrectly think that the action of cutting prices deliver the information that the quality has become lower (Stiglitz, 1987). There lies a pervasive belief among customers that products with a higher price have higher quality. As a result, cutting prices may actually decrease rather than increase demand.

Hierarchy

In a hierarchical organization, price changes are slowed down due to the time-consuming process to gather and deliver many individuals' decision (Blinder, 1998). Thus the final price decision-making may be delayed for hierarchical reasons.

Inventories

Changing prices is only one of the actions that firms take to react to fluctuations in demand. Instead of adjusting prices, firms vary inventory stocks to mitigate demand shocks (Blinder, 1982). Firms tend to adjust stocks for temporary demand shocks, while for permanent demand shocks, they may change their prices and not their inventories.

One part of the surveys we are going to explore requires respondent companies to rank the relevant importance of these theories of price stickiness. The motivation is to probe how the firms' price-setting behavior is influenced by these theories.

3. The Post Keynesian view of price stickiness

Before we present price stickiness in the Post Keynesian approach, it is important to get some insight on what is the method of analysis accepted and utilized by Post Keynesian economists, how Post Keynesians view pricing, and what is the core of Post Keynesian pricing theory.

3.1 Post Keynesian Methodological Approach

The multiple theories of price stickiness described in the preceding section are based on optimizing behavior of both entrepreneurs and customers (entrepreneurs aim to maximize their profits, while customers aim to maximize their utilities) and the assumption of full information optimization. This is the method of analysis favored by neoclassical economists who deem the economy to be a closed system in which all relevant variables are known, and firms make decisions under certain circumstances. The methodology is thus called a "closed system" approach. Neoclassical economics utilize mathematical methods to analyze phenomena and put emphasis on deduction. They provide theoretical explanations in terms of a particular event regularity — 'whenever event A occurs, then event B emerges', which implies that the conditions for closure can apply in all economic situations. (Dow, 2001)

Post Keynesians, however, employ a quite different methodology — an open system theoretical approach. They view the economy as an open system. In this system, not all relevant variables are known (Dow, 2001). Conversely they propose that the conditions for closure do not apply in economic situations, thus they reject closed system theories. Post Keynesians adopt a critical realist perspective which provides philosophical

foundations for Post Keynesian economics. Critical realism implies that the economic phenomena are not predictable and their structure and form may change with the effect of the environment in which they lie, so providing theoretical explanations of phenomena can not depend solely on deductive logic and mathematical formalism. Post Keynesians seek to provide an adequate explanation of events by drawing on a variety of sources of evidence relating to certain phenomena. To avoid making arbitrary decisions, they not only emphasize their own methodology, but consider methodological principles of alternative schools. Post Keynesians encourage one to examine economic phenomena by using different approaches and techniques and providing various evidence associated with the phenomena under investigation. The extent to which the rationality justifies the claims depends on the degree of evidence related to the investigated phenomena (Downward, 1999).

The implication of critical realism offers a basis for pricing theories in Post Keynesian economics. It asserts that the pricing behavior of firms should be evaluated by different methods and under different settings. As a result, if relevant evidence under different settings reaches the consistent insights, those insights strengthen rationality. (Downward, 2001)

Based on this methodological perspective, Post Keynesian accounts of pricing are different from conventional economics, because firms behave under conditions of uncertainty (Downward, 1999). What are the Post Keynesian views of pricing is the subject that we are going to explore next.

3.2 Post Keynesian view of pricing

Since Post Keynesians employ an open system approach to analyze economic phenomenon and individual behavior, they show distinct views regarding the role of prices, the goals of firms and the determination of prices. In neoclassical economics, price is regarded approximately as a market price which reflects demand fluctuations. The popular belief is that there is a direct proportion between price and demand: prices go up as demand increases and go down as demand decreases. Post Keynesians, however, think that prices are more likely to reflect costs of production than demands of market. Thus the role of prices is not to allocate resources but rather to cover costs and generate profits (Lavoie, 2001). In neoclassical economics, the firms' objective is to do their utmost to maximize profits, since firms act under conditions of full information where optimization can be achieved. The realization of profit maximization allows firms to set their prices based on it. Post Keynesians reject these full-information optimizing accounts of pricing. They argue that firms seek to maximize profits, but since the economic environment is changing, full information equilibrium doesn't correspond to real world conditions. Firms operate under conditions of uncertainty. It may be impossible for firms to achieve maximization goals in the short run. Firms set themselves various goals in response to changes in circumstances (Downward, 2001). Conventional demand and supply analysis is based on pure competition and the independence of demand and supply. The equilibrium price is found at the intersection of the demand and supply curve, the market is clear of shortage and surplus. From a Post Keynesian point of view, demand and supply are considered to be interdependent and imperfect competition is thought to be the normal market structure. Thus prices are not market clearing (Dow, 2001). Post Keynesians

further assert that prices are set by cost-plus pricing and they can be adjusted with the emergence of a new environment.

3.3 The core of Post Keynesian pricing theory

Hall and Hitch's full-cost pricing, Andrew's normal-cost pricing, Mean's administered prices and Kalecki's mark-up pricing are the foundations of a Post Keynesian price theory. Downward concluded that these theories have a common perspective on the price setting process:

> 'Prices are set in advance of trade and in the uncertain pursuit of some objective, which typically includes long-run profits. Firms follow a procedure of adding a markup to average direct costs to cover both overhead cost and profit as an organizational process of coping with uncertainty. Prices are also set with some uncertain attention being paid to pressure from competing groups of products, that is pressure from the environment which can, but need not automatically, cause prices to change. In particular, prices are more likely to change due to cost changes than demand changes.' (Downward, 1999, page 64)

The above shared ideas are consistent with an open system approach — firms set prices in the face of uncertainty; firms are interested in the long-run pursuit of objectives; firms mark up costs attempting to achieve their profit-seeking goals; firms set prices with reference to their competitors (they take account of their competitors' prices); firms change prices in response to changes in environment (Downward, 2001). To simplify, prices are assumed to be the result of a cost-plus pricing mechanism. The core assumptions of the theory enable us to present Post Keynesian explanation of price stickiness.

3.4 Post Keynesian explanations of price stickiness

According to Post Keynesians, prices are set by cost-plus pricing mechanisms, and prices are more likely to vary due to cost changes than demand changes: 'the business then adds a costing margin to costs or marks up the costs to set the price' (Lee, 1998, page 10).

According to Lavoie (2001), the pricing procedures that firms usually utilize to set prices include mark up, full cost, normal cost and target rate of return pricing. Mark up pricing assumes that price-setting is based on marking up unit direct costs. Here direct costs refer to the costs that occur to business enterprises when they purchase and rent production factors in the market. They include labor wage, raw materials, fuel and electric expenses, loan interest and land rent. The formula for this pricing procedure is: $P= (1 + \theta) DC/Q= (1 +\theta) UDC$, [P represents price level, θ is a gross margin, DC are direct costs, Q is output level, and UDC are unit direct costs]. Full cost pricing supposes that price-setting depends on marking up unit costs. Costs are firms' total costs including both direct costs and overhead costs. Overhead costs consist of the costs of rent, utilities, interior decoration, and taxes. The related formula is: $P= (1 + Ø) TC/Q= (1 + Ø) UC$, [Ø is a net margin, TC are total costs, Q is actual output level, and UC are unit costs]. Normal cost pricing asserts that pricing-setting is determined by marking up normal unit costs. Normal costs are defined as total costs at a normal or standard level of output. The formula for this pricing procedure is: $P= (1 + Ø) NTC/NQ= (1 + Ø) NUC$, [NTC are normal total costs, NQ is normal output level, and NUC are normal unit costs]. In the target rate of return procedure, price-setting is considered to be based on marking up normal unit costs to produce a target rate of profit on the firms' capital assets. The implied formula is: $P= (1 + Ø^*) NTC/NQ= (1 + Ø^*) NUC$, [Ø* is the costing margin for profit at normal level of output which will generate the target rate of return on the firms' capital assets]. In practice, firms may be involved in one or more of these pricing procedures. (Lavoie, 1996)

The variation in prices can be reflected in the pricing procedures, and corresponds to the changes in costs, mark up for profit, and normal output level. Evidence shows that prices are relatively stable for a period of time. Firstly, with respect to cost-based pricing or normal cost pricing, prices are more sensitive to cost than demand changes. Prices will not change until normal costs such as raw materials, labor wage or other costs vary, and the fact is these costs don't change so frequently. Secondly, the pricing process itself may need the commitment of much time and effort, discouraging enterprises from adjusting prices more often once prices are decided. Thirdly, since a great number of business enterprises co-exist in the market, competition is unavoidable. To mitigate the serious result of price competition, enterprises seek to operate in an orderly market with a single market price. Such a market price may be fixed on the basis of the average of costs of all the enterprises, of the application of a mark up for profit or of the utilization of pricing procedures. Finally, business enterprises having transactions with customers in the market discover that constant prices are helpful in establishing a good relationship with their customers (Lavoie, 2001). In a word, enterprises use mark up, full cost, normal cost, and target rate of return pricing procedures to set prices of their products, and in turn product prices change infrequently in response to these pricing procedures.

After exploring price stickiness from a Post Keynesian perspective, we are going to use empirical evidence — surveys to probe the price determination process of firms to see whether the pricing decisions are consistent with the Post Keynesian view of price stickiness.

4. Survey evidence on the frequency of price adjustment

Given that some of the explanatory variables (such as the curvature of marginal costs, the use of explicit contracts, and the prevalence of various theories of price stickiness ranked by firms) related to the frequency of price changes are unobservable and difficult to be considered as exogenous, the employment of econometric methods to analyze the extent of price rigidity with regards to all the relevant variables proves to be difficult and unreliable. The feasible approach therefore, is to carry out surveys by setting up questionnaires and conducting interviews to investigate how often firms adjust their prices and what motivates them to make the adjustment. Through the results of the survey, we can get a direct insight into the price setting and pricing decision process of firms.

In this empirical section, we select surveys conducted in the United Kingdom, Sweden, and Canada to analyze the price-setting behavior of firms. Below, we will review the feature and key results of each survey and then make a comparison of these three surveys to find out their commonalities and whether the Post Keynesian view of pricing is supported by the empirical evidence provided by the surveys under study.

4.1 Survey of the price-setting behavior of UK companies

In September 1995, a survey was conducted by the Bank of England's Agents and Business Finance Division to examine 654 companies in the United Kingdom on how they set prices (Hall, Walsh, and Yates, 1997). The sample was divided by its features on firm size, industry sector, the number of competitors, market share, and percentage of long-term relationships with customers. Since 81% of the companies had more than 100 working staff and 68% of the investigated companies were manufacturing companies, the

sample was dominated by large-sized, manufacture-run companies.

During the survey, the companies were asked what they thought might be the important factors in their price determination process, how frequently they reviewed and changed their prices, how important the various theoretical explanations of price stickiness were. In response to the first question, the results indicated that 39% of the respondents recognized that prices were set according to the bearable market level, followed by 37% of companies favoring cost-plus pricing mechanisms, of which 17% priced on cost plus fixed mark-ups and the other 20% on cost plus variable mark-ups. Moreover, 25% of respondents took rivals' prices into account when determining their own prices. However, customer-based pricing was only supported by 5% of companies. It can be clearly seen that market level, cost plus mark-ups and competitors' prices are the most popular factors influencing firms' pricing decision. With reference to the frequency of price reviews and changes, it was revealed that firms preferred time-dependent type of price review (79% of firms adopted it) to state-dependent type (only 11% of firms reviewed prices in this way), and the median frequency of reviewing prices was monthly, while the median number of adjusting prices was two times per year. What is the difference between time-dependent and state-dependent price reviews? The words convey their meanings — the reviews depend on "time" and "state" respectively. Firms may choose to review their prices routinely, say in a certain time interval, or contingently, just in response to changes in market conditions. Therefore, most UK companies in the sample reviewed prices based on a specific frequency. Since we are more concerned about how often firms adjusted their prices, in other words, the extent of price rigidity, we are going to probe deeply into

the impact of firms' features on the frequency of price changes. Using the data source provided by the researchers Simon Hall, Mark Walsh and Anthony Yates (1997, page 19), we form Table 1 to illustrate the influence.

Table 1 Features that influence the frequency of price adjustment

Features influencing number of price changes	Median number of price changes
Total Sample	2
Industrial Sectors	
Manufacturing	2
Construction	3 - 4
Retail	3 - 4
Other services	1
Company size	
Small (less than 100)	1
Medium (100-500)	2
Large (more than 500)	2
Number of competitors	
0-5	1
6-10	2
11 or more	2
Market share	
up to 5%	2
5-20%	2
20-40%	2
>40%	1
Percentage of long-term relationships	
0-40%	2
41-60%	2
61-75%	2
>75%	1

As indicated in the table, although on average prices were changed twice a year, the frequency varied with the breakdown of firms by sector, size, number of competitors, market share and percentage of long-term customer relationships. Firms in other service sectors (which include transport, communications, business services and financial intermediation) changed prices merely once a year, below the average, while construction and retail firms had the highest frequency of three to four times a year. In construction perhaps, frequent changes are likely to be associated with the change in input costs such as the price of raw materials. As to retailing, retailers are sensitive to their rivals' prices. Prices in small firms were more sticky than those in medium and large-sized firms, partly because small firms can not sustain the costs connected with price variations. Firms facing more competitors and having a smaller percentage of market share tended to change prices more often as the pressure from competition and weak power over the market motivated them to adjust prices more frequently. We also find that firms having a larger percentage of long-term customer relationships changed prices less frequently than those with a smaller percentage. When firms have a steady relation with most of their customers, they are less likely to take the risk of destroying the established goodwill relationship by providing variable prices. When it comes to the recognition and ranking of a number of theories of price stickiness, the results showed that among eleven theoretical explanations, *constant marginal costs*, *cost-based pricing*, *implicit contracts* and *explicit contracts* were the theories most recognized by UK firms studied. However, the importance rankings of these theories were not exactly the same as the recognition rankings. *Explicit contracts*, *cost-based pricing*, *coordination failure* and *pricing*

thresholds were the most important theories ranked by respondents. Similarly, we introduced Table 2 (Simon Hall, Mark Walsh and Anthony Yates, 1997, page 22) to view the overall result.

Table 2 The recognition and importance of different pricing theories

Theories	Percentage recognition	Ranking place
Constant marginal costs	53.8	6
Cost-based pricing	47.1	2
Implicit contracts	45.4	5
Explicit contracts	43.7	1
Procyclical elasticity	35.3	9
Pricing thresholds	34.4	4
Non-price elements	24.2	8
Stock adjustment	22.9	7
Co-ordination failure	22.0	3
Price means quality	18.5	10
Physical menu costs	7.3	11

Note: in the rankings, low numbers correspond to high importance and high numbers to low importance.

Since in the preceding section, we provide the detailed interpretation of each theory, we will not explain them once more. In this survey, a few theories were expressed in a slightly different way from what we mentioned before. *Price thresholds* is equivalent to price points, *non-price elements* is equivalent to non-price competition, *stock adjustment* is equivalent to inventories, *price means quality* is equivalent to quality signal, and *physical menu costs* is equivalent to costly price adjustment. The results indicate that in

terms of recognition and rank, *explicit contracts* and *cost-based pricing* were the theories both most recognized and ranked highly in importance by respondents. This implies that in the UK, firms prefer to build up long-run customer relationships by offering contracts indicating that they will not change prices until the expired date showed in the agreement. Also, firms are in favor of cost mark up pricing to set prices; they are concerned more about the change of input costs, and will adjust prices in response to this change.

From the survey results in the UK, we may conclude about the characteristics of price-setting behavior of UK firms. Prices were mainly decided by market level as well as cost plus mark-ups. Most of the firms reviewed prices using time-dependent pricing rules and the average frequency of review was once a month. Despite the frequent reviews, the most popular number of actual price changes per year was one time (37% firms responded) although the average number was two times. In addition, the frequency of price change varied with the firms' characteristics. It was also revealed that *constant marginal costs*, *cost-based pricing*, *implicit contracts* and *explicit contracts* were popularly recognized by firms as explanations for holding price constant. Moreover, firms cited theories of *explicit contracts*, *cost-based pricing*, *coordination failure* and *pricing thresholds* as more important explanations than others. Overall, prices in UK firms are sticky and the reasons behind it might be the desire to maintain customer relationships and the sluggishness of input cost change.

4.2 Survey of the price-setting behavior of Swedish companies

From March to May 2000, Statistics Sweden carried out a survey of 626 Swedish firms to observe their price-setting behavior (Apel, Friberg, and Hallsten, 2004). The firms were

chosen in a large random sample and were classified into manufacturing and service sectors. To better understand the characteristics of the sample, firms were asked questions on the determinant parties in price-setting process, the number of direct competitors, sales distribution by customer type and the proportion of sales to regular customers. The answers showed that a large majority of firms (with 90.62% of respondents in this situation) were self-determining firms in setting prices, while prices in only 9.06% firms were set by parent companies or companies outside. With regards to the number of rivals, slightly over two-thirds of firms were clustered between one to eleven competitors. On average, 72.65% of firm sales were distributed to other companies, and 86.16% of firm sales were transacted with regular customers. The purpose of the survey was also to examine the degree of price rigidity, so the questionnaire of the frequency of price reviews and changes were inevitable. In response to the question of price reviews, three small questions were designed — what type of price review rules did firms use at the time of reviews; if price reviews relied on time interval, what was the frequency; whether firms reviewed prices of several products simultaneously. 44.8% of the firms used time-dependent pricing reviews and 47.23% of the firms used state-dependent pricing reviews. Therefore, both types of rules were more or less equally exploited by firms. Among firms using time-dependent pricing reviews, the most prevalent frequency of reviews was once a year, as chosen by 65.95% of respondents, followed by 15.32% of respondents with quarterly reviews. We can conclude that prices were reviewed infrequently in Swedish companies. When conducting price reviews, 41.4% of firms only reviewed prices of one product, while 23.14% of firms reviewed prices of all products

and 15.28% of firms reviewed prices of most products. The survey then probed into the reasons behind the infrequency of price reviews. The results showed that the fear of spoiling customer relations and inflexibilities of influential factors contributed to reviewing prices not so often. Now turning to the question "How often do the prices change?" we found out that the most frequency of price adjustment was consistent with that of price reviews, which was also once a year with 40.3% of the responses. Furthermore, 27.1% of firms changed prices even less often, admitting to varying prices less than once per year. By the same token, firm features such as size, industry, cost structure, customer relations, and the number of competitors can affect the number of price changes. The larger the size of the firms was, the more often they changed prices and vice versa. Large companies can afford the costs (time, money and energy) of adjusting prices, and are capable of apportioning the costs. Since, in this survey, companies were divided into manufacturing and service sectors, the results indicated that prices were more rigid in manufacturing industry. Perhaps manufacturing companies are more likely to realize the risk of adjusting prices ahead of their rivals. Prices varied more often in companies holding larger portions of variable costs, since price changes are related to cost changes. In addition, companies operating in more competitive markets and having fewer regular customers tend to change prices more frequently. The consciousness of rival prices and maintenance of customer relations provide the explanation. Respondents in the survey were exposed to different theories of rigid prices and were asked to rank them by importance in explaining the price inflexibility. The ranking results are shown in Table 3 (Mikael Apel, Richard Friberg and Kerstin Hallsten,

2004, Page 58-59).

Table 3 The placing of the different theories

Theories	Ranking place
Implicit contracts	1
Sluggish costs	2
Explicit contracts	3
Kinked demand curve	4
Countercyclical cost of finance	5
Liquidity constraints	6
Pricing thresholds	7
Shifting customer clientele	8
Deviation from implicit collusion	9
Thick-market (supply)	10
Physical menu costs	11
Thick-market (demand)	12
Information-gathering costs	13

The survey asked companies to rank thirteen alternative explanations of why prices are sticky. As was indicated in the result, the most highly ranked theories were *implicit contracts*, *sluggish costs*, *explicit contracts*, *kinked demand curve*, and *countercyclical cost of finance*. Again, some theories were presented in different way. We find out that *sluggish costs* corresponds to cost-based pricing and constant marginal costs, *kinked demand curve* corresponds to coordination failure, *shifting customer clientele* corresponds to procyclical elasticity, *information-gathering costs* corresponds to costly price adjustment. The study concerned some theories that we didn't mention and interpret previously. *Countercyclical cost of finance* contributes to explain why prices are held up

when the economy goes into a recession: the costs of companies' financing activities increase, hence marginal costs are raised, making prices stay high in recessions. *Liquidity constraints* is also related to recessions. During recessions, customers respond slowly to price changes and firms have low cash flows to cover debt payments. In this situation, firms would rather keep prices up to cover debt payments than lower prices to attract future customers. *Deviation from implicit collusion*, however, offers explanation for keeping prices down. During periods of demand booms, prices are kept down to avoid price competition and deviation from implicit collusion. *Thick-market* is another source of price stickiness, providing explanations from both demand and supply angles. It claims that in periods of economic prosperity, the price elasticity of demand is high, causing firms to keep prices down; on the supply side, firms' costs decrease due to the better purchasing power of customers and easy access to subcontractors, which helps firms to keep prices down. The ranking results tell us that firms regarded customer relations, low frequency of cost change, and risk of being ahead in price adjustment as the most important reasons for holding back price changes.

Since prices are considered as the result of adding a percentage markup to the cost of producing goods, firms were further asked about the variability of the markup in response to cost changes. Four kinds of situations were presented, constant markup (markup is constant, prices change proportionally to cost changes), procyclical markup (markup rises, prices change more than cost changes), countercyclical markup (markup falls, prices change less than cost changes), random markup (the variation of markup is untraceable). The most popular markup that firms chose to set prices was constant markup, followed by

procyclical markup. When firms utilized cost-plus pricing in price-setting procedure, they commonly priced on cost plus stable mark-ups or on cost plus increasing mark-ups. Finally, a list of several motivations for changing prices was presented to firms and they were required to place them in order of importance. *Response to competitors' price change* was ranked highly by the greatest number of firms; furthermore, *changes in costs or demands* were also recognized as important by many firms.

The survey results tell us the price-setting behavior of typical companies in Sweden. The sample under investigation represented the firms that set prices themselves, had one to eleven competitors in market, had a large share of their sales to regular customers, and directed sales mainly to businesses. These companies followed time-dependent pricing or state-dependent pricing reviews and more than half of them reviewed prices one time a year. Prices in these companies were also changed slowly, only once per year on average. The survey showed that prices were more sticky in companies that were smaller, belonged to manufacturing sectors, had fewer variable costs, transacted with more regular customers, and confronted fewer direct competitors. The results of the rankings of alternative theories of price stickiness and motivations for adjusting prices showed that the worry of breaking up long-run relations with their customers, the reaction to their competitors' price adjustment, and the stickiness of cost changes could contribute to the low frequency of price adjustment.

4.3 Survey of the price-setting behavior of Canadian companies

From July 2002 to March 2003, a survey designed to detect the pricing behavior of Canadian companies was made by the Bank's regional offices. 170 companies were

selected to represent companies for their price-setting manners (Amirault, Kwan, and Wilkinson, 2004). The sample companies were classified by industry sector, firm size and regional distribution. The sample involved every industry area, various company sizes and all main regions, so they were symbols of Canadian companies. And the whole survey was conducted by directly interviewing senior staff of the companies by professional economists in the Bank, which ensured the quality and reliability of the survey results.

During the survey process, firms were first asked about their basic characteristics to better analyze their price-setting behavior. Then the key questions on the frequency of price adjustment and reasons to stimulate price changes were put forward. The results showed that the most frequent price changes was once a year, indicated by 27 percent of respondents, a further 8 percent claimed that they didn't change prices even once in the past 12 months. The median number of price adjustment was four times a year, thus prices were much more flexible than in the preceding two surveys. The explanations for the more flexible prices were strengthened competition, widely-spread information technology, and enlarged instability of input costs. Firms in more competitive market tend to adjust prices more often to increase their competition power and avoid being eliminated by their rivals. The rapid development and great use of information technology have made price reviews and adjustment easier, which lead to the increased frequency of price changes. With the enhanced variability of input costs, prices respond symmetrically to costs change. Again, the median number of price adjustment varied with firm characteristics, such as industry sectors, firm scale, share of export sales in total sales,

number of competitors, and the chosen type of price reviews. The following Table 4 (David Amirault, Carolyn Kwan and Gordon Wilkinson, 2004, page 34) gave us a comprehensive view.

Table 4 Characteristics that affect the median number of price adjustment

Characteristics affecting number of price changes	Median number of price changes
Total Sample	4
Industrial Sectors	
Construction	5
Manufacturing	4
Retail and wholesale trade	7
Transportation, information, and cultural industries	3
Finance, insurance, and real estate	4
Other commercial services	1
Company size	
Small (less than 101)	2
Medium (101-499)	4
Large (more than 499)	10
Number of competitors	
0-5	2
More than 5	4
Sale distribution	
Export sales less than half of total sales	3
Export sales at or more than half of total sales	9
Type of price reviews	
Time-dependent	2
State-dependent	10

The table clearly illustrates the variations in the median number of price changes per year with the influence of various characteristics. As for industrial sectors, prices in retail and

wholesale trade were most flexible, say with adjustment of seven times a year, the reasons being the influence of competition and the lower share of regular customers in total customers. Next to retail and wholesale trade, flexible prices could be observed in the construction sector, where the frequency of change in prices was five times one year. The stickiest prices existed in other commercial services, where price changes occurred once a year. These findings were consistent with those of the survey made for UK companies. In the case of firm scale, the number of median price changes differed. Large firms with more than 499 employees adjusted their prices more often than median and small firms, ten times a year versus four and two times a year. Costly price adjustment might account for the difference, since larger firms can assume costs tied to price adjustments. Firms competing with more than five rivals tended to change prices twice as often as firms facing less than five rivals, as intense competition compelled firms to make changes in their prices to attract customers and survive in the market. The share of export sales in total sales also had an effect on the frequency of price adjustment. Firms having a larger share of export sales had higher tendency to alter prices, for prices exposed to foreign markets were set flexibly, while firms with most of their sales in the domestic market had fewer price changes. Whether firms reviewed prices at specific time intervals or in response to particular events affected the median number of price adjustment. Firms applying state-dependent price reviews change prices far more frequently than do firms following time-dependent price reviews, since state-dependent price reviewers reacted at once to a shock by varying their prices and didn't wait for a certain time. The survey results indicated that firms change prices five times more frequently under

state-dependent rule than under time-dependent rule.

Several possible factors that might cause firms to alter prices were included in the questionnaire and we discovered that *price changes by competitors* was the most common reason urging firms to adjust prices. Next cited important factors were *change in domestic input costs* and *change in demand for product/service*. Simply, prices respond to changes in supply and demand. Finally, respondents were asked to assess a number of theories of price stickiness, eleven theories were showed to them to see the degree of recognition. The results are provided in Table 5 (David Amirault, Carolyn Kwan and Gordon Wilkinson, 2004, page 37).

Table 5 Percentage recognition of theories of sticky price among firms

Theories	Percentage recognition
Cost-based pricing	67.1
Customer relations	55.3
Explicit contracts	45.3
Non-price adjustment	44.1
Coordination failure (rising prices)	41.2
Low inflation	33.5
Implicit contracts	31.8
Coordination failure (falling prices)	31.2
Factors do not change	31.2
Menu costs	21.2
Sticky information	13.5

Cost-based pricing was recognized by 67.1 percent of the firms, and ranked as the most popular theory regarding the explanation of keeping prices stable. *Customer relations*, the

theory indicates that price adjustment is sluggish as a result of maintaining customer relationships, was the second most popular explanation. More than half of the respondents showed awareness of it. *Explicit contracts* and *non-price adjustment* were also considered important in explaining slow price adjustment. Regarding *coordination failure*, it explained more in keeping prices from rising than in keeping them from falling, as evidenced by 10 percent more firms that viewed coordination failure as an explanation in holding prices high. *Low inflation* was recognized by 33.5% of firms as a source of price inflexibility. *Sticky information*, the idea that information that needs to be obtained to call for a change in price is not available promptly, was the least popular among firms.

The findings of the survey display the features of price-setting behavior in Canadian firms. Prices are not so sticky as they once were — the median frequency of price adjustment is four times per year. Increased competition, widely-used information technology, and enlarged instability of input costs give rise to increased flexibility in prices. Firm-linked characteristics affect the frequency of price changes to some extent. Firms in commercial service sectors, of small size, having fewer competitors, with a lower proportion of sales in foreign countries and following time-dependent price reviews have less incentive to change prices. As for the causes of price variation, the change in competitors' prices and shocks in demand and supply are cited as most important. In the rankings of a number of theories for why prices are sticky, the four highest-ranked theories are *cost-based pricing*, *customer relations*, *explicit contracts*, and *non-price adjustment*. Firms understand them as the reasons why there exists inert prices.

4.4 The combination of the three reviewed price-setting surveys

We go to great length in the preceding part to go through the process and main findings of firm-based price-setting surveys made by the Bank of England, the Bank of Sweden, and the Bank of Canada respectively. We select these three surveys to investigate why prices react slowly to changes in the economic environment. Obviously, they have some common design. In this part, we will make a comparison of these three similar surveys and would like to examine whether the empirical findings of price stickiness provide a strong support to Post Keynesian pricing theory. The comparison of the three surveys is conducted by producing Table 6 in terms of survey features such as timing, organizers, sample size, and representative of the sample, survey results such as frequency of price reviews, price-reviewing rules, median number of price adjustments, the influence of company's characteristics on the frequency of price changes, and the most highly ranked explanations for price stickiness.

Table 6 The comparison of three similar price-setting surveys

	United Kingdom	Sweden	Canada
Survey features			
Timing	September 1995	March-May 2000	July 2002-March 2003
Organizer	The Bank of England's Agents and Business Financial Division	Statistics Sweden and Swedish central bank	The Bank of Canada's regional offices
Sample size	654	626	170
Representative of the sample			
Industry	Mainly manufacturing sectors	Only manufacturing and service sectors	All sectors
Firm size	Majority of large firms	All size	All size
Regional distribution	All regions	All regions	All regions

Random sample	Not random	Random	Not random
The type of products in response to the survey questions	Specific, main product	Main product sold to main type of customer	Main product
Survey results			
Median frequency of price reviews	Monthly	Annually	—
Price-review type (percentage of respondents)			
Time-dependent	79%	44.8%	About two-thirds
State-dependent	11%	47.23%	—
Median frequency of price changes per year	2	1	4
The highest frequency of price changes per year reported by respondents	1	1	1
The effect of company characteristics on the frequency of price changes (In which firms do sticker prices occur?)			
Industry grouping	Other services	Manufacturing	Other commercial services
Company size	Small (less than 100 employees)	Small (5-19 employees)	Small (less than 101 employees)
Number of competitors	Few (0-5)	Few (0-3)	Few (0-5)
Market share	Great proportion (more than 40%)	—	—
Length of customer relationships	Large proportion of long-term customer relationships (>75%)	Relatively more regular customers	—
The share of variable costs of all costs	—	Small (<50%)	—
The share of export sales of total costs	—	—	Small (<50%)
Price-review types	—	—	Time-dependent
The top five ranked theories of price stickiness	Cost-base pricing Implicit contracts Explicit	Implicit contracts Cost-based pricing Explicit	Cost-based pricing Customer relations Explicit

	contracts Procyclical elasticity Pricing thresholds	contracts Coordination failure Countercyclical cost of finance	contracts Non-price adjustment Coordination failure
Highly ranked causes for changing prices	—	Price changes by competitors Changes in costs for foreign inputs Changes in demand for article/service	Price changes by competitors Change in domestic input costs Change in demand for product/service

As shown in the comparison table, prices in the sample respond slowly to changes in market conditions. Although prices in Canadian firms are relatively flexible compared with those in two other countries, these firms yet don't promptly adjust prices in response to shocks in demand and supply. Combination of the three surveys tells us that there are common factors leading firms to change prices sluggishly — slow variation in input costs and obedience to contracts, explicit or implicit. On the other hand, what triggers firms to change prices are price changes by competitors and changes in demand and supply. Since the surveys focus on the actual behavior of prices, price stickiness can be easily considered as a normal phenomenon for firms, as evidenced by the small frequency of price adjustment per year in all three countries. This supports the Post Keynesian perspective. Different from the view of mainstream economics, firms don't merely pursue profits maximization. Firms' pricing decisions are based on the consideration of customer relations and competitive pressure. These factors are not so certain as maximization of

profits, therefore, firms take decision under conditions of uncertainty. This is consistent with the Post Keynesian view of pricing, since Post Keynesians apply an open-system methodological approach to analyze economic phenomenon, they conduct their analysis on the assumption that firms act under conditions of uncertainty. The survey evidence shows that firms view long-term customer relationships as important and take into account competitors' prices when setting prices and taking pricing decisions. Meanwhile, it is apparent that firms apply cost-plus pricing: firms set prices on the basis of cost plus markup to cover costs and generate profits. Empirical evidence indicates that *cost-based pricing* is the theory of price stickiness that firms in three countries ranked highly as the important explanation of why they delay price changes or hold prices unchanged. In this point, prices are set in advance of trade, because firms need to ensure that costs are covered by the set price, and costs are known before the trade gets started. Moreover, change in prices is in relation to cost changes, and it is the sluggishness of cost changes that cause the slow adjustment in prices. This result strongly supports the core Post Keynesian perspective on pricing. It is admitted that to some limited extent firms do change prices in response to shifts in market conditions, but this decision-making is not planned in advance. Firms usually make decisions contingently. As revealed in the survey results, a majority of firms adjust prices by following their rivals' steps. All three surveys mention that firms report that they compete with at least a few known direct competitors, and they can not foresee their competitors' decision of pricing. Obviously, firms don't initially plan their pricing decisions. And this again is consistent with the Post Keynesian perspective. (Downward, 2001)

In short, survey results provide empirical evidence that slow price adjustment is understood as normal to firms. Although there are a number of causes leading firms not to change prices from their initially set prices, cost-based pricing is a prevalently recognized reason that inhibits them from varying prices frequently. Prices are made up of costs plus a percentage mark-up, so cost-driven price changes pervasively exist. Admittedly, to some extent firms adjust their prices in response to changes in economic environment, however, these pricing decisions are not pre planned — firms make pricing decisions with contingencies in mind and they often look to their competitors' prices. Survey results indicate that firms are conscious of their rival prices and likely to adjust their prices when their competitors make price changing decisions ahead of them. The price-setting process, decision-making procedure, and the behavior of prices are entirely consistent with Post Keynesian pricing theory.

5. Conclusion

This paper puts forth reasons for the existence of price stickiness, presents multiple theories of price rigidity, outlines a Post Keynesian pricing theory, and draws upon the price-setting studies conducted in the UK, Sweden and Canada to examine the actual behavior of prices. The procedures and findings of each survey are reviewed and a comparison of the three surveys is made. These three surveys are conducted in a similar way — the sample is chosen to be representative of various firms, questions regarding the frequency of price reviews and changes are asked, assessment of a number of theories of price stickiness is carried out, and the reasons for holding up price adjustment are studied.

Therefore, they are comparable. Our purpose is to see whether survey results support the Post Keynesian perspective of price stickiness.

The methodological emphasis of Post Keynesian pricing theory implies that firms operate in an open system, where only some of the relevant variables are known, and where the structures and mechanisms are not stable and unchanging. In the case of investigating pricing, firms' behavior of pricing is examined under conditions of uncertainty. Consistent with this view, results of the surveys manifest that firms set prices in pursuit of several objectives. Customer relations and competitive pressure are taken into account by firms when determining their prices. Firms adopt cost-plus pricing to set their prices, adding a mark-up to costs. In addition, firms are conscious of their rivals' prices, and tend to change their prices following up on their rivals. This justifies that firms' determination on price adjustment is not made with a plan worked out beforehand. Empirical evidence offered by the conducted surveys is totally in line with the Post Keynesian pricing perspective.

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