# Links between Competition and Inflation[*]

by

Marcus Asplund and Richard Friberg

Stockholm Scool of Economics

Box 6501

SE-113 83 Stockholm

nema@hhs.se, nerf@hhs.se

## Abstract

The U.S. has recently experienced a prolonged period with high growth, low and falling unemployment, and low inflation. One popular view is that "competitive pressures" have kept inflation down in the U.S., as well as in other developed countries. In this survey we discuss the empirical evidence of the relation between inflation and the intensity of competition.

First, we examine the evidence on whether the intensity of competition affects the *speed* of price adjustment. We argue that the many studies proxying the intensity of competition by some measure of industry concentration face serious methodological problems. When we also consider the studies measuring the intensity of competition more precisely, the bulk of the evidence supports that less competitive markets are *slower* to adjust prices.

Second, we examine two prime candidates to a general increase in the intensity of competition that may have had a temporary downward pressure on prices; deregulation of markets and international trade. For the many previously regulated markets (c.f. airlines, telecommunications, electricity) we argue that the nature of deregulation was so heterogenous that it may be misleading to draw any conclusion about the impact on price levels. Trade liberalization, on the other hand, has been shown to intensify competition but the magnitude

of the effects are unknown. Finally, evidence is in favor of the notion that competition exerts a downward pressure on costs and thereby indirectly on prices.

# Entering a new era?

The U.S. has lately combined sustained high growth and falling unemployment with low inflation. In response to this it has been claimed in the popular debate that the U.S., and many other economies, are entering a new era. Krugman (1997) gives a brief account of the issues "Most economists believe that the US economy is currently very close to, if not actually above, its maximum sustainable level of employment and capacity utilization… So standard economic analysis suggests that we cannot look forward to growth at a rate of much more than 2 percent over the next few years. And if we – or more precisely the Federal Reserve – try to force faster growth by keeping interest rates low, the main result will merely be a return to the bad old days of inflation. However, many influential people – business leaders, journalist, and even a few reputable economists – do not accept that dreary verdict…their optimism is sometimes referred to as the 'new economy view', sometimes more grandly as the 'new paradigm'."

One building block of this 'new economy view' is the presumption that intense competition implies less inflationary pressure. Bootle (1997, p. 32) describes it in the following way: "The world is in the grip of overwhelming forces which are transforming the economic and business landscape and the lives of ordinary people. The roots of the economic changes ripping through society are diverse - …They all contribute to the emerging dominance of competitive markets. And in the context of anti-inflationary macroeconomic policies they have a dramatic result – the end of perpetual inflation in the west."

Evidence that this view is recognized by Swedish financial markets comes from Erik Feldt, Chief Analyst at Nordbanken Trading, "Paradigm shifts occur extremely seldom – the last time it happened in the true sense of the word is probably when geocentrism was abandoned – but perhaps is it nevertheless the case that we see a new economic picture emerging, where high growth and low unemployment no longer need imply rising inflation. Cutthroat international competition and increased global trade imply that it is increasingly difficult for firms to raise their prices [Feldt (1998, p. 41), our translation]."[1] The intuition that the above mentioned observers seem to share is the following; the tougher the competition, the more

---

[1] See also Veckans Affärer, September 1997, "VA-special: The new economy- a Swedish miracle" .

difficult is it to raise prices. Since inflation is observed as rising prices, inflation will disappear in the new, more competitive environment.

Right or wrong, the popular idea that stronger competition is associated with less inflationary pressure is thus an issue worth exploring. One objection against "the new economy view" is that the remark "if firms are faced with intense competition they will not be able to raise prices" lacks relevance for links between competition and monetary policy. It is certainly true that if the firm is a price taker it can not raise its price in response to a firm specific cost shock. But a monetary shock is not something that affects only one firm – it is something affecting all firms. Another objection is that economists generally agree on that inflation, in the long run, is a monetary phenomenon. In the long run we are convinced that doubling the money stock will be associated with a doubling of all nominal prices (i.e. relative prices are invariant). Taking the new economy view at face value is therefore at odds with one basic property of macro economics; the long run neutrality of money. However, it is fairly uncontroversial that in the short- to medium run monetary policy may affect relative prices and thereby real variables.

In this survey we are interested in the short- to medium run behavior of prices and their relation to the competitiveness of markets. We also note that inflation is measured by changes in prices, for this reason we analyze some institutional changes which are often believed to have contributed to falling prices within certain sectors - a real and temporary phenomenon.

The questions we focus on are the following: Do more competitive markets have different price adjustment patterns? Does the market structure affect the rates of price change? If so, has there been any significant change in the competitiveness of markets or market structures that can help to explain low inflation in some developed countries in the last decade? Before proceeding it is necessary to make one important caveat about our ambitions with this survey. A full treatment of the causes and effects of inflation requires a general equilibrium analysis which is far beyond the scope of our work. Available general equilibrium models focus on the question of why prices are sticky, and the implications for monetary policy and transmission - not on the speed of price adjustment under varying intensity of competition.[2] Instead we intend to illustrate a few mechanisms that relate the rate of price changes to competitiveness.

---

[2] The focus has been on how frictions in some sector of the economy allow monetary shocks to have real effects, (the treatment in Blanchard and Fischer (1989, Chapter 8, remains a good introduction). Frictions are assumed

# Price responses and the intensity of competition

The purpose of the following section is to show that the price response of changes in demand or costs (for example due to inflation), not even in the simplest case, depends solely on the intensity of competition. For simplicity our discussion will concern the effects of cost shocks in a single market. Think of it as a increase in wages. A common misconception is that in more competitive markets a cost shock will be passed through to consumer prices to a lesser extent ("the recent increase in wages can not be passed on to consumers in today's highly competitive environment").

To see the flaw in the argument, consider the perfectly competitive and monopoly determination of prices. Figure 1a and 1b show two demand schedules, linear and constant elastic, together with constant marginal costs at two levels, MC < MC', $\Delta$MC=MC'-MC. We are interested in how changes in marginal costs are passed through onto prices, both in levels ($\Delta$P related to $\Delta$MC) and in percentage terms ($\Delta$P/P related to $\Delta$MC/MC).

The perfectly competitive outcome is price equal marginal cost (corresponding to points A and A'), irrespective of the shape of the demand function. The cost increase will be passed on fully to the consumer such that $\Delta$P=$\Delta$MC and $\Delta$P/P=$\Delta$MC/MC. In the monopoly case (B and B'), on the other hand, the shape of the demand function will determine whether the cost will be passed on more or less than completely. With a linear demand function the price will respond by less than the change in costs, whereas in the case of constant elastic demand price will change in proportion to the cost.

A first answer to the question if more competition leads to cost changes being passed through to prices to a lesser extent is that the price change depends on the shape of the demand function as well as the degree of competition. Of course the shape of demand functions will differ across products, and there is no strong reason to expect one shape to be more common than the other. In between the extremes of perfect competition and pure monopoly lies all

---

either in direct costs of adjusting prices or in the wage formation. This literature generally uses constant elasticity form of the demand function which implies constant markups (given the elasticity of demand). Other firms' prices enter the decision problem only through the aggregate price level. Higher elasticity of demand would imply a lower markup but adjustment would still take place in one step. One exception is Bergin and Feenstra (1998) who use a demand function derived from a translog utility and have firms using products from other firms as inputs.

forms oligopolistic competition, which will have their own pass-through coefficients (see Dixit (1986) for some comparative statics). For example, a market where oligopolistic firms set their quantities of a homogenous good will have less (more) than complete pass-through of costs if the demand is linear (constant elastic), but will be closer to full pass-through than a monopoly with the same demand function. Thus a given cost change will feed into prices in the short run differently depending on such factors as the nature of competition *and* shape of the demand function. There is not a one-to-one mapping between the competition and price response to shocks.

In the simple diagrammatic exposition there is no adjustment process as the price moves directly to the new equilibrium. This implies that the figure shows the "ultimate" pass through of a cost change, not the short run adjustment process. What we will discuss in the following are predictions and evidence on changes in prices as a function of the market structure, i.e. inflation and market structure.

## **Outline of the survey**

Clearly a simplistic analysis as the above yields no unambiguous predictions for how prices respond. In the following we will therefore provide an examination of the relevant research in the area.

Firstly, would firms in a more competitive market adjust prices at a slower rate in response to cost (and/or demand) shocks than in a less competitive market? The next section surveys the theory and empirical results that are available to shed light on this issue.

Further, almost by definition, a period of strengthening competition implies falling prices. If we start out with an imperfectly competitive equilibrium, and then for some exogenous reason competition is intensified, we would expect falling prices until a new equilibrium price is reached. In an inflationary environment these falling prices would show up as "lower inflation" in a given sector. Such low inflation would persist only until a new equilibrium was reached and thus be a one-time effect on price levels. The deregulation of many industries and globalization of markets are often mentioned as factors leading to increased competition, we survey the evidence on this.

Finally, we discuss the indirect link of competition on cost efficiency, which will translate into prices.


## **Competition and the speed of price adjustment**


We first focus on how the extent of competition influences the speed of price adjustment. Will intensified competition lead to prices reacting less rapidly? There are a number of theoretical papers studying the relation between the speed of price adjustment and competition in an industry. Theoretically it is clear that under perfect competition adjustment to a common shock will be instantaneous whereas once we allow for market power, adjustment may be more drawn out. As we leave perfect competition and study speed of adjustment under varying degrees of imperfect competition the results are ambiguous.[3] Theory shows that the speed of price adjustments depends on many factors apart from the intensity of competition, for instance the shape of demand, and on the direct costs of adjusting price. As often is the case in issues relating to Industrial Organization we thus have a wealth of theoretical results and need to establish empirical evidence.

The classical references on price adjustment in different markets are Mills (1927) and in particular Means (1935). Means noted that prices in some markets responded much less to the Great Depression than prices in other markets. For instance he noted that prices of agricultural products (where there are many sellers) fell by 63 percent in the early 1930's whereas prices of agricultural implements (a highly concentrated sector) fell by only 6 percent. Means formulated the idea that prices in many markets were "administered" and failed to clear markets. He suggested that the failure of prices in concentrated markets to adjust was one cause to the severity of the depression. A more recent study is Carlton (1986) who among other things notes that the correlation between concentration and price rigidity is positive –

---

[3] One vein of the theoretical literature studies how the nature of adjustment costs affects the speed of adjustment and uses the degree of market concentration as the measure of competitive pressure, Ginsburgh and Michel (1988) and Worthington (1989). Another strand of the literature takes the physical adjustment costs as given but allow the parameters of the demand function to vary. Specifically C. Martin (1993) shows that (for the case of monopolistic competition) prices adjust more rapidly as the elasticity of demand increases, that is as firms have less market power. For the case of oligopoly he finds that more collusive behavior tends to reduce the speed of adjustment. Or equivalently, on more competitive markets prices should respond more rapidly to changes in the environment.

prices tend to be more rigid in concentrated industries. However, that prices tend to be more rigid in some industries may merely reflect that there are fewer shocks to demand or costs which would motivate a price change. Simple correlations are thus not enough to establish that more concentration implies more rigid prices.

Accordingly, we need to account for factors that would motivate a price change. This is the path taken by an approach that can broadly be described as a two-stage procedure. First a price adjustment equation is estimated using prices from different markets, to obtain a parameter $\lambda$. This parameter measures the speed of adjustment towards the optimal (frictionless) price, i.e. the price that would be set if there were no costs associated with price changes. [4] In estimations the optimal price will vary with cost- and demand-shocks, which are typically proxied by relatively crude measures. Also price data are usually indexes taken from official statistics and do not correspond to prices of individual products.

In a second stage the relationship between the speed of price adjustment ($\lambda$) and structural variables measuring competition (in the majority of cases market concentration) is estimated. Below we summarize the literature that follows this kind of methodology. A number of criticisms can be directed at the methodology of many of the studies – we return to that issue further below. Good surveys of the literature on the nature of price adjustments more generally are Carlton (1989), S. Martin (1993) and van Bergeeijk and Haffner (1996). Encaoua and Geroski (1986) give extensive references to earlier work.

Table 1 about here

What conclusions can be drawn about the speed of price adjustment and the strength of competition (measured by concentration)? There is a marked tendency towards finding that stronger competition is associated with more rapid adjustment. Domberger (1979) and Kardasz and Stollery (1988) are the only studies to find strong effects in the other direction. The findings of the two diverging studies can hardly be explained by reference to the choice

---

[4] More formally a price adjustment equation is estimated on prices from different markets,

$$p_t = \lambda\, p^*_t + (1-\lambda)\, p_{t-1}$$

$p$ is the price in period $t$ and $t-1$ respectively and $p^*$ is the optimal (frictionless) price. $\lambda$ is the speed of adjustment towards the optimum price. An estimated $\lambda$ of unity thus implies instantaneous adjustment and lower

of countries, industries or time period. While Domberger (1979) finds a positive correlation for the U.K., Encaoua and Geroski (1986) find a negative correlation for the same country, with a partially overlapping time period. Kardasz and Stollery find a positive correlation on 3-digit level Canadian data for the period 1971-82, Jones and Laudadio (1990) find the reverse result for the same time period and country. Before evaluating the implications of the above results let us discuss some of methodological problems that the above empirical studies are faced with. As this survey is concerned with links between inflation and competition, the measurement of the latter is crucial - to what extent can we trust that the results are informative of the relation between the speed of price responses and the intensity of competition?

Most of the studies that have examined the relationship between speed of price adjustment and intensity of competition have proxied the latter with a measure of firm concentration. Despite popular belief that concentrated markets are less competitive than fragmented ones it remains an empirical issue. From the early work in the 50's there has been a literature that used the paradigm that observable structural characteristics (such as market concentration) determined firm conduct (the intensity of competition), which in turn lead to observable performance measures (such as profitability). The paradigm is accordingly referred to as the Structure-Conduct-Performance (SCP) paradigm.

The early studies often found a positive relation between firm concentration and profitability in cross section samples of (aggregate) industries. Later studies in general failed to find any strong correlation when controlling for other factors, such as advertising and R&D intensity, scale economies, and capital intensity. As of today it is widely accepted that the intensity of competition within an aggregate industry can not be described by a one dimensional measure such as firm concentration. Indeed, Schmaleense's (1989, p. 976) survey of the existing literature summarizes by noting: "The relation, if any, between seller concentration and profitability is weak statistically, and the estimated concentration effect is usually small. The estimated relation is unstable over time and space and vanishes in many multivariate studies."

Part of the reason why the intensity of competition is difficult to measure by firm concentration at the industry level is that industry classifications at the two to four digit level

---

λ's imply a more drawn out adjustment process. In step two the relationship between λ and structural variables measuring competition is estimated.

very rarely corresponds to 'markets' where the included firms compete. Thus, the results from studies in Table 1 which use data from two to four digit S.I.C. industries should not be viewed as giving definite information about the relation between the intensity of competition and speed of price adjustment.

Without going into any details of the other methodological problems of the above studies, it is fair to say that the empirical determination of the intensity of competition has shifted in the last decade towards studies of narrowly defined industries or single markets. This is done by studying time series data of one industry, and/or different geographical markets within the same industry. In addition, the intensity of competition is often measured by the price level rather than with some often distorted profitability measure. There are far fewer studies in this tradition as of today, but support is common for the hypothesis that the intensity of competition (now measured directly by the price level) is softer in more concentrated markets. For example, Schmalensee (1989, p. 988) states "In cross-section comparisons involving markets in the same industry, seller concentration is positively related to the price level."

This implies that firm concentration may proxy the intensity of competition when the market is appropriately defined. Now return back to the question of the relation between the intensity of competition and speed of price adjustment. We wish to emphasize the studies based on data from regional markets (gasoline and retail banking) in Table 1; Borenstein and Shepard (1997) and Jackson (1997). Common to both is the possibility to control for input cost changes, (crude oil prices or security interest rates), and measure concentration more precisely than in the aggregate industry studies. Borenstein and Shepard find support for the hypothesis that markets which are less competitive (measured by market concentration) have slower price adjustment. The result is the same when price-cost margins are used as a measure of the intensity of competition. Jackson argues that the firms in the most *and* the least concentrated markets have the slowest price adjustments.[5]

Although there are no studies of Swedish markets which are directly comparable to those listed in Table 1, some of the results in our studies of the gasoline and mortgage loans market

---

[5] In related work, using a discrete choice model, Hannan and Berger (1991) find that firms in more concentrated banking markets are less likely to adjust their prices for a given cost change. Finally, the results of Neumark and Sharpe (1992) indicate that banks in more concentrated markets are slow to increase their deposit interest rates but fast to reduce them.

can serve as a reference. In Asplund, Eriksson, and Friberg (1997) we looked at the pattern of price adjustments in the retail gasoline market 1980-1996. Over the sample period the market became more concentrated (due both to entry/exit and firm growth) which one would suspect should lead to changes in the price adjustment pattern. When examining the speed of price adjustment on monthly data the results showed a striking stability over the entire period. In Asplund (1998) the Swedish mortgage loans market 1989-1995 was the object of interest. Again the market structure changed and again there is little indication of a change in the speed of price adjustment. Controlling for the default risk of the firms, there was no change in the price adjustment to a given change in cost over the period. In contrast to the gasoline retail market there was, however, a significant change in the size of the "markup".

What then do the above studies tell us about the connection between the strength of competition and inflation? Do more competitive industries exhibit lower inflation? We noted that in the long run, inflation is a monetary phenomenon. It implies that the long-run price response to a monetary expansion should be independent of the market structure. Should we expect a more or less rapid adjustment process in a more competitive market? Due to methodological problems we found that it is difficult to make definite statements about whether the intensity of competition has any significant effects on the speed of price adjustments. Nonetheless, the majority of the earlier studies, as well as the recent studies of well defined markets, suggest that more competitive industries have faster price adjustment. This would point in the direction that fiercer competition is associated with higher inflation, in the sense that prices respond more rapidly following a monetary shock. A result at odds with "the new economy view".

## **Changes in the intensity of competition?**

More or less by definition intensified competition leads to lower prices. If the competition is increasing due to some change in the market conditions then a firm with market power will be forced to reduce its price (to bring it closer to the perfectly competitive price). However, this is only a temporary effect in price levels, and may not have any impact on the speed of price adjustments or on the inflationary process in the long run.[6] In the following we will analyze

---

[6] We should however point out that also adjustments to one-time effects takes time and that institutional aspects of potential relevance for the intensity of competition change frequently.

the empirical evidence of price effects of two frequently mentioned factors behind intensifying competition, deregulation and trade liberalization.

**Deregulation**

Many countries have seen a change in regulations of the competitive environment over the last decade or so. Several important, previously highly regulated, markets have been deregulated (or, more correctly, have experienced a reregulation), beginning in the late 70's in U.S. and continuing in the early 80's in the U.K. and spreading to the rest of Europe later in the 80's. The magnitude of the deregulations can be illustrated with the U.S., where the share of output produced in fully regulated industries dropped from 17% in 1977 to 6.6% in 1988, Winston (1993). Well known examples include airline, railroad, electricity, banking, and telecommunication industries, and many of the regulations were introduced with the explicit purpose of increasing the competition.[7] This followed from the presumption that if an imperfectly competitive market was deregulated it would lead to more competition and correspondingly lower prices.

However, the nature of the regulations differed substantially across industries and countries. Taking airlines in the U.S. as an example, the prices were previously regulated such that long haul flights had prices above marginal cost whereas short haul flights did not cover marginal cost. The reason that the structure could be sustained was that entry and exit from routes were also subject to regulatory approval. This form of regulation lead to several adverse incentive effects, for example to capture market shares on the profitable long haul flights service levels and flight density were increased. Deregulation will have ambiguous effects on prices. Short haul prices would be expected to rise and long haul prices fall. Moreover, the distribution of prices within each category will change (frequent flyer discounts, coach fares). This example illustrates that it is rarely possible to give a precise number on the magnitude of price change following a deregulation.

The other major problem in assessing the impact of deregulation is that other factors are also changing. Again referring to the airlines, over the course of deregulation the fuel prices and other costs changed which fed into prices. It is therefore not sufficient to compare prices

---

[7] For some up to date surveys of important industries see Waverman and Sirel (1997) for European telecommunications and Joskow (1997) on electricity in the U.S.

before and after the deregulation. Finally, deregulation should *not* be expected to transform an imperfectly competitive industry into a perfectly competitive one; few would argue that the U.S. airline industry post deregulation is characterized by perfect competition.

Having stated the problems with any empirical assessment of price effects of deregulation it is not surprising that Joskow and Rose (1989, p.1464) states that " Depending on the industry, type of regulation, time period, and norm for comparison, regulation has been shown to increase prices, decrease prices, distort the structure of prices in a variety of different ways, and sometimes to have no significant effect on prices at all." However, the picture is not all that bleak if we want to make an overall judgement on price effects. The evidence surveyed in Winston (1993) and Joskow and Rose (1989) points to that, on average, in most of the deregulated (primarily U.S.) industries competition has been intensified and prices have fallen. It should be noted that very few of the studies attempt to quantify the price effects of deregulation.

To sum up the section: Deregulations have had a competition increasing effect which on balance have exerted a downward pressure on prices (although results from individual markets differ substantially). However, this is a temporary effect on the price levels, and not on the pass-through of shocks in long run equilibrium.

**<u>Trade liberalization</u>**

The other major factor thought to increase competition has been the liberalization of trade. Since World War II there has been an ongoing reduction of tariffs and other trade barriers in Sweden and the rest of world alike. Reduction has been driven both by global agreements such as GATT and regional trading agreements such as EU and NAFTA. Sweden's entry into the European Economic Space and the European Union has brought us the ongoing reduction of barriers to trade associated with the EU "single market" program. Common wisdom suggests that liberalization of foreign trade should bring stronger competition - in its turn this will bring falling prices, other things being equal.

What is then the empirical evidence on trade liberalization bringing about stronger competition? There is a large literature in the Structure-Conduct-Performance tradition that Schmalensee (1989, p.976) summarizes as finding "The ratio of imports to domestic

consumption tends to be negatively correlated with the profitability of domestic sellers, especially when domestic concentration is high." Much of the same criticism that we directed at the SCP paradigm when discussing the literature on the speed on of price adjustment is valid when discussing this literature as well. It is telling that, in his survey in the Handbook of International Economics, Feenstra (1995) does not mention this older literature at all when discussing the effect on domestic markups from trade liberalization. Instead he bases his conclusion (p. 1564) "Weak evidence that markups have fallen for some developing countries [when trade liberalization occurs]" mainly on studies by Levinsohn (1993) and Harrison (1994).

Levinsohn (1993) uses annual plant level data on inputs and output for a large number of manufacturing firms in Istanbul during the 1983-1986 period. The natural experiment in the form of a dramatic liberalization of Turkish imports took place in 1984. Levinsohn's results are consistent with the notion that trade liberalization decreases markups. Harrison (1994) tests the hypotheses on a panel of 246 firms in the Cote d'Ivoire for the period 1979-87. Her results also point in the same direction.[8] There is thus some support in favor of what has frequently been called the "oldest insight in the area of trade policy and imperfect competition", namely that trade liberalization implies a downward pressure on prices of the domestic producers.

An indication that the competitive pressure induced by trade liberalization is limited, at least in the short run, is the pervasive evidence of goods having different prices on different national markets – the law of one price does not hold.[9] Flam and Nordström (1995) for instance study the European car markets for the period 1989-92 – pre-tax prices differ by up to 50 percent between national markets in the EU. Verboven (1996) estimates markups for a number of car models in five European countries in 1990. For instance he finds that for a Nissan Micra the markup varied from 8.1% in Belgium to 36.1% in Italy. In *one* truly competitive market such price and markup differences could not persist. The abolishing of tariffs has not been sufficient for a truly common market to emerge.

---

[8] Hansson (1992) uses Swedish 4-digit level industry data to examine the relationship between markups and the share of imports in consumption in industries. He suggests that the free trade agreement did lead to intensified competition.

[9] See Goldberg and Knetter (1997) for an excellent survey.

Another example comes from the banking industry, for instance Dell'Ariccia (1996) states "In the last ten years legal obstacles to trade in financial services have been virtually eliminated in many countries. Nevertheless retail banking markets have remained concentrated and dominated by domestic banks."[10] The point of these examples is that there are many mechanisms other than tariffs that serve to segment national markets. As noted by Goldberg and Knetter (1997) economists still have inconclusive and limited evidence on the relative importance of various mechanisms. Exclusive dealerships, national firms controlling the distribution networks, subsidies and public procurement practices are some of the mechanisms that allow firms to segment markets along national borders.

As observed in the introduction, an argument that sometimes appears in the popular debate runs something like this: "If there is stronger competition from abroad it will be harder for domestic producers to raise prices when there has been a monetary expansion". In answering this question one must not forget that in standard theory a monetary expansion is associated with a depreciation of the expanding country's exchange rate. A reformulation of the question could thus be: Does a high import share lead to low exchange rate pass-through? Will import prices be affected little by a depreciation of the domestic currency when the market share of foreign firms is high?

The theoretical models in Dornbusch (1987) and empirical and theoretical results of Feenstra, Gagnon and Knetter (1996) point in the opposite direction – the larger the share of producers in an industry that come from abroad, the more will prices rise following a monetary expansion/depreciation of the domestic currency. This is intuitive. When there are only domestic producers the price will essentially be independent of the exchange rate, and with no domestic producers the price will be highly dependent on the exchange rate.

A general equilibrium analysis of related issues is found in Rogoff (1985). Rogoff predicts that a more open economy will have a lower rate of inflation. However, the hypothesized mechanism is very different from the simple view that "it is difficult to raise prices when there are many foreign competitors". First, related to the argument above, is that a monetary expansion will lead to a depreciation of the exchange rate, and thereby have a greater impact

---

[10] Dixon (1993, p. 119) makes a similar observation "even in those countries like the UK, where the market has been completely open to foreign banks for over a decade, many aspects of banking have remained predominantly national concerns. This is because there are many unofficial barriers, and these have perhaps even more of an effect in restricting foreign banks from entering than do official barriers."

on prices in a more open economy. Second, inflation is determined by a policy maker who wants to raise the level of activity in the economy by expansionary monetary policy but dislikes inflation (a standard assumption in the study of central banking and credibility). For a given monetary expansion, in a relatively open economy there will be little effect on output but a large increase in prices. In a more open economy it is thus less tempting for the central bank to surprise agents with positive monetary shocks, and consequently we will observe lower equilibrium rates of inflation.

The mechanism is thus the very opposite of the introductory "popular" view – that a more open economy would have lower inflation since its own firms could not raise prices when facing competition. D. Romer (1993) makes an empirical test of Rogoff's proposition and finds that more open countries have lower inflation (although no correlation exists among OECD countries).

What do we learn from this section? The evidence is broadly supportive of the notion that trade liberalization decreases markups, i.e. exerts a downward pressure on prices. As with deregulation this is a one-time effect on the price levels and the magnitude of the effects should not be exaggerated.


## Costs and efficiency

It is quite likely that competition will lead to a downward pressure on costs. Prices will reflect the costs of production. Thus it can be expected that increased competition will lead to falling (relative) price in a sector that has experienced increased competition. This has recently been brought to attention by the substantial privatizations of state monopolies and public utilities in many European countries. Citing the 'new economics' advocate Bootle (1997, pp.40-41) "The old, bloated public sector enterprises, so long a protected haven from competitive pressures, are now increasingly subject to the cold blast of competition as they have either been privatised, are being prepared for privatisation, or are left to live in fear of it….Wherever industries have been privatised, the results have been the same – a flood of job loses and a new focus on lower costs".

The arguments for that firms enjoying a protected market position tend to be less cost conscious (X-inefficient), are essentially of two kinds. First, in a highly competitive environment only the most efficient firms survive, any inefficiencies would lead to negative profits and exit. Likewise, in less competitive environments firms can survive even with some slack. Second, in highly competitive industries the incentive schedules of workers and management can be made more sensitive to performance which tend to improve efficiency. Taken as given that competition leads to an increase in efficiency and reduction in cost this will reduce prices. Now reinterpret the costs in Figure 1a and 1b as the costs of an efficient and a less efficient firm. In terms of Figures 1a and 1b, the direct effect of competition is the movement from B' to A', and the indirect cost reducing effect from A' to A. The first movement is that intensified competition leads to lower mark-ups, and the second is the cost pressure of competition.

There is an extensive literature that has attempted to test the prediction that the efficiency of the existing firms is positively related to the intensity of competition. Early studies such as Edwards (1977) found that banks in concentrated local banking markets had higher overhead cost, and Primeaux (1977) suggests that unit costs are lower in electric utilities facing competition. In a comprehensive recent paper, Nickell (1996) shows that lower monopoly rents (more intense competition) leads to higher factor productivity growth.

In addition, there is evidence from frontier production functions that competition has a cost reducing effect, see for instance Caves and Barton (1990), and Green and Mayes (1991). Scherer and Ross (1990 p.672) conclude "The evidence is fragmentary, but it points in the same general direction. X-inefficiency exists, and it is more apt to be reduced when competitive pressures are strong than when firms enjoy insulated market positions." Again, this is a temporary effect where we need to assume that the intensity of competition has actually increased - something which is not necessarily the case following a deregulation.

## **Conclusions**

The starting point for this survey was that in the long run inflation is a monetary phenomenon. Doubling the monetary stock leads to a doubling of nominal prices, after the dust has settled. However, in the short and medium run monetary policy can affect real variables. The issue is then if the time it takes for the dust to settle is dependent on the intensity of competition. What are the lessons from this survey? Our reading of the available evidence is that adjustment to shocks will be slower in less competitive environments. Stronger competition will then imply that a monetary shock feeds into prices sooner. When there is little markup to absorb shocks firms are forced to respond rapidly.

This fits well with the original observation by Means (1935) that initiated the literature on speed of price adjustment; prices responded slower in more concentrated sectors, presumed to be less competitive, during the Great Depression. The monetary contraction then had a limited price impact in the concentrated sectors and was associated with substantive quantity effects. It is worth pointing out that this implies that intensified competition reduces the scope for monetary policy as an instrument. The intuition is simply that the potential for monetary policy comes from various imperfections – take the economy closer to perfect competition and there will be less imperfections and thus less of a role for monetary policy.

The target for monetary policy (in Sweden as many places elsewhere) is a stable development of the consumer price index. Intensifying competition in a sector will bring about a one-time fall in the price of goods in that sector. Many changes have occurred that are commonly believed to increase competitive pressures. We have examined the evidence on deregulation, trade liberalization, and found some support for the notion this has lead to a downward pressure on prices. There is also evidence that intensified competition brings about more efficient production which will spill over into lower prices. Temporarily we will observe falling prices, other things equal.

What should be kept in mind is that the publicity given to strengthening competition in some sectors is not always proportional to their weight in the consumer price index. Take the much hailed Swedish deregulation of the telecommunication market as an example. There are good reasons to believe that it intensified competition which in turn lead to falling prices. However, it will have a negligible impact on the consumer price index (as it only weights as 2.1 percent). Another widely discussed case is the deregulation of the Swedish electricity market.

According to one informed observer, a best guess of the following fall in prices is about 15 percent, but its direct contribution to CPI is less than four percent.

There are of course indirect effects as both telecommunications and electricity are inputs in other industries. Even though there are many successful deregulations, and instances where competition has been intensified, it is difficult to argue that their aggregate contribution to the consumer price index will be significant. Having completed this survey, our reading of the evidence is that the primary explanation to low inflation rates in many countries in the last decade is not intensified competition. The most likely determinant is instead monetary policy and the expectations regarding future monetary policy.

Nevertheless, the extreme example of the OPEC collusive agreement of 1973 shows that changes in the competitive situation in markets may have a significant impact on the general inflation. This exemplifies that for the changes in the competitive environment to have any greater, albeit temporary, impact on the general inflation it needs to hit an industry that contributes substantially to CPI, either directly or indirectly. Apart from oil, sectors such as housing and food retailing are the ones to look at. There are reasons to believe that, at least for the latter, competition in Sweden during the last years has become fiercer. To examine the issue we are currently studying the price effects of changing competitive environment in some regional Swedish food retailing markets.

**References**

Asplund, Marcus, 1998, Why, when, and how do firms adjust their prices? Evidence from mortgage loans companies, mimeo, Stockholm School of Economics.

Asplund, Marcus, Rickard Eriksson, and Richard Friberg, 1997, Price adjustments of a gasoline retail chain, Stockholm School of Economics Working Paper Series no. 197.

Baldwin, Richard E. and Anthony J. Venables, 1995, Regional economic integration, in Gene M. Grossman and Kenneth Rogoff (eds.): Handbook of International Economics, Volume 3, North-Holland, 1597-1644.

Bedrossian, Arakel and Demetrios Moschos, 1988, Industrial structure, concentration and the speed of price adjustment, Journal of Industrial Economics 36, 459-475.

Bergin, Paul R. and Robert C. Feenstra, 1998, Staggered price setting and endogenous persistence, manuscript, University of California Davis. Available at http:/polar.ucdavis.edu/~feenstra/index.html

Blanchard, Olivier and Stanley Fischer, 1989, Lectures on Macroeconomics, The MIT Press, Cambridge, Ma.

Bootle, Roger, 1997, The Death of Inflation, Surviving and Thriving in the Zero Era, Nicholas Brealey Publishing, London.

Borenstein, Severin and Andrea Shepard, 1997, Sticky prices, inventories and market power in wholesale gasoline markets, manuscript, Haas School of Business, University of California, Berkeley.

Bradburd, Ralph M and Richard E. Caves, 1987, Transaction-cost influences on the adjustment industries' prices and outputs, The Review of Economics and Statistics, 575-583.

Carlton, Dennis W, 1989, The theory and facts of how markets clear: is industrial organization valuable for understanding macroeconomics?, in Richard Schmalensee and Robert D. Willig, eds, Handbook of Industrial Organization, Volume 1, North-Holland, 909-946.

Carlton, Dennis W, 1986, The rigidity of prices, The American Economic Review 76, 637-658.

Caves, Richard E. and David R. Barton, 1990, Technical Efficiency in U.S. Manufacturing Industries, The MIT Press, Cambridge, Ma.

Dell'Ariccia, Giovanni, 1996, Cross-border banking liberalization with asymmetric information, manuscript, Massachusetts Institute of Technology.

Dixit, Avinash K, 1986, Comparative statics for oligopoly, International Economic Review, 27, 107-122.

Dixon, R, 1993, Banking in Europe: The Single Market, Revised Edition, Routledge, London.

Dixon, R., 1983, Industry structure and the speed of price adjustment, The Journal of Industrial Economics 32, 25-37.

Domberger, Simon, 1979, Price adjustment and market structure, Economic Journal 89, 96-108.

Domberger, Simon, 1981, Price adjustment and market structure: a reply, Economic Journal 91, 1031-1035.

Edwards, Franklin R., 1977, Managerial objectives in regulated industries: Expense-preference in banking, Journal of Political Economy 85, 147-162.

Encaoua, David and Paul Geroski, 1986, Price dynamics and competition in five OECD countries, OECD Economic Studies, 47-74.

Feenstra, Robert C., 1995, Estimating the effects of trade policy, in Gene M. Grossman and Kenneth Rogoff (eds.): Handbook of International Economics, Volume 3, North-Holland, 1553-1595.

Feldt, Erik, 1998, Att ligga före marknaden (To be ahead of the market), Privat Kapital, (4), 40-41.

Flam, Harry and Håkan Nordström, 1995, Why do pre-tax car prices differ so much across European countries?, manuscript, Institute for International Economic Studies, Stockholm University.

Flam, Harry, 1992, Product markets and 1992: Full integration, large gains?, Journal of Economic Perspectives 6(4), 7-30.

Ginsburgh, Victor and Philippe Michel, 1988, Adjustment costs, concentration and price behaviour, Journal of Industrial Economics 36(4), 477-481.

Goldberg, Penelopi K. and Michael M.Knetter, 1997, Goods prices and exchange rates: What have we learned?, Journal of Economic Literature XXXV, 1243-1272.

Green, Alison and Mayes, David G., 1991, Technical inefficiency in manufacturing industries, Economic Journal 101, 523-538.

Hannan and Berger, 1991, The rigidity of prices: Evidence from the banking industry, The American Economic Review 81, 938-945.

Hansson, Pär, 1992, The discipline of imports: The case of Sweden, Scandinavian Journal of Economics 94(4), 589-597.

Harrison, Ann E., 1994, Productivity, imperfect competition and trade reform, Theory and evidence, Journal of International Economics 36, 53-73.

Jackson, William E. III, 1997, Market structure and the speed of price adjustments: evidence of non-monotonicity, Review of Industrial Organization 12, 37-57.

Jones, J.C.H. and L. Laudadio, 1990, Price rigidity, inflation and market concentration: some Canadian evidence from the 1970s, Applied Economics 22, 1625-1634.

Joskow, Paul L. 1997, Restructuring, competition and regulatory reform in the U.S. electricity sector, Journal of Economic Perspectives 11, 119-138.

Joskow, Paul L. and Nancy L.Rose, 1989, The effects of economic regulation, in Richard Schmalensee and Robert D.Willig, eds, Handbook of Industrial Organization Vol 2, North-Holland, Amsterdam, 1450-1506.

Kardasz, Stanley W and Kenneth R Stollery, 1988, Market structure and price adjustment in Canadian manufacturing industries, Journal of Economics and Business 40, 335-342.

Krugman, Paul R, 1995, Increasing returns, imperfect competition and the positive theory of international trade, in Gene M. Grossman and Kenneth Rogoff (eds.): Handbook of International Economics, Volume 3, North-Holland, 1243-1277.

Krugman, Paul R, 1997, How fast can the U.S. economy grow? downloadable from http://web.mit.edu/krugman/www/howfast.html.

Levinsohn, James, 1993, Testing the imports-as-market-discipline hypothesis, Journal of International Economics 35, 1-22.

Martin, Christopher, 1993, Price adjustment and market structure, Economics Letters 41, 139-143.

Martin, Stephen, 1993, Advanced Industrial Economics, Blackwell, Oxford.

Means, Gardiner C, 1935, Industrial Prices and their Relative Inflexibility, Senate Document 13, 74th Congress, 1st session. Washington D.C.: U.S. Government Printing Office.

Mills, Frederick C, 1927, The Behavior of Prices, National Bureau of Economic Research, New York.

Neumark, David and Steven A. Sharpe, 1992, Market structure and the nature of price rigidity: evidence from the market for consumer deposits, The Quarterly Journal of Economics, 657-680.

Nickell, Stephen J, 1996, Competition and corporate performance, Journal of Political Economy 104, 724-746.

Primeaux,Walter J., 1977, An assessment of X-efficiency gained through competition, Review of Economics and Statistics 59, 105-108.

Roberts, John M, 1992, Evidence on price adjustment costs in U.S. manufacturing industry, Economic Inquiry,

Rogoff, Kenneth, 1985, Can international monetary policy cooperation be counterproductive?, Journal of International Economics 18, 199-217.

Romer, David, 1993, Openness and Inflation: Theory and evidence, The Quarterly Journal of Economics CVIII, 869-903.

Scherer, F.M and David Ross, 1990, Industrial Market Structure and Economic Performance, Third Edn., Houghton Mifflin Company, Boston.

Schmalensee, Richard, 1989, Inter-industry studies of structure and performance, in Richard Schmalensee and Robert D.Willig, eds, Handbook of Industrial Organization Vol 2, North-Holland, Amsterdam, 951-1009.

Shaanan, Joseph and Robert M. Feinberg, 1995, Dynamic competition and price adjustments, Southern Economic Journal 62, 460-466.

Van Bergeijk, Peter A.G. and Robert C.G. Haffner, 1996, Privatization, Deregulation and the Macroeconomy: Measurement, Modelling and Policy, Edward Elgar, Cheltenham.

Verboven, Frank, 1996, International price discrimination in the European car market, Rand Journal of Economics 26, 240-268.

Waverman, Leonard and Eser Sirel, 1997, European telecommunications markets on the verge of full liberalization, Journal of Economic Perspectives 11, 113-126.

Weiss, Cristoph R, 1993, Price inertia and market structure: Empirical evidence from Austrian manfacturing, Applied Economics 25, 1175-1186.

Weiss, Cristoph R, 1995, Determinants of price flexibility in oligopolistic markets: evidence from Austrian manufacturing, Journal of Economics and Business 47, 423-439.

Winston, Clifford, 1993, Economic deregulation: Days of reckoning for microeconomists, Journal of Economic Literature.

Winters, L.A., 1981, Price adjustment and market structure; a comment, The Economic Journal 91, 1026-1030.

Worthington, Paula R, 1989, On the distinction between structure and conduct: adjustment costs, concentration, and price behavior, Journal of Industrial Economics, 38, 235-238.

**Table 1** Summary of empirical work on the correlation between market concentration and the speed of price adjustment.

| Study | Sample, period | Main result with respect to speed of price adjustment | Corr(concentration, Speed of adjustment) |
|---|---|---|---|
| Borenstein and Shepard (1997) | 188 local wholesale gasoline markets in the U.S. Weekly data for the period 1986:1-1992:11. | More market power is associated with slower adjustment of wholesale gasoline price to crude oil price changes. Specifically higher price-cost margins imply slower adjustment. Also branded gasoline (which should have more market power) prices respond slower than unbranded gasoline prices. | - |
| Jackson (1997) | 29 local banking markets in the U.S. Monthly data for the period 1983:12 – 1985:11 | *Both* low concentration and high concentration banking markets exhibit slower adjustment of deposit rates than do markets with average concentration in response to changes in the 6-month treasury bill rate. | Non-monotonic |
| Weiss (1995) | 17 2-digit manufacturing sectors in Austria. Quarterly data for the period 1974:Q4 – 1988:Q3. | Weak support in favor of higher concentration being associated with slower adjustment. | (-) |
| Shaanan and Feinberg (1995) | 31 4-digit industries over two time periods in the U.S.; 1972-77 and 1977-82 | Weak support in favor of higher concentration being associated with slower adjustment. Note the long periods (5 years!) | (-) |
| Weiss (1993) | 17 2-digit manufacturing sectors in Austria. Quarterly data for the period 1974:Q4 – 1988:Q3. | Support in favor of higher concentration being associated with slower adjustment to cost shocks. No statistically significant effect on the adjustment speed from concentration for demand shocks. | - for cost shocks |
| Jones and Laudadio (1990) | 54 3- and 4-digit manufacturing industries in Canada. Annual data for the period 1971-1982. | Weak support (only significant for the first year) for higher concentration being associated with slower adjustment. | (-) |
| Bedrossian and Moschos (1988) | 20 2-digit manufacturing sectors in Greece. Quarterly data for the period 1963:Q1-1977:Q4. | Support for higher concentration being associated with slower adjustment. | - |
| Kardasz and Stollery (1988) | 28 3-digit manufacturing industries in Canada. Quarterly data for the period 1971:Q4-1982:Q4. | Support for higher concentration being associated with more rapid adjustment. | + |

| | | | |
|---|---|---|---|
| Bradburd and Caves (1987) | 83 intermediate good industries in the U.S. Annual data for the period 1958-1972. | Support for higher concentration being associated with slower price adjustment. | - |
| Encaoua and Geroski (1986) | 50 4-digit industries in Canada, annual data 1970-1980. | No significant correlation between concentration and speed of adjustment. | 0 |
| | 67 4-digit industries in Japan, annual data 1971-1979. | Prices in highly concentrated industries (CR4>80%) are more rigid than in other industries. | - |
| | 50 industries in the U.K., annual data 1970-1979. | Prices in less competitive industries are slower to respond. | - |
| | 430 industries in the U.S., annual data 1958-1980. | Concentration has a negative and significant impact on the adjustment speed. | - |
| | 36 industries in Sweden, annual data 1970-1980. | Only measure of competition that E&G had for Sweden was openness (which had little effect on the speed of price adjustment) | n.a. |
| Dixon (1983) | 43 3-digit manufacturing sectors in Australia. Annual data for the period 1948-1974. | Weak support for higher concentration being associated with slower adjustment. | (-) |
| Domberger (1979) | 21 manufacturing industries in the U.K. Quarterly data for the period 1963-1974. | Support for higher concentration being associated with more rapid adjustment. [For a discussion of Domberger's results see Winters (1981) and Domberger (1981)]. | + |