

Fölster, Stefan; Peltzman, Sam

Working Paper

The Social Costs of Regulation and Lack of Competition in Sweden

Working Paper, No. 91

Provided in Cooperation with:

George J. Stigler Center for the Study of the Economy and the State, The University of Chicago
Booth School of Business

Suggested Citation: Fölster, Stefan; Peltzman, Sam (1993) : The Social Costs of Regulation and Lack of Competition in Sweden, Working Paper, No. 91, The University of Chicago, Center for the Study of the Economy and the State, Chicago, IL

This Version is available at:

<https://hdl.handle.net/10419/262493>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

THE SOCIAL COSTS OF REGULATION AND
LACK OF COMPETITION IN SWEDEN

Stefan Fölster

Sam Peltzman

Working Paper No. 91

December 1993

Center for the Study of the Economy and the State
The University of Chicago
1101 East 58th Street
Chicago, Illinois 60637

Center papers are distributed in limited numbers
for comments only and should not be quoted without
written permission.

The social costs of regulation and lack of competition in Sweden

Stefan Fölster *

Sam Peltzman **

*** The Industrial Institute
for Economic and Social Research,
Box 5501,
114 85 Stockholm**

**** Sears Roebuck Professor of
Economics and Financial Services,
University of Chicago,
Graduate School of Business,
1101 East 58th Street,
Chicago, Illinois 60637**

Abstract

Until 1993, cartels were legal in Sweden, and their birth and death was in principal a matter of public record. Here, Swedish practice departed sharply from most developed countries. Sweden also has apparently stringent regulatory barriers to competition in areas like environmental standards and food prices. We exploit a unique dataset to estimate the effect of cartels and regulation, as well as traditional market structure measures, on prices, output and productivity in Swedish manufacturing. For 83 representative goods produced in Sweden we have wholesale level prices in Sweden relative to the same goods' price in the EEC; and we know the relevant cartel arrangements. We also have firm level data that enable estimation of output and productivity effects. A puzzling finding is that cartels do not seem to raise prices but have substantial output effects ($\pm 6\%$ plus within a year of a change in cartel status). We find substantial price effects from environmental and food price regulation which are largely dissipated by static inefficiency in production. Productivity growth is well below average in both the cartelized and regulated sectors. More firms and higher concentration are both associated with lower prices.

I Description of Institutions

In international comparison Sweden has had high price levels for an extended period of time (Table A). They remain high even after the krona depreciated by 20% in the fall of 1992. The difference appears too large to be explained by per capita income differentials or relatively high indirect tax rates (Diagram 1).

Many industrial branches in Sweden are highly concentrated. This is particularly true of the non-traded goods sector. Even in the traded goods sector, however, concentration tends to be high. In a considerable number of branches cartel agreements, either legal or illicit, militate against new entrants. Often these cartel agreements are politically sanctioned and supported by regulation. In fact, only 20-25% of GDP is produced in sectors that are truly exposed to international competition. The share of GDP produced in internationally oriented sectors actually declined between 1989 and 1975 from 35 to 31 percent. Up to a third of the internationally oriented production is sheltered from competition in various ways. Transport industries, for example, tend to be regulated and subsidized. Car imports are restricted by technical standards and red tape. Among the domestically oriented sectors restraints of competition have been common, although there are of course branches, such as restaurants, where competition has been fierce. Table B shows three measures of the extent to which the Swedish economy is exposed to competition.

While some possible causes of high prices such as competition policy appear unrelated to issues concerning the welfare state, other causes are direct consequences of extensive welfare programmes. Regulation in the housing sector, for example, was a central

element of housing policy designed to ensure a good housing standard for low-income households. Taxes affect prices not just through their level, but also because tax rules discriminated against small firms and new entrants, thereby reducing competition through entry. This discrimination was partly motivated by the fact that income in small firms was difficult to separate from the owners' personal income and was therefore taxed progressively in accordance with the welfare states' ambitions to equalize incomes.

The purpose of this paper is to try to disentangle to what extent factors such as competition policy, cartelization and regulation contribute to the high price level. As a byproduct this also sheds light on how productivity growth has been affected. The analysis gives some foundation for forecasting the likely effects of recent changes in tax laws and competition policy. A limitation of our data is that it focusses on industrial producer prices.

Differences between Swedish and US competition policy

A new competition law will take effect in Sweden on 1 July 1993. The new competition policy conforms to EC rules, except in merger cases. The new competition law is further reinforced by provisions of the EES treaty and new public procurement law.

Under the old competition law agreements limiting competition among companies were not illegal - with the exception of vertical price maintenance and joint tendering. They had to be registered with the authorities on request, however, and could be prohibited if found to be against public interest.

A striking feature of the cartel register legislation is that it originally (1946) put few

sanctions at the disposal of the government. Instead it was thought that a public display of cartel agreements in the cartel register would be sufficient to deter non-competitive practices. Successively the powers to intervene were strengthened (1953, 1956 and 1982), but were still weak by American standards.

Among the more important registered practices were horizontal price fixing agreements in the form of recommended prices and in some cases binding price lists issued by branch organisations or other interested parties. Another common practice in the register were market sharing agreements which either fix the quantity each firm can produce or sell, or carve the market into distinct areas which are served by a single distributor. About 15 per cent of total sales of goods and services were found to be affected by horizontal agreements in 1989 (SPK, 1992:3). Of these some 70 per cent were affected by price fixing agreements, some 30 per cent by market sharing agreements and around 15 per cent by combined price fixing and market-sharing agreements.

The cartel register was administered by the SPK (Swedish National Price and Competition Board). In 1992 there were about 1 250 formal competition-restraining arrangements registered. The SPK also investigated restrictive business practices, but has no power to take action against such practices. Another competition authority, the Competition Commissioner also examined corporate practices, in co-operation with the Board, either at his own initiative or on the basis of complaints. A great majority of cases are settled through negotiation, often because this gives the offending party a chance to avoid negative publicity. Only 1 or 2 per cent of the examined cases are referred to the Market Court. The court may issue prohibitions or injunctions restraining the involved

Regulation and import restraints

Public regulation has been severe in some areas of the economy. During recent years a number of areas have been deregulated, but the previous regulations have preserved existing market structures and cheaper alternatives are only slowly emerging.

In the food sector regulation has implied consumer subsidy equivalents to farmers at a somewhat higher rate than for the EC average. In addition local authorities had until recently extensive powers to prohibit establishment of food stores. This was often used to protect small retailers, often belonging to one of the two biggest chains. The rules have recently been changed, requiring that local authorities pay greater attention to competition, and already a large number of low-price supermarkets have opened.

Other areas where regulation has distorted market prices considerably are construction and transportation. Import tariffs, technical standards and environmental standards are also demanding, but perhaps not more so than they have been in many EC countries. The EES treaty, however, will lead to significant changes. A basic principle within the EES is that any product that is legal in one country can freely be imported into other countries (Cassis de Dijon principle). Certain exceptions to this principle have been granted for reasons of safety, protection of life, public order, protection of national treasures, protection of industrial or commercial ownership, effective tax control, good trading practices, public resource savings, consumer protection, protection of culture, environment and work environment. Exceptions have been granted sparingly by the EEC court.

Conglomeration and concentration

Concentration in the goods producing sector is higher than in most European countries. This has enabled many companies to develop into large world corporations. Per unit of GDP Sweden has twice as many corporations among the 500 world largest industrial companies as in Japan and four times as many as the United States.

These large corporations have grown primarily through mergers and acquisition. At the same time there is an extensive conglomeration of ownership and control of companies. This could act as a barrier to entry. The knowledge that a firm is backed by a strong group may deter a potential competitor from contesting a market.²

Public procurement

Public procurement accounts for about 20% of GNP. Forty percent of that is procurement by the state, while the remainder is accounted for by municipalities and counties. In addition many services are produced publicly that could be procured from private producers. In recent years municipalities have begun to expose their technical and even social services to competition and in some cases also turned to private producers. Table C shows the results of a recent study on the quality-adjusted cost savings achieved in

² In 1985 the five biggest final owners held some 44 per cent of the total voting rights in companies with more than 500 employees, while the ten biggest had more than half (SOU 1990:44). In addition these final owners tend to hold shares through intermediaries, such as investment companies, which in turn are linked through joint ownership. Fourteen such "empires" dominate the corporate sector, with three major ones alone controlling companies that account for some two-thirds of employment, sales and total assets of the 270 largest corporations in Sweden.

municipal and county services by procurement from private producers and from exposing public services to competition.

Rules concerning public procurement are sharpened considerably by a new law that will go into effect simultaneously with the EES treaty. The new law requires publication of calls for tenders in the entire EES area for large procurements. In addition binding rules are introduced for how procurements are to be conducted. A law requiring mandatory competitive tendering is being discussed, but has not yet been enacted.

Motivation of the study

The study aims to identify to what extent high prices are caused by insufficient competition due to cartelization, regulation, import restrictions and interactions between these factors. Also the study sheds some light on some social costs of insufficient competition. One social cost is the static inefficiency that arises from the gap between domestic prices and marginal costs. The second is the effect that oligopolistic profits may have on the wage levels. The third is the connection between isolation from competition and productivity growth.

Since the pioneer work of Bain (1951) many cross-sectional econometric studies have focused on the relation between industry concentration, profits, and sometimes productivity.³ These studies generally attempt to test the structure-conduct-performance paradigm. Concentration is considered the main dimension of structure and the main determinant of performance: Attempts to exercise market power are likely to be more successful in industries that are highly concentrated. Their main conclusion is that concentration has some effect on profitability, but not a substantial effect.

This type of study, which was more common a decade ago has been subjected to severe criticism mainly because it became increasingly clear that concentration was a poor measure of monopoly power. Also, the interpretation of results was increasingly thrown into doubt. A number of studies implied that the relationship between concentration and profits

³ Geroski (1982) for example estimates a simultaneous equation model with multi-factor productivity and the concentration ratio as the dependent variables.

primarily reflected the fact that larger firms earn higher profits and that innovative, rapidly growing, firms earn temporary rents to innovation. That is, high profitability could reflect either high prices or low costs.

Many recent studies of the relation between concentration and profitability have also integrated foreign trade into the analysis. Examples are Pugel (1978), Marvel (1980) and Chou (1986). A number of recent Swedish studies also follow these methods. Olsson (1991) for example regresses dependent variables such as productivity growth and price increase at the industry level over independent variables such as concentration, export share, import share and the occurrence of regulation. Erixon (1991) presents similar regressions both at the industry and the company level. Stålhammar (1991) conducts a more sophisticated analysis following a method that has been applied by a number of other authors as well. Stålhammar calculates a parameter of implicit collusion for various manufacturing industries. The parameter is based on a model by Cowling and Waterson (1976) and is a function of the industry's price-cost margin, price elasticity, and the firm's market share. The parameter for implicit collusion is then regressed over concentration as well as import- and export shares. Stålhammar (1992) integrates both foreign trade and wage determination into the analysis.

The study reported here is based on considerably more detailed data than previous work and it utilizes new sources of information on collusion and relative prices.

II Empirical analysis

For each product we have information on the Swedish manufacturers' production, costs, employment and so forth. Also quantities imported and exported are available. This data is collected for a 15 year period. Some of the problems associated with cross-section analyses can therefore be circumvented.

Product markets

Most empirical work uses the industry as the unit of observation. Many industries however contain a variety of distinct product markets, some of which are highly concentrated and oligopolistic while others are display intense competition. This is especially true of technology oriented industries such as SNI 3852 (computers and office machines) or SNI 3831 (electrical industrial machinery). Some studies have already shown that using more detailed data significantly changes basic results. Kwoka and Ravenscraft (1986), for example, use "line-of-business" data and report, in contrast to previous studies, that higher concentration is correlated with lower profits.⁴ Here the level of disaggregation is even lower. A unit of observation in our study is a specified product.

Product markets were selected from the list of products used to calculate the producer price index. This is in itself a representative list of products produced in Sweden or imported into Sweden. From this list 48 products were selected specifically because their

⁴ A line-of-business denotes a firm's operations in one of the industries in which it is active.

cartel registration status had been changed during the period 1976-1990. An additional 85 products were randomly selected. After discarding those products that did not meet all data availability requirements 83 products were left in the sample of which 34 had experienced at least one change in their cartel registration status. The sample is therefore not a random sample of Swedish industry, containing some bias towards product markets with cartel registration. However, the bias is slight: In 1989 20% of our sample's total sales is covered by cartel agreements as compared to SKA's estimate of 15% for the whole Swedish economy in that year. The sample also provides a reasonable cross-section with observations from most industries. Table D shows the share of sales in each industry accounted for by our sample.

Prices

While consumer price comparisons have been common and are conducted regularly by the OECD, producer price comparisons have been rare. Here we analyze a measure of Swedish producer prices relative to EEC prices for the same product.

The starting point is a measure of export prices as compared to prices for the home market. This information is collected by SCB in order to calculate changes in the producer price index.⁵ A problem with this measure is that the composition of countries to which

⁵ These SCB-data are not available for all product groups, in part because the price information is not released in cases where individual firms can be identified. We have therefore also relied on data on domestic and export- producer prices can also be calculated from foreign trade statistics that are published divided into narrow product groups following the so called "Harmonized System". For each product group the quantity produced, the quantity exported, the quantity imported, and the sales values in nominal prices for each of these categories is published. A potential problem with this data base is that within a product group the products that are exported may differ from those that are sold in the home market. For the product group "computer software" this is obviously an important problem. The large majority of product groups are, however, so narrowly defined that this

Swedish firms export changes over time and differs between industries. Building material firms, for example, export much to Norway which is an equally protected market with high prices; they export little to central Europe where prices generally are much lower.

To avoid this problem a measure of export prices was calculated that corrects for the destination of exports. The basis for this correction is a producer price comparison in 1985 among European countries.⁶ Using country producer price indices backward and forward yields a matrix of price relations among EEC countries for our sample period 1976 to 1990. Export prices for exports from the Swedish companies to EEC countries were then related to the EEC average using the matrix described above. This can be described as follows, with a numerical illustration given in brackets.

Let the export price in year y be $X_{y,cd}$ for export from country c to destination d . The home market price is $P_{y,c}$ in country c . Using the producer price comparison among EEC countries in 1985 allows calculation of the average (GDP-weighted) EEC price E_{1985} . Using national product price indices an index (I) could then be calculated of each country's price for a product relative to the EEC average

$$I_{y,c} = P_{y,c} / E_y \quad \text{for } y = 76..90 \text{ (years of our time series)}$$

$$c = 1..12 \text{ (EEC countries)}$$

To illustrate, assume the following for 1985:

1. Swedish(s) widgets exported to Germany (G) sell for DM104 ($x_{1SG} = 104$)
2. The closest comparable German produced widget, which is the item used in the EEC price comparisons, sells for DM100 ($P_{Y,G} = 100$), or 4 percent less than the Swedish import.

may not be a major problem for a statistical analysis as long as the measurement is not systematic. In some cases we have also relied on firms' own estimates or on measurements conducted by the National Competition Board. For those product groups where we have two or three price measures t-tests reveals no significant difference.

⁶ by Eurostat.

3. The EEC price comparison shows that the German widget price is 8 percent above the EEC average price ($I_{1985,G} = 1.08$). So, the average EEC produced widget would sell for DM92 (DM100/1.08).

Our procedure results in:

$$XE_{1985} = X_{ISC}/I_{1985,G} = 104/1.08 = 96.$$

This amounts to assuming that the 4 percent premium for the Swedish widgets sold in Germany is a quality premium and then adding this quality premium to the EEC average price of DM92 to arrive at an estimate of what Swedish widgets would sell for in the EEC. If we have exports to several EEC countries simultaneously, then XE is calculated as a weighted average of the separate export prices. For goods that have exports some years and no exports other years, product price indices are used to fill in the gaps.

Finally we calculate our measure of "Swedish prices relative to EEC prices," as $P_{y,s}/XE_y$. Table E shows this measure for the fourteen product groups. There appears to be a pervasive tendency for Swedish industrial goods prices to exceed those of comparable goods in the EEC. No product category, indeed not one of the 83 sample products, have sold at lower average prices in Sweden than the EEC over a 15 year sample period. However, the Swedish price premium, which averages 13.6 percent in our sample, is smaller - on the order by half - that typically found in consumer markets. This suggests that Swedish retail margins are also higher than those in the EEC. In fact, a number of comparisons do find higher retail margins in Sweden than in EEC countries (reference).

Cartels and regulation

The agreements in the register fall into a large number of categories. Some of these occur quite rarely in the register, or concern temporary arrangements, e.g. when a company changes ownership. These types of agreements can be grouped into horizontal and vertical restraints to competition. Horizontal restraints primarily consist of price fixing (15.9% of sample) and market sharing (7.5% of sample). Vertical restraints primarily consist of exclusive dealing (12.4% of sample). These different restraints can of course occur simultaneously. Other types of restraints occur relatively infrequently (together 6.6% of sample) and usually affect both horizontal and vertical competition.

An important question is whether all firms register cartels, in particular price and market sharing agreements. Swedish competition law has only considered two restrictive practices as a criminal offense, namely resale price maintenance and joint cooperation in tendering bids. Thus firms would not have avoided registering price or market share agreement for fear of criminal investigation.

After 1982 antitrust authorities were given increased enforcement powers to terminate restrictive practices proved to have harmful effects. Price and market-sharing agreements were pointed out as the type of agreement most likely to lead to harmful effects. Thus firms may have had an increased incentive after 1982 to keep such agreements secret. In fact, no drastic change was reported in the number of agreements was found. The number of new market sharing agreements has remained constant. The number of new price fixing agreements has decreased steadily since the late 60ties.

This is only very indirect evidence. It must be assumed therefore that there exist cartel arrangements that firms have managed to keep secret or that occur implicitly without any formal agreement.

It is difficult to calculate the "intensity" of regulation. Instead we define a dummy variable that captures the existence of significant regulation. We have divided regulation into "significant environmental regulation" , "price or quantity regulation" and "technical standards." In deciding in which areas regulation is significant we have relied on a classification from the Swedish Competition Authority (SKA).

Tariffs and quotas occur primarily for imports from non-EEC countries. Since our price comparison is with the EEC those tariffs and quotas are neglected here. For trade with the EEC tariffs and quotas apply only for products that also have price and quantity regulation. The variable for price and quantity regulation thus also captures the effect of tariffs and regulations.

1. Cartels & Regulation: Data

Table F summarizes the cartel agreements in our sample. Of the 1245 "product-years" (83 products x 15 years of data), 366 or 29.4 percent are covered by some type of cartel agreement. No trend in this cartel frequency is evident in our sample period. We

further classified these agreements as horizontal (market sharing or price fixing) or vertical (exclusive dealing). About half the agreements (14.1 percent of product years) are both vertical and horizontal, with the remainder roughly equally divided between the two types.⁷ Of the horizontal agreements (detail not shown), the majority involve price fixing.⁸

A notable aspect of the Table is the substantial concentration of cartels by industry. Here, the food industry deserves special mention. It accounts for slightly more than 1/10 of the sample but around 1/3 of all the cartel activity. This high incidence of cartelization may be rooted in Swedish agricultural policy, which has the effect of raising the prices of the industry's raw agricultural inputs above even those in the EC. To help food processors overcome this cost disadvantage, Sweden has protected them against import competition. This relaxed threat of foreign entry may have encouraged domestic cartelization. Two other industry groups (wood/paper and chemicals) together account for another 1/4 of the cartel activity. In these cases, other forms of domestic regulation may be providing entry barriers conducive to cartelization.

Table G elaborates on this last point by summarizing the industrial distribution of the three types of regulation as classified by SKA. In our sample, the price regulation occurs exclusively in the food sector and it is invariably combined with tariffs and quotas against processed food imports from the EEC. Thus the price regulation category here reflects another aspect of Swedish agricultural policy. The other forms of regulation are also concentrated in a few industries: the forest products, chemical and petroleum refining industries are subject to significant environmental regulation in Sweden, as in most developed countries. The technical standards category comprises products which must meet peculiarly Swedish standards of content or design. These standards could act as non-tariff barriers to imports or even as barriers to domestic entry if local firms have different costs

⁷ We include "other" types under vertical, though these can have horizontal dimensions; these other agreements comprise 18 of 97 product years classified as vertical.

⁸ Ninety percent of the horizontal agreements have price-fixing provisions; 42 percent contain market sharing arrangements.

of complying with the standards. Once more, the food industry stands out; it accounts for nearly 2/3 of the sample products subject to significant technical standards.

The tendency of cartels to arise in regulated industries can be summarized by the following regressions estimated across the 83 sample products:

$$\begin{aligned}
 (1) \quad \text{HORIZ} &= .089 + .207 \cdot \text{ENV} + .558 \cdot \text{PRICE} + .147 \cdot \text{TECH} \\
 &\quad (3.2) \quad (4.5) \quad (1.7) \\
 (2) \quad \text{VERT} &= .117 + .104 \cdot \text{ENV} + .644 \cdot \text{PRICE} + .111 \cdot \text{TECH} \\
 &\quad (1.4) \quad (4.5) \quad (1.0)
 \end{aligned}$$

The dependent variables are the share of a product's sample observations under the indicated type of cartel and the right hand side variables are dummies for the indicated type of regulation. T-ratios are below coefficients, and the intercepts give the cartel frequency for products with no significant regulation. The regressions show that the presence of regulation is associated with cartel frequencies which are, depending on the type of regulation, anywhere from two or three to around six times the base-line cartel frequency.

Our main interest is in how this panoply of cartellization and regulation has affected Swedish economic performance. By "performance" we mean mainly prices, but also the level of costs and productivity growth. Our initial exploration of these issues heeds Schmalensee's (1989) advice "that the primary objective of cross-section studies (in industrial organization) must be to describe the main patterns in the data set employed as clearly and completely as possible." (p. 957) Thus, we begin with the main regularities in the data without claiming that they represent the reduced form of an explicit model.

2. Cartels and Regulation: Prices

Table H provides the most basic, and durable such description. It shows results of regressions of Swedish relative prices (see Table E) on various cartel and regulation dummies.⁹

The prices are relative to EEC prices, but the cartel and regulation dummies are defined exclusively with respect to Sweden. This compromises the potential information content of the dummies. For example, cartels and regulation could have substantial effects on prices but if the same industries in the EEC are cartellized and regulated in the same way as in Sweden the regression will not show this because relative prices will be unaffected. In addition, recall that we know only about those cartels which have been registered. Accordingly, the cartel and regulatory dummies are "noisy" measures of the conditions we wish to measure.

Nevertheless, Table H tells a fairly straightforward story:

1. Taken as a group, products under horizontal cartels have prices around 3 percent higher than the sample average [column 1]. This estimate does not rest heavily on conditions peculiar to the food industry [Column 2].

2. However, regulation rather than cartels seems to be the primary source of these high relative prices [column 3]. Holding constant the effect of regulation, horizontal cartels have no higher prices than the sample average.

3. The price premia associated with regulation are substantial - enough to roughly

⁹ The regressions also include a set of year dummies the results of which are not reported in the Table.

double (price regulation) or raise by half (environmental regulation) the typical Swedish price premium of 13.6 percent for affected goods.¹⁰ These results suggest that Swedish environmental regulation is more costly than EC environmental regulation. They also reveal price regulation as the primary source of Sweden's unusually high food prices: note that food products not covered by this regulation (line B, column 3) actually have slightly below average price premia. However, technical standards have no marginal effects on prices in this sample.

4. Vertical restraints have theoretically ambiguous competitive effects. The frequent conjunction of vertical restrictions with horizontal cartels in our sample might arouse skepticism that vertical restrictions enhance competition in Sweden. But our results [column 3, line A.1] are more consistent with that view than the contrary.

5. Because our measure of regulation is concentrated in a few industries, the price increasing effects do not account for a substantial part of the overall Swedish price premium vis a vis the EC. If the effect of regulation is removed, the regression in column (3) implies that the average price premium would shrink from 13.6 percent to 11.3 percent. This result should be taken as a call for further work rather than a definitive estimate. If our rather crude measures of regulation can account for nearly 20 percent of the overall price

¹⁰ The size of the coefficients, which are estimates of these extra premia, deserve more emphasis than the t-ratios. The reported (OLS) t-ratios are exaggerated, because of the persistence over time of cartels and regulation. This means that we do not really have 1245 independent observations. Regressions which suppressed all the time variation in prices by using 15 year averages of the data across the 83 products yielded t-ratios around half those shown in the Table.

premium, perhaps a more refined analysis will expand on this estimate.¹¹

Our data base has enough firm-specific data to enable us to add some conventional market structure measures to the regression. Since Bain (1951) well over 100 studies have investigated the relations between market structure measures (usually concentration) and measures of market performance (usually of profitability used as a proxy for the price-marginal cost ratio). An advantage of our data base is that we have a direct measure of price performance across a variety of products, so we need not rely exclusively on indirect measures like profit ratios. A disadvantage is that we lack EC market structure measures which should in principle be included.

The results are summarized in Table I. Standing alone, (column 1) concentration as measured by the Herfindahl Index (the sum of the firms' squared market shares) has a weak positive effect on prices, as in most of the post Bain literature. However, this result is decisively reversed when the number of firms is added to the regression (column (2)). The negative coefficient on concentration is consistent with a differential efficiency interpretation following Demsetz (1973). Briefly, if one (or a few) producers discover lower marginal cost production methods, their output and market share will rise and prices will decline. For example, suppose one of 3 initially equal size firms doubles its market share.

¹¹ The sort of refinement permitted by our data proved unavailing. We investigated the interaction between regulation and cartels (e.g. do cartels have different effects in regulated industries than unregulated industries) without uncovering a consistent pattern. We also looked unsuccessfully for different effects from price fixing and market sharing agreements. Again, it is premature to conclude that such subtleties are absent. Rather, they may be hidden by the small number of products in our sample which fit the relevant subcategories.

According to column (2), line C.1 the resulting increase in the Herfindahl Index (.167)¹² would be associated with a price reduction of about 1 ½ percent. That price reduction implies that the market share gained by the now dominant firm was accompanied by a net increase in output which presumably results from this firm's lowered marginal costs.

At the same time, the regression suggests an important role for entry. Holding concentration constant, each additional firm is associated (column 2, line C.2) with about 3 percent lower prices. This is a potentially significant magnitude in the Swedish context where most goods have few producers. In our sample, the average number of firms is 2.5 and the maximum number is only 4.¹³ The regression suggest that with, say 2 more producers per product, roughly half the Swedish price premium could be eliminated. Since entry in most of our product markets is not limited by legal barriers to entry this could be achieved only by a more stringent competition law, or more import competition. However, the caveat about structural interpretation of the regressions deserves special emphasis here. Causation running from lower prices, via widened markets, to more firms cannot be ruled out.

Column (3) of table I adds the industry average wage. The positive coefficient is reasonable but economically unimportant. The main reason for this is that wage differences across Swedish manufacturing industries are vanishingly small. The 15-year average of the real ('90 SEK) wage across the 83 products in our sample is SEK 275,000 while the standard

¹² The difference between $3(1/3)^2$ and $(2/3)^2 + 2(1/6)^2$.

¹³ Generally our sample contains all Swedish firms operating in a product market. In some cases however there are very small additional firms (< 10 employees) that have been omitted.

deviation is only SEK 5,000, or less than 2 percent of the mean. Thus, the regression implies that even a 4 standard deviation move in the average wage would not affect prices by much more than 1 percent.

All of the previous results on cartels and regulation remain essentially unaltered when the market structure and wage variables are added to the regression.

Time series analysis

By exploiting the time series dimension of our data, we gain a check on the rather negative findings on the effects of cartels which emerged from the cross-section analysis. Our sample has 40 changes in cartel agreements. There are about as many (21) cartel formations (new agreements, added provisions) as terminations (19). The time pattern of these changes is striking. Eighteen of the formations and 11 of the terminations, or over 70 percent of all the changes, occur in 1979-83. In addition to the aforementioned changes in competition law, this period saw considerable macroeconomic changes, such as an oil-price "shock" and a major devaluation of the Krona. Our turnover data suggest that the need for price realignments in this period stimulated new cartels but also put pressure on existing agreements.

In the next set of Tables, we examine price changes that occur around 38 of these cartel changes.¹⁴ We also examine output changes around cartel changes. Output provides a measure of cartel effects which is, in principle, complementary to price effects (if price rises, output should decline). However, if prices are more poorly measured than output,

¹⁴ Two occur in the terminal years of our sample.

or if product demands are sufficiently elastic, output may provide the more sensitive measure of cartel effects. Indeed, the time series analysis supports this view. It essentially corroborates our previous negative findings on the price-effects of cartels while revealing some substantial output effects.

Table J shows results for two measures of price change. They are extracted from regressions of the price change on various sets of dummies for change in cartel agreements plus controls. Because cartels can form or break up before this appears in the cartel register, we include dummies for the year preceding the change. Dummies for the year following a cartel change allow for any lagged effects of the change. Panel A shows the change in the Swedish relative (to EEC) price net of year effects. Panel B shows the change in the numerator of this price ratio - the Swedish domestic price - after controlling for current and two lagged changes in the denominator (the EEC price) and year effects. There is some evidence of price increases around formation of vertical cartels and of price decreases around their dissolution. But the overwhelming pattern in the Table is of small price changes, typically one percent or less and typically undistinguishable from zero. The one exception covers dissolution of vertical agreements, and here the change seems temporary, and it is sensitive to the way price is measured.

Table K uses non-parametric tests to hedge against the possibility that these negative results are due to a few atypical price changes or to price indexes which understate price changes. Here we simply count signs of residuals from regressions of the price changes on controls. We want to see if positive residuals usually accompany new cartel agreements and negative residuals accompany cartel terminations. The results are perhaps a bit sharper

than Table J. The main tendency is for prices to tick up when cartels are formed and down when they dissolve. But statistical significance is often lacking. The relatively small sample sizes limit the power of our tests, and of more refined analysis of, for example, the interaction of cartel changes with regulation.¹⁵ Nevertheless, they add to the impression that Sweden's tolerance of cartel agreements is not a major source of her historically by high prices.¹⁶

The evidence on output is much less equivocal: Output falls substantially when cartels are formed and rises when they are dissolved. This is shown in Tables L and M which are the analogues for output to Tables J and K. Table J shows that, depending on the time span and type of agreement, output falls anywhere from 6 to 13 percent when a cartel is formed, and it rises a comparable amount when a horizontal cartel is terminated.¹⁷ (The apparently weaker results for vertical cartel terminations should be discounted, because they are based on only one "pure" case¹⁸). Table M shows that these results are not due to a few outliers. In over 90 percent of the cases, cartel formation is accompanied by abnormally

¹⁵ We did attempt to divide each sample into subsamples of products subject to some form of regulation and those not so subject. The consistent pattern was that prices of the regulated products rose and fell less frequently than other goods when cartels formed or dissolved. But this difference was insignificant.

¹⁶ The tests in Tables E and F were repeated - with essentially identical results - on: 1) a sample consisting only of products which had undergone cartel switches in the 1976 - 1990 period, 2) price change variables measured as deviations from the 1976-90 mean for the product.

¹⁷ Essentially identical results were obtained from a sample including only those products with change in cartel status. So, e.g., for these products output growth was 6 percent below trend in the year in which a horizontal cartel formed.

¹⁸ In eight other cases, vertical and horizontal agreements are terminated simultaneously.

low output growth and cartel termination by abnormally high growth in the year of the change. There is no similarly strong pattern for the year preceding and the year following cartel changes.

Half the cartel formations involve products subject to stringent environmental regulation. In the year of a cartel formation, output of these goods fell much more (17 percent for horizontal and 20 percent for vertical cartel formations) than for other goods. These differences, which are statistically significant, may signal a regulatory restraint on the threat to cartel stability which otherwise arises from potential output expansion. Actual output expansion when cartels terminated proved to be no different for goods subject to environmental regulation (1/3 of terminations) than for others.

There is an obvious tension between the results on price changes and on output changes which we cannot resolve here. Taken literally, the results seem inconsistent with rational cartel behavior which employs output restriction only if this raises prices. Alternatively, our results might suggest that our price measure is not accurately reflecting transaction prices or non-price attributes (quality, delivery time, etc.) of products. However, tests for changes in two measures of profit-margin around cartel changes yielded the same negative results as for prices.¹⁹ This lack of response of profits margins to cartel changes implies that measurement problem alone do not account for our odd results on prices.

¹⁹ The two measures, more fully described in the next section, are profits before capital costs/sales and value added per employee. All else the same, these would increase if prices rose or lower quality goods were sold at unchanged prices.

CARTELS REGULATION AND THE EFFICIENCY OF PRODUCTION

Standard theory does not have much to say about the effect of cartelization or regulation on the efficiency of production. Nevertheless, at least since Adam Smith contended that "monopoly ... is a great enemy to good management", economists have suspected a connection between competition and production efficiency. Our data allow us to investigate this connection for Sweden and thereby to shed light on the question of whether lack of competition in Sweden has contributed to the perceived high cost structure of its manufacturing sector. We begin with regressions describing the connection between measures of static efficiency and productivity growth on the one hand and cartelization and regulation on the other.

STATIC EFFICIENCY

We use two measures related to static efficiency: Gross profits as a percentage of sales (the "price-cost margin") and value added per worker.²⁰ All else the same (including prices), more efficient use of resources would raise both measures. The two measures differ in their treatment of labor rents. These reduce profitability, but not value added.²¹ So labor rents show up as an inefficiency in the profit based measure but not in value added per worker. Our choice of measures is dictated in part by lack of data on raw material prices. This precludes investigation of efficiency in the use of raw materials. Finally our efficiency measures are for the aggregate of the firms or divisions producing a product,

²⁰ Gross profits are before depreciation and capital costs, and value added is just gross profits plus employment costs.

²¹ Any rents to outside suppliers would reduce both profits and value added.

while the competition measures are product specific. Recall, however, that these products account for around 80 percent of firm or division sales in our sample.

Table N summarizes the relation between both measures and competition/regulation. (The regressions include capital intensity variables as controls). The results here need to be interpreted in light of the previously discussed price effects summarized in Tables H and N, because either higher prices or greater efficiency can raise profits or value added. Specifically, if b_{π_i} or b_{v_i} denotes a coefficient of interest in the profit or value added regression respectively of Table N, and b_{p_i} is the coefficient on the same variable in the earlier price regression, the following approximations²² obtain:

$$(1) \quad \frac{\% \Delta \text{ COST/UNIT}}{\Delta i} = \frac{b_{p_i}}{(\text{PRICE})} - b_{\pi_i} \left(\frac{\text{SALES}}{\text{COSTS}} \right)$$

$$(2) \quad \frac{\% \Delta \text{ Output per worker}}{\Delta i} = \frac{b_{v_i}}{\left(\frac{\text{VALUE ADDED}}{\text{WORKER}} \right)} - \frac{b_{p_i}}{(\text{PRICE}) \left(\frac{\text{VALUE ADDED}}{\text{SALES}} \right)}$$

We can then estimate the effect of a change in competition or regulation (Δi) on efficiency by appropriately combining the two coefficients. The results of this exercise are shown in Table O, which uses the price regression in col (2) Table I and the regression in cols (3)

²² These follow from the relations

$$\frac{\text{PROFITS}}{\text{SALES}} = \frac{\text{PRICE} - \text{UNIT COST}}{\text{PRICE}}$$

$$\frac{\text{VALUE ADDED}}{\text{WORKER}} = (\text{PRICE} - \text{PURCHASES PER UNIT}) \left(\frac{\text{OUTPUT}}{\text{WORKER}} \right)$$

We assume that PURCHASES PER UNIT is a parameter.

and (4) of Table N to generate estimates of the effect of competition and regulation on static efficiency at the sample means of the relevant variables. To illustrate how these estimates were arrived at, we can work through a specific case. Table O says that Swedish environmental regulation has reduced output per worker by 6.8 per cent.²³ This is a residual, the net result of effects on price (Table I) and on value added (Table N). It is computed as follows: According to Table I col. (2) environmental regulation raises Swedish relative prices by 6.8 points or 6 percent of the mean value (113.6) of the Swedish relative price index. By itself a 6 percent price increase would raise sales by 6 percent. Because value added is only about 40 percent of sales, a 6 percent sales increase would be amplified into a 15 percent (6/.4) rise of value added, which would translate into an extra SEK 78,000 per worker (in 1990 prices given a mean value added per worker of around SEK 520,000). However Table N col(4) line B.1 tells us that only SEK 44,000, or 56 percent of the potential increase in value added, is attained. Table O attributes this shortfall of SEK 34,000 to a decline in output per worker. In short, the actual increase in value added (about 8 percent) is the result of the 15 percent potential increase from higher prices and the partly offsetting roughly 7 percent reduction in output per worker.

The results in Table O suggest that cartels are not associated with a loss of production efficiency. In fact, if anything, cartelized industries are more efficient. Environmental and price regulation, however, do seem to be associated with non-trivial

²³ The associated $|t|$ of 2.5 (and all other t -ratio in the table) is subject to two offsetting biases: 1) the aforementioned (n.10) upward bias stemming from overstatement of the true degrees of freedom, 2) a downward bias resulting from the assumed independence of the coefficients b_p and b_v or b_{π} when they are likely to be positively correlated.

productivity losses. The former is expected, because expenses for environmental protection do not produce measurable output. The large (12.1 percent) productivity loss for price regulated goods implies that the minimum prices shelter considerable inefficiency. And the correspondingly modest unit cost effect (1.8 percent) suggests that suppliers and workers are sharing the costs of this inefficiency with firms and consumers.

The results for the market structure measures imply an important connection between competition and efficiency, but one that needs to be interpreted carefully. At the margin, an extra firm is associated with 6 percent increased output per worker. But the results for the Herfindahl measure of concentration imply that attempts to maintain the number of firms by a vigorous anti-concentration policy would be mistaken. Consistent with the previously articulated differential efficiency story, the more concentrated industries tend to be the more efficient. The large numbers in Table O, line C.1. need to be discounted, because they refer to an unrealistic shift from atomistic competition to monopoly. A more realistically modest change in the Herfindahl index, say .2,²⁴ would still suggest a considerable productivity gain (around 7 percent higher output per worker) from expansion of efficient leading firms. If there is a policy implication commended by these results it would be to eliminate any barriers to new entrants while allowing market forces to determine how concentrated markets become.

²⁴ Approximately the result when one of 3 previously equal sized firms doubles its market share.

2. PRODUCTIVITY GROWTH

For each product in our sample, we estimated the average annual growth in productivity for 1976-1990 under two measures: a "Solow residual" estimate of total factor productivity (TFP) growth and the more traditional growth of output per worker. The TFP growth estimate is:

$$\text{Output growth} - \alpha (\text{Labor Input Growth}) - \\ (1-\alpha)(\text{Capital Input Growth}),$$

where α = labor's share of output.

This is an estimate of the growth of output per unit of input.²⁵ We are limited to a two-input production function by the aforementioned lack of data on material inputs, and we also recall that our output measure is at the firm rather than product level. We estimated α as (wage costs/value added) over the 15 year period for each product.²⁶ It is of particular importance to note that our output series is obtained by deflating sales by a product price index. Total employment and an estimate of the real value of fixed assets constitute our input measures. For our sample TFP growth averages 1.62 percent per year while labor productivity grows at 2.46 percent per year. These are broadly typical of manufacturing in Europe and North America over this 1976-1990 period.

²⁵ It is based on assumption of factor neutral technical progress and Cobb-Douglas technology.

²⁶ An alternative in which the share of capital was obtained by multiplying the sample wide 15 year rate of return by the capital stock yielded essentially identical conclusions.

The relation between TFP growth and competition and regulation is spelled out in Table P. The first two regressions show that cartelized and regulated industries have experienced generally sub-par productivity growth. These negative effects are not always precisely estimated, but they tend to be numerically large. For example, regression (2) implies essentially zero TFP growth for products subject to horizontal cartels. This regression also implies, somewhat in contrast to the results for the level of productivity, that higher concentration and more firms are associated with lower TFP growth. This is similar to Salinger's (1990) finding that concentrated industries in the U.S. experienced a reversal of previously favorable cost trends in roughly the same period.

The third regression in Table P adds an industry group EEC price trend variable. This is meant as a control for industry specific factors, hopefully unrelated to Swedish competitive and regulatory conditions, which affect productivity in all countries. For example, productivity in electronics has generally been well above average, and this is reflected in generally declining relative prices for electronics products both in Sweden and the EEC. Since we lack direct estimates of industry sector TFP growth outside Sweden, we use the EEC price trend as a proxy. The addition of this variable essentially wipes out every previous result and dramatically boosts the regression's fit. The coefficient of this variable is around -1 , which might suggest that it is a perfect proxy for industry-wide TFP trends.²⁷

There is, however, need for caution in taking this result at face value. Recall that output growth is estimated as the difference between the growth of sales and of product

²⁷ If TFP growth is translated point-for-point into lower price growth.

prices. Any measurement error in industry price trends common to Sweden and the EEC will be translated into an opposite-signed error in estimated TFP growth. For example, if electronics price indexes generally understate quality improvement, TFP growth in electronics will be correspondingly understated. The coefficient of -1 on the EEC price variable would also be consistent with the (probably unrealistic) extreme case in which the common measurement error accounted for all of the variance in price trends across products. Correlation of this error with the cartel and regulatory variables could then bias their coefficients in the third regression.²⁸

Table Q repeats the exercise in Table P using a labor productivity measure. Growth of capital per worker is added as a control. The results of interest are nearly identical. So any conclusions seem insensitive to the way productivity growth is measured.

Our conclusions about dynamic efficiency have to be qualified. What is clear is that the cartelized and regulated sectors in Sweden generally have been substantial laggards in TFP growth. This tendency is especially pronounced for horizontal cartels and for environmental and technical standards regulation. What remains unclear is the precise role of Swedish cartels and Swedish regulation in bringing this result about. Among the possibilities we must acknowledge are that: 1) the pressure to cartelize an industry and provide regulatory barriers to entry is greater where productivity growth is low; 2) barriers to competition similar to those in Sweden operate in the EEC for similar products and hinder productivity growth there to roughly the same extent as in Sweden. The one

²⁸ Electronics and fabricated metals have the best measured price performance in both the EEC and Sweden, and they show relatively little cartel and regulatory activity.

reasonably clear conclusion from our data is that cartelization and regulation have not enhanced productivity growth in Swedish manufacturing.²⁹

Simultaneous equations

In the previous analysis determination of firms' productivity growth and market prices was analysed separately. For several reasons there may be important linkages between the two. A productivity increase tends to lower the profit maximizing price, even for a firm with monopoly power. Holding constant the level of cartelization and regulation one would therefore expect firms with faster productivity growth to charge lower prices.

The price that a firm charges may in turn affect productivity growth. Monopoly power should be reflected in the price levels, even after controlling for our measures of cartelization and regulation, since these probably contain a considerable measurement error. To the extent that monopoly power affects productivity growth one would therefore expect a relationship between the price level and productivity growth.

In order to test these linkages the simplest approach is to estimate a simultaneous equation model following the structure of the productivity growth equations reported in the previous section. In the first system in table X TFP growth and relative (to EEC) prices are the dependent variables in a cross-section estimation over the 83 product markets. Relative

²⁹ We can also say that any effects of cartelization take sometime to show up. For the sample of products with the changes in cartel status we regressed the difference between annual TFP growth and long run productivity growth on cartel and year dummies. A similar regression was estimated for labor productivity growth. The coefficients of the cartel dummies were small and insignificant in both regressions. This means that productivity growth for the same product does not noticeably lag behind its long run trend in the years just following a cartel agreement.

prices and "level"-variables are averages over the period 76-90.

As in any simultaneous system a key question is how well the equations are identified. In this estimation the EEC price trend variable is a natural choice as a variable to identify the productivity growth equation. For the relative price equation we use the price regulation dummy as an identifying variable. This assumes that price and quantity affect productivity growth via price changes.

The result in table R broadly confirm single-equation results reported above. Environmental regulation has an effect on both productivity and prices. The independent linkage between relative prices and TFP growth appears small. One could argue that productivity growth should affect the relative price change rather than the relative price level. Substituting relative price change for relative price levels yields broadly similar conclusions, however, and is therefore not reported here.

Instead a more careful modelling of how prices affect productivity seems to bear fruit. The most frequently stated argument is that high prices may imply high profits. High profits in turn reduce employees' efforts and therefore depress productivity growth. The link between prices and profits, however, may be quite weak. Therefore one may get stronger results by explicitly modelling the effects of prices on the profit rate, and the effects of the profit rate on productivity growth.

We replace the simple productivity growth variable with a new variable "relative productivity growth" which shows productivity growth relative to that in EEC countries. This is calculated as $\text{RELATIVE PRODUCTIVITY GROWTH} = (1 + \text{TFP GROWTH}) / (1 - \text{MEDIAN INDUSTRY PRICE CHANGE IN EEC})$. This achieves essentially the same as

done in previous regressions by introducing EEC price change as an independent variable. However, it ensures that productivity growth is also corrected by EEC price change in the profit equation.

Since productivity growth also affects profits, we model this as a system with three simultaneous equations with the dependent variables being the profit rate, relative productivity growth and relative prices. The profit equation contains relative productivity and relative prices as explanatory variables, and the wage rate is used to identify the equation. The relative productivity equation contains profits and the cartel and regulatory variables. It is identified by the cartel and regulatory variables since we let the relative price enter recursively only into the profits equation. Thus the relative price is a function only of the cartel and regulatory variables. This is motivated because theoretically relative prices should affect relative productivity only through profits, not directly.

The results are shown in table S. They indicate that relative productivity growth has a significantly positive effect on the profit rate. The profit rate, on the other hand, has a significantly negative effect on productivity growth. Environmental regulation and price- and quantity regulation raise relative prices and thus feed through to the profit rate and relative productivity growth.

These results indicate that monopoly power may indeed have significantly negative effect on productivity growth via the profit rate. However, our measures of monopoly power in form of the cartelization variables may contain too much measurement error to pick up much of a direct link from cartelization to productivity growth.

Finally, a common argument is that high profits lead to high wage demands. Therefore wages should be treated as an endogenous variable. We have estimated such models also, but the results remain broadly the same. This is not surprising, since wage levels in Sweden have primarily been determined at more central levels than the firm. For that reason they do not differ a lot between firms.

III Summary and Conclusions

The broad conclusion to which our results point is that Sweden's tolerance of cartels and its regulatory policy have negatively affected the performance of Swedish manufacturing. We have found evidence of such negative effects on prices, output, productivity and productivity growth. These effects are summarized in Table T. It can be seen at a glance that virtually all the effects we have been able to detect are negative, and they are often substantial. As between the effects of cartels and regulation, the latter are the more substantial.

The effects we have been able to measure are probably understated. In essence, we have measured these effects as differences between a "treatment" group and a "control" group of products. To properly estimate the effects of the treatment (cartels, regulation) we would need a control group entirely free of treatment effects. However, this is not what we have. The control group includes products with no publicly registered cartel agreements. But it includes products with undisclosed cartels. The control group includes products without unusually severe regulation of three specific types. But it includes products subject, in varying degrees, to some of these and to other kinds of regulation which may have effects

on competition. Accordingly, we are able only to estimate differences between more and less cartelization and regulation rather than the full effects of these treatments. Also, recall that there is a further downward bias in our estimates of price effects stemming from our inability to control for effects of policies within the EEC which are similar to those in Sweden. Specifically, the estimated price effects of environmental and price regulation (+6% and +11%) are the (extra) premiums over similar products sold in EEC markets. But those products (e.g., chemicals and food) are also heavily regulated in the EEC. So our estimates imply that Swedish regulation has historically been more stringent than the EEC. They do not, however, reveal the full price effects of the regulation.

Because of the preceding caveats, our results should be regarded as rough magnitudes rather than precise estimates of the negative effects of cartelization and regulation. It seems safe to conclude that these effects are hardly trivial. They have, if anything, grown worse over time given the reduced productivity growth we have found in the regulated and cartelized sectors of Swedish manufacturing.

Sweden's entry into the EC will force changes in the institutions which governed the period we have studied. Because of this, our results give grounds for optimism about the likely evolution of Swedish manufacturing. The adoption of EC antitrust standards will presumably narrow the scope for cartels in Sweden. Our results imply that a less heavily cartelized Swedish manufacturing sector will be more efficient, both statically and dynamically. Inevitably integration into the EC will bring pressure for a convergence of regulatory institutions. This will lead to a corresponding convergence of costs which, our results imply, will improve Sweden's relative position. Indeed, there is evidence that some

of this has already occurred. We broke the 1976-90 period into halves and estimated separate price effects of regulation in each half. For both price and environmental regulation, the impact on Swedish prices was greater in the first half (1976-82) of this period than in the second. In the case of environmental regulation, the extra Swedish price premium narrows significantly from 10 percent in 1976-82 to around 3 percent subsequently. A smaller and less statistically reliable³⁰ narrowing occurred for goods subject to price regulation, from a 15 percent to a 10 percent extra price premium. Pressures for further narrowing of Swedish price premiums attributable to more stringent regulation can only grow as Sweden integrates into the EC. These pressures will be uneven, because the degree of regulation and cartelization varies across Swedish industries. The food sector, in particular, stands out among those Swedish industries that will be most substantially affected by the convergence of Swedish and EC policies. Much of this industry has been cartelized, subject to minimum price regulation and protected from entry by products not meeting Swedish technical standards. If these practices are eliminated, our data suggest that Swedish food prices will decline by around 10 percent in real terms at the wholesale level, while output per worker will grow a like amount. At the same time, the industry is likely to reverse its distinctly sub-par record of productivity growth.

Swedish manufacturing is highly concentrated, and this can raise concerns about the vigor of competition. Our results, however, suggest that such concerns are overstated. Indeed we find that the most concentrated Swedish industries tend to have significantly lower domestic prices and a substantial, though narrowing, advantage in output per worker

³⁰ The relevant t-ratio is 1.9 v. 5.1 for the environmental case.

over less concentrated industries. We interpret this to mean that, where regulatory barriers to entry are absent, high concentration in Sweden reflects cost advantages of large firms. The proviso here is potentially important, because we find lower prices and higher productivity where there are more firms. These twin results suggest the need for distinguishing between concentration and the number of firms in evaluating Swedish market structure. In particular, it would not be surprising if Swedish production become more concentrated as her markets become more accessible to EEC producers. This would occur if less efficient domestic production is replaced by imports. In this case, as long as the number of sellers is not reduced, our results imply favorable price and productivity effects flowing from the increased concentration. The implications for competition policy seem fairly straightforward. It is our layman's impression that EEC policy toward mergers is generally less restrictive than that of the U.S. Were it otherwise, Sweden might be ill served by legal restraints on the mergers and exits that will accompany the realignment of its manufacturing capacity when it joins the EEC. Removal of legal barriers to entry and regulatory restraints on competition would appear to merit more attention than restraints on concentration.

References

- Bain, J. Relation of profit rate to industry concentration: American manufacturing, 1936-1940, *Quarterly Journal of Economics*, 65, 1951.
- Chou, T. C. Concentration, profitability and trade in a simultaneous equation analysis: The case of Taiwan, *Journal of Industrial Economics*, 34, 1986, 429-43.
- Cowling, K. and M. Waterson, Price-cost margins and market structure, *Economica*, 1976, 43, 267-274.
- Erixon, L. Omvandlingstryck och produktivitet, in *Konkurrens, Regleringar och Produktivitet*, Expertrapport nr 7 till Produktivitetsdelegationen, 1991.
- Geroski, P. Simultaneous equation models of the structure performance paradigm. *European Economic Review*, 19, 1982.
- Jacquemin, A., De Ghellinck, E. and Huveneers, C. Concentration and profitability in a small open economy, *Journal of industrial economics*, 24, 1980.
- Heckman, J. Shadow prices, market wages, and labor supply, *Econometrica*, 1974, 42, 679-94.
- Kwoka, J.E. and Ravenscraft, D.J. Cooperation v. rivalry: price-cost margins by line of business. *Economica*, 53, 1986, 351-63.
- Martin, H. Market power and/or efficiency, *The review of Economics and Statistics*, 70, 1988.
- Marvel, H.P. Foreign trade and domestic competition, *Economic inquiry*, 18, 1977, 103-22.
- Olsson, H. Konkurrensförhållandenas betydelse för produktiviteten, in *Konkurrens, Regleringar och Produktivitet*, Expertrapport nr 7 till Produktivitetsdelegationen, 1991.
- Pugel, T. A. *International Market Linkages and US Manufacturing: Prices, Profits and Patterns*, Cambridge, MA: Ballinger Publishing, 1978.
- Salinger, Michael. *The Concentration Margins Relationship Reconsidered*. *Brookings Papers on Economic Activity: Microeconomics*, 1990.
- Schmalensee, Richard. Inter-industry Studies of Structure and Performance, ch. 16 in Schmalensee, Richard and Willig, Robert (eds.). *The Handbook of Industrial Organization V.II*. Amsterdam: North-Holland, 1989.
- SOU, *Demokrati och makt i Sverige*, 1990:44.

SPK, Horisontell Prissamverkan och marknadsdelning, SPKs rapportserie, 1992:3.

Ståhlhammar, Nils-Olov. Domestic market power and foreign trade: The case of Sweden. *International Journal of Industrial Organization*, 1991, 9, 407-424.

Ståhlhammar, Nils-Olov. Concentration, prices and profitability in the Swedish manufacturing industry, in Bourdet, Y., *Internationalization, market power and consumer welfare*, London: Routledge, 1992.

TABLE A. RELATIVE CONSUMER PRICES AT CURRENT EXCHANGE RATES, INDEX SWEDEN = 100

COUNTRIES	OKTOBER 1992	MAY 1993	SEPTEMBER 1993
Japan	91	128	145
Switzerland	94	112	127
Norway	95	109	117
Denmark	91	108	112
Iceland	91	105	109
Germany (W)	76	91	101
Sweden	100	100	100
Austria	74	89	99
Finland	79	88	92
Netherlands	70	83	92
Belgium	71	85	91
France	71	85	91
Canada	59	71	79
USA	55	74	79
Spain	61	69	76
Ireland	65	71	75
England	57	68	75
Italy	61	70	74
Australia	55	68	71
New Zealand	47	60	67
Greece	54	65	67

COUNTRIES	OKTOBER 1992	MAY 1993	SEPTEMBER 1993
Portugal	50	58	60

TABLE B. THREE MEASURES OF THE SWEDISH ECONOMY'S EXPOSURE TO COMPETITION.

MEASURE OF EXPOSURE TO COMPETITION	SHARE OF TOTAL percent
1. Import penetration in private production	15.1
2. Share of private production with import penetration greater than 16%	16
3. Share of production affected by subsidies	
Private production	17
Private and public production	36
4. Share of consumption affected by restrictions of competition	
Private consumption	62 - 79
Private and public consumption	75 - 84

Comment: Measure 1 and 2 refer to the year 1989. Measure 2 and 4 are based on import penetration per industry bransch. Measures 3 and 4 refer to the year 1991.

Source: Measures 1 and 2 come from Flam, Horn & Lundgren (1993). Measure 3 and 4 from Andersson et.al. (1993).

**TABLE C. QUALITY ADJUSTED COST REDUCTIONS AFTER
PRIVATISATION IN MUNICIPAL SERVICES.**

	PRIVATISED	EXPOSED TO COMPETITIO N	DECENTRAL IZED	CONTROL GROUP
Municipal costs	- 7.9	-9.1	-4.2	-3.6
Cost effectiveness	-12.3	-9.8	-4.2	-3.6

Cost effectiveness is the change in quality-adjusted municipal costs plus the entrepreneurs profit.

Source: Fölster, S. (1993).

TABLE D. SAMPLE CHARACTERISTICS BY INDUSTRY, 1976 - 1990.

	US SIC/ SNI	NUMBER OF PRODUCTS	AVERAGE SALES PER PRODUCT, (milj. kronor)	SAMPLE'S SHARE OF INDUSTRY'S OUTPUT
1. Food	20/1,31	10	2011	0.17
2. Apparel & leather	23,13/ 32	4	416	0.14
3. Wood & paper	24,26/ 33,34	8	2415	0.15
4. Packaging	30,32, 34/35, 36,37	3	1563	0.21
5. Industrial chemicals	28/35	7	734	0.15
6. Drugs & cosmetics	28/35	3	593	0.13
7. Petroleum products	29/36	4	294	0.07
8. Rubber	30/36	2	519	0.13
9. Stone, clay & glass	32/36	8	324	0.34
10. Fabricated metal	34/381	10	403	0.07
11. Industrial machinery	35/382	7	639	0.08
12. Electrical equipment & electronics	36/383	9	1075	0.12
13. Transport equipment	37/384	7	2200	0.15
14. Miscellaneous		3	878	0.09
Total		83	1314	0.09

TABLE E. SWEDISH PRICES RELATIVE TO EEC PRICES, 1976-1990
AVERAGE, EEC = 100

PRODUCTS GROUP	SWEDISH RELATIVE PRICES	STANDARD DEVIATION
1. Food	118.3	5.9
2. Apparel & leather	120.3	15.4
3. Wood & Paper	119.9	19.0
4. Packaging	109.2	1.9
5. Industrial chemicals	120.5	12.3
6. Drugs & cosmetics	110.6	8.1
7. Petroleum products	113.4	5.6
8. Rubber	115.3	7.4
9. Stone, clay & glass	107.0	3.9
10. Fabricated metal	109.2	5.5
11. Industrial machinery	110.7	3.5
12. Electrical Electronics	111.8	6.3
13. Transport Equipment	113.3	3.8
14. Miscellaneous	108.2	1.4
Total sample	113.6	10.1
Minimum	101.5	
Maximum	169.3	

TABLE F. CARTEL FREQUENCY AND TYPE

PRODUCTS GROUP	PRODUCT YEARS		PERCENT OF PRODUCT YEARS			
	TOTAL	WITH CARTEL AGREE- MENT	ANY AGREE- MENT (2)/(1)	VERTICAL AGREE- MENT	HORIZ- ONTAL AGREE- MENT ONLY	BOTH TYPES
1. Food	150	113	75.3%	10.7%	4.7%	60.0%
2. Apparel & Leather	60	20	33.3	33.3	0	0
3. Wood & Paper	120	50	41.7	15.0	10.0	16.7
4. Packaging	45	23	51.1	28.9	0	22.2
5. Industrial Chemicals	105	43	41.0	21.9	0	19.0
6. Drugs & Cosmetics	45	9	20.0	6.7	0	13.3
7. Petroleum Products	60	6	10.0	0	10.0	0
8. Rubber Products	30	0	0	0	0	0
9. Stone, Clay & Glass	120	19	15.8	0	15.8	0
10. Fabricated Metal	150	0	0	0	0	0
11. Industrial Machinery	105	18	17.1	0	0	17.1
12. Electrical Electronics	135	14	10.4	0	10.4	0
13. Transport Equipment	75	15	20.0	0	20.0	0
14. Miscellaneous	45	36	80.0	0	53.3	26.7
TOTAL	1245	366	29.4	7.5	7.8	14.1

TABLE G. FREQUENCY OF REGULATION

PRODUCTS GROUP	PERCENT OF PRODUCT YEARS			
	ANY REGULATION	ENVIRONMENTAL	PRICE	TECH. STDS.
1. Food	100.0	8.7	70.0	100.0
2. Apparel & Leather	0	-	-	-
3. Wood & Paper	100.0	100.0	0	12.5
4. Packaging	33.3	0	0	33.3
5. Industrial Chemicals	100.0	100.0	0	0
6. Drugs & Cosmetics	0	-	-	-
7. Petroleum Products	100.0	100.0	0	25.0
8. Rubber Products	0	-	-	-
9. Stone, Clay & Glass	0	-	-	-
10. Fabricated Metal	0	-	-	-
11. Industrial Machinery	0	-	-	-
12. Electrical Electronic	0	-	-	-
13. Transport Equipment	60.0	0	-	60.0
14. Miscellaneous	33.3	33.3	0	0
TOTAL	410	25.1	8.4	19.3

**TABLE H. REGRESSION OF SWEDISH
Relative Prices on Cartel & Regulation Variables, 1976-90**

INDEPENDENT VARIABLES	(1)		(2)		(3)	
	COEF	t	COEF	t	COEF	t
A. Cartel Agreement						
1. Vertical	-.1	.1	-.8	.8	-2.5	2.5
2. Horizontal	3.4	3.4	2.2	2.2	.1	.1
B. Food Industry			4.4	3.8	-2.0	.9
C. Regulation						
1. Environmental					7.0	9.1
2. Price					12.8	6.0
3. Technical Standards					.8	.7
D. Year Dummies*	YES		YES		YES	
\bar{R}^2	.09		.10		.18	
S.E.E.	11.9		11.8		11.3	

1. All Regressions based on 1245 observations: 83 products x 15 years of data. Cartel/Regulation variables = +1 if indicated type of cartel or regulation is in force in the year, 0 otherwise. *All regressions include 14 dummies, each = +1 for observations in years 1976 ... 90, coefficients not shown.

**TABLE I. MARKET STRUCTURE, REGULATION
Cartels and Prices, 1976-90**

INDEPENDENT VARIABLES	(1)		(2)		(3)	
	COEF	t	COEF	t	COEF	t
A. Cartel Agreement						
1. Vertical	-2.3	2.3	-2.0	2.0	-2.0	2.1
2. Horizontal	0	0	-.8	.8	-.8	.8
B. Regulation						
1. Environmental	7.1	9.3	6.8	8.9	6.6	8.7
2. Price	11.6	7.2	12.3	7.6	12.3	7.6
3. Technical Standards	.2	.2	-.8	.8	-.9	.8
C. Market Structure						
1. Herfindahl Index	1.19	1.4	-9.3	2.9	-9.1	2.9
2. Number of Firms			-2.9	3.9	-2.8	3.9
D. Avg. Wage (000 '90 SEK)					.06	2.3
E. Year Dummies*	YES		YES		YES	
\bar{R}^2	.18		.19		.19	
S.E.E.	11.3		11.2		11.2	

TABLE J. PRICE CHANGES AND CARTEL CHANGES

PRICE VARIABLE AND INTERVAL*	TYPE OF CARTEL CHANGE							
	FORMATION				TERMINATION			
	HORIZ.		VERTICAL		HORIZ.		VERTICAL	
A. <u>SWEDISH RELATIVE PRICE</u>	% Δ	t	% Δ	t	% Δ	t	% Δ	t
1. Year of Change (0)	.9	1.2	.0	.0	1.0	1.3	-3.5	3.4
2. Year After (+1)	-1.0	1.3	.9	1.3	-0.6	.8	1.7	1.6
3. Year Before (-1)	-1.3	1.7	.9	1.2	-.2	.2	.8	.8
4. 0 to + 1	-.1	.1	1.2	1.2	.4	.3	-1.8	1.2
5. -1 to 0	-.5	1.1	.9	1.0	.9	1.1	-2.4	1.5
6. -1 to 1	-1.5	1.1	2.1	1.7	.3	.2	-.5	.3
B. <u>SWEDISH DOMESTIC PRICE</u>								
1. 0	.0	.0	.5	1.7	.2	.6	-.4	.9
2. +1	.2	.6	.3	1.1	.2	.7	-.2	.3
3. -1	-.4	1.2	.3	.8	.3	.9	.1	.2
4. 0, +1	.2	.4	.9	2.0	.4	.9	-.6	.9
5. -1, 0	-.4	.8	.8	1.8	.6	1.0	-.4	.5
6. -1, 1	-.2	.3	1.2	2.1	.8	1.3	-.5	.9

Note: Based on regressions with change in lag of price as dependent variable. Independent variables include up to 3 cartel change dummies, year dummies and, for the Swedish price change, the current and two lagged values of the changes of the EEC price index for the good.

Sample sizes vary from 913 to 1162 depending on the lag structure.

*Each line indicates a different assumed lag structure. E.g. In line 1. it is assumed that all effects occur in year of cartel change, for line 6. the effects are assumed to begin a year before and end a year after the change.

**TABLE K. FREQUENCY OF POSITIVE RESIDUALS FOR PRICE CHANGES
AROUND CARTEL CHANGES**

PRICE VARIABLE, TYPE OF CHANGE (NUMBER OF CASES)	FREQUENCY POSITIVE RESIDUALS	CONTROL GROUP FREQUENCY	DIFFERENCE	T
A. Swedish Relative Price				
I. Cartel Formation				
1. Horizontal (10)				
(a) Year of Change	.80+	.42	.38	2.2
(b) Year Before	.70	.68	.02	0.2
(c) Year After	.40	.56	-.16	1.1
2. Vertical (13)				
(a)	.62	.47	.14	0.9
(b)	.75+	.61	.14	1.1
(c)	.69	.62	.07	0.4
II. Cartel Termination				
1. Horizontal (17)				
(a)	.41	.51	-.10	0.8
(b)	.65	.53	.12	0.8
(c)	.50	.59	-.09	0.6
2. Vertical (9)				
(a)	.00-	.53	-.53	5.2
(b)	.78	.54	.24	1.3
(c)	.75	.59	.16	1.0
B. Swedish Price				
I. Cartel Formation				
1. Horizontal (10)				
(a)	.80	.51	.29	1.60
(b)	.56	.75	-.19	1.12
(c)	.70	.68	+.02	0.11
2. Vertical (12)				
(a)	.83+	.56	.27	2.19
(b)	.64	.61	.03	0.16
(c)	.75	.68	.07	0.46
II. Cartel Termination				
1. Horizontal (16)				
(a)	.44	.73	-.29	2.39
(b)	.86+	.77	.08	1.04
(c)	.60	.69	-.09	0.66
2. Vertical (9)				
(a)	.22-	.73	-.51	3.40
(b)	.89+	.76	.13	1.20
(c)	.63	.57	.06	0.43

() = number of cases. Cartel with both horizontal and vertical provisions (3 formations, 8

terminations) is counted twice. Cases used in computations vary because of different underlying lag structures of the two regressions used to generate residuals and because 1975 and 1991 data are unavailable.

+(-) = significantly (5%) greater (smaller) than overall sample frequency.

TABLE L. OUTPUT CHANGES AND CARTEL CHANGES

INTERVAL	TYPE OF CARTEL CHANGE							
	FORMATION				TERMINATION			
	HORIZ.		VERTICAL		HORIZ		VERTICAL	
	% Δ	t	% Δ	t	% Δ	t	% Δ	t
1. Year of Change (0)	- 5.8	2.7	-10.5	5.7	+6.7	3.3	+2.5	0.9
2. Year After (+1)	- 3.0	1.4	+ 3.8	2.0	-0.4	0.2	-0.4	0.1
3. Year Before (-1)	- 4.1	1.9	1.0	0.5	-0.2	0.1	-1.3	0.4
4. 0 to + 1	- 8.8	2.9	- 7.1	2.7	+6.2	2.1	+1.9	0.5
5. -1 to 0	-10.0	3.3	- 9.7	3.6	+6.5	2.2	+1.4	0.3
6. -1 to 1	-13.3	3.5	- 6.4	1.9	+6.2	1.7	+1.3	0.3

See note to Table J. This table is based on regressions with the change in log of output, year t minus the average annual change, 1976-1990 as dependent variable and year dummies as independent variables. Sample size varies from 996 to 1162 depending on the log structure.

**TABLE M. FREQUENCY OF POSITIVE RESIDUALS,
OUTPUT CHANGES AROUND CARTEL CHANGES**

TYPE OF CHANGE (NUMBER OF CASES)	FREQUENCY POSITIVE RESIDUALS	CONTROL GROUP FREQUENCY	DIFFERENCE	t
I. Cartel Formation				
1. Horizontal (10)				
(a) Year of Change	.20-	.62	-.42	2.2
(b) Year Before	.20-	.45	-.25	1.9
(c) Year After	.70	.38	.32	1.5
2. Vertical (13)				
(a)	.00-	.65	-.65	13.5
(b)	.31	.48	-.18	1.2
(c)	.69	.49	.21	1.5
II. Cartel Termination				
1. Horizontal (17)				
(a)	.94+	.46	-.48	4.4
(b)	.41	.52	-.11	0.8
(c)	.63	.57	+.05	0.4
2. Vertical (9)				
(a)	1.00+	.38	+.62	9.2
(b)	.44	.48	-.04	0.2
(c)	.50	.67	-.17	1.0

See notes to Tables K and L.

**TABLE N. PROFITS/SALES. VALUE ADDED PER WORKER
COMPETITION AND REGULATION**

INDEPENDENT VARIABLES	PROFITS/SALES x 10 ²				VALUE ADDED/WORKER (SEK 000)			
	COEF. t		COEF. t		COEF. t		COEF. t	
	(1)		(2)		(3)		(4)	
A. Cartels								
1. Vertical	-0.2	.3	-0.0	.0	-21	1.5	-15	1.1
2. Horizontal	1.3	1.3	1.7	1.7	29	2.1	30	2.1
B. Regulation								
1. Environmental	3.8	5.2	3.8	5.3	46	4.3	44	4.1
2. Price	7.5	4.9	7.4	4.8	77	3.4	81	3.6
3. Technical Standards	0.4	.4	0.7	0.7	22	1.5	19	1.3
C. Capital Intensity								
1. Capital/Sales	7.3	3.5	7.4	3.5				
2. Capital/Worker (SEK 000)					.22	19.4	.22	19.3
D. Market Structure								
1. Herfindahl Index			9.0	2.9			68	1.5
2. Number of Firms			1.1	1.5			-4	0.4
E. Year Dummies	YES		YES		YES		YES	
R ²	.20		.21		.39		.40	
S.E.E.	10.8		10.8		158.0		156.9	

**TABLE O. ESTIMATED IMPACT OF COMPETITION AND REGULATION
ON UNIT COSTS & OUTPUT PER WORKER**

VARIABLES	EFFECT OF UNIT CHANGE ON			
	COST/OUTPUT	t	OUTPUT/WORKER	t
A. Cartels				
1. Vertical	-1.8%	1.5	+1.6%	0.5
2. Horizontal	-2.8	1.9	+4.0	1.1
B. Regulation				
1. Environmental	+1.3	1.2	-6.8	2.5
2. Price	1.8	0.8	-12.1	2.1
3. Technical Standards	-1.9	1.3	5.5	1.5
C. Market Structure				
1. Herfindahl Index	-19.2	4.0	34.3	3.0
2. Number of Firms	-3.9	3.5	5.8	2.3

Based on coefficients from col(2) Table I and cols (2) and (4) Table N. See text for formula combining these coefficients. Estimates are taken at sample means of all relevant variables.

TABLE P. TOTAL FACTOR PRODUCTIVITY GROWTH

1976 - 1990

INDEPENDENT VARIABLES	(1)		(2)		(3)	
	COEF	t	COEF	t	COEF	t
A. Cartels						
1. Horizontal	-1.22	1.7	-1.56	2.1	-.04	0.2
2. Vertical	+.46	.7	.47	.7	.11	0.6
B. Regulation						
1. Environmental	-.47	1.1	- .53	1.3	+.19	1.6
2. Price	-.41	0.5	- .15	0.2	-.20	0.8
3. Technical Standards	-.74	1.3	- .96	1.7	+.01	0.4
C. Market Structure						
1. Herfindahl Index			-3.30	1.7	-.25	0.4
2. Number of Firms			- .77	1.7	-.10	0.8
D. Median Industry Price Change in EEC, '76-'90					-.98	30.4
\bar{R}^2	.10		.11		.93	
S.E.E.	1.54		1.53		0.42	

Sample = 83 products

Dependent variable is Annual Percentage growth of total factor productivity between 1976-77 and 1989-90. See text for definition of total factor productivity, Cartel, regulation and market structure measures are 1976-1990 averages of annual values. EEC Industry price change is the median value for the industry group of the annual rate of change of EEC product price indexes for 1976-77 to 1989-90.

TABLE Q. GROWTH RATE OF OUTPUT PER WORKER

1976 - 1990

INDEPENDENT VARIABLES	(1)		(2)		(3)	
	COEF	t	COEF	t	COEF	t
A. Cartels						
1. Horizontal	-1.17	1.6	-1.48	2.0	-.02	0.1
2. Vertical	+.39	0.6	.41	0.6	.05	0.5
B. Regulation						
1. Environmental	-.51	1.2	-.56	1.4	.15	1.9
2. Price	-.25	0.3	-.01	0.0	-.05	0.3
3. Technical Standards	-.78	1.4	-.98	1.8	+.02	0.2
C. Market Structure						
1. Herfindahl Index			-2.99	1.5	-.05	0.1
2. Number of Firms			-.72	1.6	-.90	0.05
D. Growth Rate of Capital Per Worker	.91	3.8	.86	3.6	.90	20.2
E. Median Industry Price Change, EEC					-.97	45.8
\bar{R}^2	.18		.19		.97	
S.E.E.	1.49		1.48		0.27	

TABLE R. SIMULTANEOUS ESTIMATION OF RELATIVE PRICES AND TFP GROWTH

INDEPENDENT VARIABLES	Relative Price Coef	t	TFP growth Coef	t
A. Cartels				
1. Vertical	-0.046	1.2	-0.0001	0
2. Horizontal	0.015	0.3	0.0001	0
B. Regulation				
1. Environmental	0.06	2.5	0.04	2.0
2. Price	0.12	2.2		
3. Technical standards	-0.001	0	0.004	0.2
C. Median Industry Price Change in EEC, '76-'90			-0.98	28.1
D. Dependent variables				
1. Relative price			-0.21	0.8
2. TFP growth	-0.03	0.6		
\bar{R}^2	0.11		0.93	
S.E.E.	0.09		0.057	

TABLE S. SIMULTANEOUS ESTIMATION OF THE PROFIT RATE, RELATIVE TFP GROWTH AND RELATIVE PRICES

INDEPENDENT VARIABLES	Profit rate Coef t	Relative TFP growth Coef t	Relative Prices Coef t
A. Cartels			
1. Vertical		-0.012 0.6	-0.04 1.1
2. Horizontal		0.006 0.23	0.03 0.7
B. Regulation			
1. Environmental		0.009 0.6	0.07 2.2
2. Price		-0.032 0.99	0.115 2.1
3. Technical standards		0.008 0.5	-0.0005 0.01
C. Wage level	-0.004 0.2		
D. Dependent variables			
1. Profit rate		0.39 2.5	
2. Relative TFP growth	1.85 3.3		-0.13 0.3
3. Relative price	0.34 1.75		
\bar{R}^2	0.13	0.15	0.11
S.E.E.	0.2	0.09	0.09

TABLE T. SUMMARY OF EFFECTS OF CARTELS AND REGULATION

INSTITUTION [MAIN AFFECTED SECTORS]	PRICES	OUTPUT	PRODUCTIVITY OUTPUT/WORKER	TOTAL FACTOR PRODUCTIVITY GROWTH (per year)
<u>CARTELS</u> [Food, wood/paper, packaging, chemicals]	-2% in vertical agreements	-6 to -13% after agreement, +6% after agreement is terminated	N	-1.6% for horizontal agreements
<u>REGULATION</u> 1. Environmental [Wood/paper, chemicals, petroleum]	+6%	-	- 7%	- .5%
2. Price [Food]	+11%	-	-12%	N
3. Technical standards [Food, packaging, transport eqpt.]	N	-	N	-1%
RELEVANT AVERAGES FROM SAMPLE	+13.6% Sweden v. EEC	5.6% standard deviation of yearly ouput change	SEK 520,000 Value Added per worker	+1.6%/year TFP Growth

N = No effect found

- = Data unavailable