# The Industrial Institute for Economic and Social Research



Current Research Projects
Summer 1972

# The Industrial Institute for Economic and Social Research

is an independent non-profit research institution, founded in 1939 by The Swedish Employers' Confederation and The Federation of Swedish Industries.

#### **Objectives**

To Carry on research into economic and social conditions of importance for industrial development in Sweden.

#### Activities

The greater part of the Institute's work is devoted to long-term problems, especially to long-term changes in the structure of the Swedish economy particularly within manufacturing industry. This also includes continuous studies of the development of private consumption in Sweden and projections of demand for various products. Research results are published in the series issued by the Institute.

Along with the long-term research work the Institute carries out investigations concerning special problems and performes certain services to industrial enterprises, organizations, governmental agencies, etc.

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## CURRENT RESEARCH PROJECTS SUMMER 1972

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### PREFACE

Here we present in English most of our current research projects. We hope that in this way we will make it possible for an international audience interested in economic research in Sweden to get an idea about what subjects we are dealing with at the Industrial Institute for Economic and Social Research.

Stockholm in June 1972 Lars Nabseth

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#### SWEDISH ECONOMIC GROWTH

The Institute's investigation of economic growth in Sweden during the last 100 years has so far resulted in five publications.<sup>1</sup> What remains now is a summary analysis. The basic question is the following: Which have been the sources of growth, and how has their intensity varied from time to time?

The breakthrough of the industrial age in Sweden is usually dated to the period around 1870. However, long before then the Swedish economy had been prepared for the arrival of »the new age». The middle of the century witnessed a series of events which became fundamental for the coming development; the trade policy was liberalized; the railroad-network was started; the banking system was developed; obligatory education was introduced; the iron exports began to increase after almost a hundred years of stagnation, and from Great Britain there was a sudden demand for Swedish wood products. The time was apparently ripe for industrial revolution in the early 1870's when the international boom brought extreme price increases on the Swedish basic products, iron and wood. This led to an expansion in the iron- and saw-milling industries. The boom, supported by intensive railroad construction rapidly spread to other parts of the Swedish economy.

When the international boom subsided in the mid 1870's, and when the rail-road investments diminished at the same time, the Swedish industrialization process lost much of its power. In spite of this, however, the Swedish national product rose, even though slowly, not only during the late 1870's but also during the long international depression in the 1880's. In comparison with other countries, Sweden actually came out rather well during the bad years of the 1880's. This was due to several favorable circumstances: the market for wood products was never as strongly depressed as other industrial markets; through extensive borrowing abroad the total domestic demand could be kept up fairly well without currency difficulties; the iron mills succeeded in partially counteracting the depression by switching to steel production; and through extensive emigration the pressure on the Swedish agricultural population decreased.

<sup>&</sup>lt;sup>1</sup> Y. Åberg, Production and Productivity in Sweden 1861–1965 (Produktion och produktivitet i Sverige 1861–1965); V. Bergström, The Economic Policies in Sweden and their Results (Den ekonomiska politiken i Sverige och dess verkningar); L. Ohlsson, Foreign Trade and Economic Growth in Sweden 1871–1966 (Utrikeshandeln och den ekonomiska tillväxten i Sverige 1871–1966); L. Lundberg, Capital Formation in Sweden 1861–1965 (Kapitalbildningen i Sverige 1861–1965); and P. Silenstam, The Development of the Labour Supply in Sweden 1870–1965 (Arbetskraftsutbudets utveckling i Sverige 1870–1965).

However, the most important saving factor for the Swedish economy seems to have been the fact that the Swedish agriculture switched from vegetable to animal production. If the Swedish farmers had not succeeded in this, the situation would have become disastrous.

The period from the early 1890's until the beginning of the First World War was characterized by an almost constant boom and a very rapid industrial expansion. The conditions for growth of the Swedish economy were unusually favorable at this time. The railroad investments were largely completed and the terms-of-trade improved gradually. In addition, the technical development during the preceding decades had been especially favorable for Sweden. Through the advances in electric technology and in the production of iron and pulp, the rivers, the phosphorous ores, and the forests had become sources of wealth previously unheard of. The development of the Swedish economy around the turn of the century was based largely on exploiting these natural resources. This period also witnessed the breakthrough of the Swedish engineering industry. Industrial production now increased faster than during any other period of the same length.

The interwar period, of course, was marked by two deep depressions. During the 1920's as well as during the late 1930's, production rose fairly rapidly. This expansion was based upon the construction industry, the engineering industry, and the pulp exports. Technical development seems to have been slow, and productivity rose more slowly than during the preceding period. In spite of this, the standard of living increased fairly rapidly due to the fact that the age distribution developed in an exceptionally favorable manner.

The 1920's and '30's exhibited entirely different business trends. The 1920's were characterized by keen international competition, small profit margins, rapidly increasing foreign trade, and high interest rates. During the 1930's, on the other hand the international wave of protectionism brought a »green house climate» with limited competition and stagnating foreign trade. Productivity, which rose fairly rapidly during the 1920's, increased much less during the 1930's.

The postwar economic development is in many ways a mirror image of the development during the interwar period. The 1950's, like the 1930's, were characterized by limited competition, low interest rates and slow productivity increase, while the 1960's like the 1920's, brought keen international competition, rapidly increasing foreign trade, small profit margins and fast productivity growth. The combination of a high investment rate, rapid technical change and increasing foreign trade, especially during the 1960's, brought a very fast productivity increase. Of course, the absence of big changes in business outlook was one of the reasons behind the favorable economic development in the postwar period as during the decades around the turn of the century.

As is seen in table 1, the three periods prior to the Second World War exhibit only slight differences in the growth rates of gross national productivity (GNP per employee). The postwar period, however, contrasts against earlier periods. From 1949 until 1969, the average increases in production as well as

Table 1. Production, Productivity and Exports during 100 years
Annual percentage growth rates

	1869-1889	1889-1914	1919-1939	1949-1969
GNP	3.2	3.3	3.3	4.0
GNP per employee	2.2	2.3	2.1	3.5
Exports	3.9	3.0	4.9	7.7

productivity were considerably higher than before. It should be pointed out, however, that the faster growth rates can be attributed entirely to the 1960's. In fact, the 1950's fit rather well into the pattern of the preceding periods. GNP grew only 3.4 % per year then and the productivity increase was limited to 2.9 % per year. During the 1960's the corresponding figures were 4.6 and 4.1 % per year, respectively. The break in the trend came neither during the 1940's nor the 1950's but only at the beginning of the 1960's. Historically, the last ten years have been quite unique as far as the rate of economic growth is concerned.

What caused the acceleration of economic growth which became apparent at the beginning of the 1960's? It is important to shed light upon that question, because the answer will probably indicate the nature of future economic development in Sweden and therefore how to influence the economy in the most desirable direction.

Investigator: Ragnar Bentzel.

#### SURVEY OF ADVERTISING COSTS

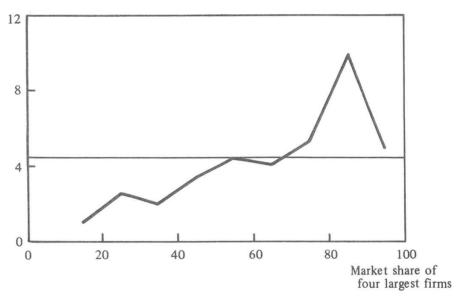
The Institute has conducted a survey in collaboration with the Central Bureau of Statistics of the costs of advertising in Sweden. The survey shows that the total cost of commercial advertising in Sweden amounted to 1.6 billion Sw.kr. in 1967. Of this sum 75 % were made for goods and services intended for private consumption.

The survey also shows the costs of advertising for different consumer goods. In relation to turnover, toothpaste, detergents and toiletsoap have the highest costs of advertising — around 20-25%. As a contrast, clothes have costs of advertising which amount to only around 1% of the turnover. This is the same pattern as in the USA and in the UK. When ranking different commodities according to the costs of advertising in relation to turnover, a rank correlation of 0.7-0.8 for the three countries is found.

The Institute has also made an analysis in order to explain why the costs of advertising differ between commodities. With the help of six variables it has been possible to account for a little more than 2/3 of the differences. The most important of these variables is the concentration of sellers. When there are only a few firms competing in the market — oligopoly — the costs of advertising have been found to be considerably higher than otherwise. The relation between costs of advertising in percent of turnover and seller concentration measured as the proportion of output accounted for by the four largest firms is shown in figure 1.

Figure 1. The Relation between Seller Concentration and Advertising Costs in 1967

Advertising costs, %



Advertising costs

Average advertising costs for 89 commodities

Investigator: Rolf Rundfelt.

#### EFFECTS OF ABOLISHING RENT CONTROLS

The conditions in the housing market have changed considerably since 1962 when the Institute published Bostadsbristen, en studie av prisbildningen på bostadsmarknaden (The Housing Shortage. A Study of Pricing in the Market for Housing), a book written by Professors Ragnar Bentzel, Assar Lindbeck, and Ingemar Ståhl. Therefore, the Institute has considered it important to follow up this study in order to shed light upon the consequences of the transition to a more market determined rent structure. During the 1960's the stock of housing has increased gradually; the market position of the nonprofit enterprises has been strengthened; a new law concerning rents and providing for tenancy protection and the so-called use value principle of rent determination has been passed; the government housing credit system has been changed through the introduction of so-called parity loans; and, finally, certain parts of the rent control system have been abolished, primarily with regard to sales of cooperative apartments and houses mortgaged by the National Housing Board, but also with regard to the determination of rents in certain private rental facilities. Another important change is that the housing production has been so large and the construction costs of new production have become so high that market equilibrium has almost been reached in certain parts of the new production.

The study begins with an analysis of the present situation and how it has been reached. Then a comparison is made between today's housing market which is subject to partial rent control and a hypothetical, non-controlled housing market in equilibrium. Special attention is devoted to the aspects of income distribution, the distribution of housing consumption, freedom of consumption, the general standard of housing, the direction of housing production and its magnitude, and the question of socio-economic stability. With this background, various methods of abolishing rent controls and the housing shortage are analyzed. An attempt is made also to analyze the effects of the modifications of the control system — partly according to the so-called use value principle — which have been proposed in recent years.

Investigator: Assar Lindbeck.

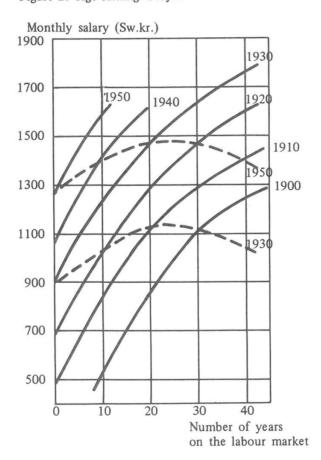
# STATISTICAL METHODS FOR THE ANALYSIS OF EARNINGS DATA WITH SPECIAL APPLICATION TO SALARIES IN SWEDISH INDUSTRY

This study contains three main parts. The first part is a general introduction and a description of the data used, the second part is a combined cross section and time series analysis of age-earnings profiles and the third part is cross sectional application of the general linear model. Although the methodological

aspects of the study are stressed in a forthcoming monograph, the empirical results obtained are also of great interest. The study gives a detailed analysis of the present salary structure in Swedish industry as inherent in the salary statistics of the Swedish Employers' Confederation and the Swedish Association of Graduate Engineers.

There are two kinds of age-earnings profiles, those which describe the earnings path of an individual or a cohort and those which describe earnings differences between individuals at the same point of time. The first kind of profiles is called cohort profiles. They are illustrated in figure 2 by the solid curves. The second kind of profiles, cross section profiles, is illustrated by the curves of small dashes.

Figure 2. Age-earnings Profiles



The cross section profiles can be deduced from the cohort profiles. In the present study a model is presented which is able to describe both these profiles and link them together. The steeper slope of the cohort profiles is explained by the increase in the general salary level due to economic growth (and inflation). Except for this general salary increase the increases which determine the shape of the profiles are assumed to be dependent on physical age and active age, i.e. number of years in the labour market. The relative importance of these factors in the determination of salary increases is estimated from the data. The results show that active age is more important than physical age. This is illustrated in table 2, where the average percentage increase in monthly salaries of graduate engineers specialized in electrical engineering is decomposed into three components: the general increase in salary, the increase due to physical age and the increase due to active age.

For instance, for an engineer who is 30-34 years old and graduated 0-4 years ago the total annual average salary increase is estimated to 13.2%. 5.5% is the general increase due to economic growth and inflation. 2.5% is due to his physical age and 5.2% to his active age.

The model has been used to analyze differences in profiles between employees with different educational qualifications and to calculate life-time salaries.

In the last part of the study not only salary differences due to differences in age but also differences due to job, educational qualifications, industry and cost of living area are analyzed. The results show that differences in job levels explain the largest part of the salary differences. The second most important factor is age, followed by educational qualifications. Differentiation due to industry and cost of living area is relatively unimportant. The analysis also includes interactions between the above factors, i.e. it is, for instance, investigated if the salary differences between young and old employees depend on their education. A general result is that interactions are relatively unimportant. The analysis is concluded with a comparison of the salary structures in 1957, 1960, 1964 and 1968, which reveals a surprisingly permanent structure.

The study was almost completed at the end of 1971 and the results will be published shortly.

Table 2. Annual Average Percentage Salary Increase of Graduate Engineers Specialized in Electrical Engineering and Employed in the Private Sector, 1961–1970

General	Physical age							
salary increase	22-29	30-34	35-39	40-44	45-49	50-54	55-59	
5.5	2.4	2.5	2.0	0.2	-0.8	-3.7	-0.6	
	Numbe	r of years	after gr	aduation				
	Number 0-4	r of years			20-24	25-29		

Investigator: Anders Klevmarken.

#### THE DIFFUSION OF NEW TECHNOLOGY IN INDUSTRY

An important explanation of economic growth in different countries is the introduction of new production processes originally developed in other countries. There is comprehensive evidence in medicine, ethnography, sociology, etc., concerning various types of diffusion processes, but considerably less empirical material is available on the diffusion of new technology among industrial enterprises. The purpose of the present international investigation is to study this problem. Besides IUI, the following research organizations are participating in the investigation: National Institute of Economic and Social Research in London, Istituto Nazionale per lo Studio della Congiuntura in Rome, National Bureau of Economic Research in New York, IFO-Institut fur Wirtschaftforschung in Munich and Österreiches Institut für Wirtschaftsforschung in Vienna.

Ten processes, all introduced during the postwar period, have been selected for the study. Among them are such important innovations as numerically controlled machine tools and the oxygen steel process. The first report of the investigation was published in 1969<sup>1</sup> and the intention is to publish a final report in 1973.

The material collected for the study concerning the diffusion of new technology in Swedish industry is more comprehensive than is required for the international study. Therefore, this material can form a basis for further study of technology in Swedish manufacturing industry. Figure 3 shows the diffusion among Swedish firms of special presses for paper production, wet suction boxes, continuous pulp cooking, outside chip storage and tunnel kilns for brick making.

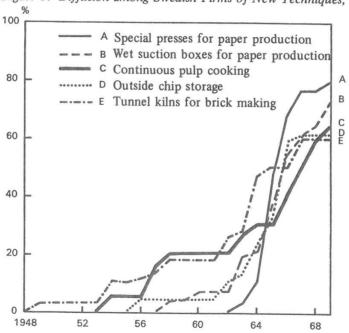


Figure 3. Diffusion among Swedish Firms of New Techniques, 1948-1969

<sup>&</sup>lt;sup>1</sup> The Diffusion of New Technology. A study of ten processes in nine industries. (The National Institute Economic Review, May 1969.)

The studies made so far, especially those in the U.S., show that certain firms always tend to lead in introducing new processes available on the market, and, similarly, that other firms always tend to lag in the introduction process. The same tendencies are found in the Swedish material as well.

Investigators: Lars Nabseth, Staffan Håkanson, Märtha Josefsson.

#### THE CHEMICAL INDUSTRY

The purpose of this study is to investigate which factors have determined the development of the Swedish chemical industry up to now and to analyze the future prospects of the industry in our country.

A cross section analysis of the OECD countries shows a strong correlation between the consumption of chemical goods and the gross national product. During the 1960's the share of chemical goods in the total consumption of industrial goods has successively increased. The primary explanation seems to be that the technical development, and hence also the productivity increase, has been faster within the chemical sector than in other industries, making chemical products more competitive against other products.

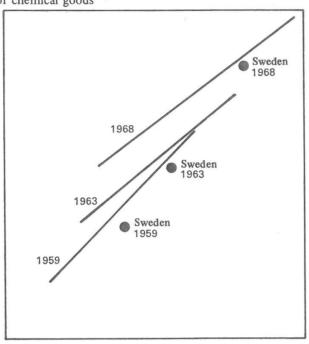
There is a similar connection between the chemical production and the gross national product. This correlation, however, has weakened during the 1960's as a consequence of the increased internationalization of the chemical industry. Improved transportation techniques have made the chemical producer less dependent on his national market than before, although it is still important as his primary market.

For the major OECD countries with a large and differentiated home market we observe a strong correlation between the growth rates of the chemical production and of industrial production as a whole. For the minor countries this correlation is considerably weaker, and among them the most important determinant of the growth rate of the industry seems to be the specific prerequisites for the chemical industry in each country. E.g., the Dutch chemical industry has expanded rapidly during the 1960's, mainly because the Netherlands have been a suitable location of heavy petrochemical industry.

The Swedish chemical industry is a relatively small part of the whole industry of the country, but its growth rate relative to the GNP growth rate has been a little above the OECD average during the 1960's. Since the chemical industry is a great consumer of chemical goods for further processing the Swedish consumption of chemical goods, which has been small compared to our gross national product, has gradually approached the »normal» level. As can be seen from figure 4, however, we are still somewhat below this.

Figure 4. The Relation between Chemical Consumption and Gross National Product in the OECD Countries, 1959, 1963 and 1968

Per capita consumption of chemical goods



Gross national product per capita

Investigator: Olle Renck.

# THE REAL AND FINANCIAL STRUCTURE OF THE SWEDISH ENGINEERING INDUSTRY

A question which has received increasing interest during the last ten years is the forces behind the expansion of the industrial firms and their profitability. Particular interest has focused on the effects of growth on profitability. However, these effects are difficult to estimate empirically because the rate of return also influences the growth rate by generating internal sources of finance for growth. In this study the influence of other factors on the profitability is examined too, e.g. firm size, capital intensity, solvency, liquidity and the composition of the capital in terms of real and financial funds.

Another question which has received considerable attention in modern theories of the firm deals with how the value of the firm (the market value of its shares) is determined by various financial factors. This problem will be analyzed from both theoretical and empirical points of view. The basic hypothesis is that the value of the firm is equal to the discounted value of all future expected dividends. Then it is possible, with a simple model to describe how a firm's value is influenced by its expected rate of return and capital growth and also by the discount rate. It is of great importance for the results to quantify the effects on the discount rate of such financial factors as the pay-out ratio, the leverage ratio etc. Regression analyses with this purpose will be performed.

At the beginning of the study empirical data will be presented that show the engineering industry's expansion and structural development during the last ten years. Cross section comparisons based on firm data are made to determine relationships between various real and financial variables within firms. The hypothesis is that firm size, growth rate and rate of return are important variables explaining structural differences between firms. The data used for these cross section and time series studies and for the econometric analysis are the industrial and financial statistics of the Central Bureau of Statistics as well as the Financial Statistics of the Swedish Engineering Employers' Association.

Investigator: Göran Eriksson.

#### THE GROWTH AND STRUCTURE OF SWEDISH ENGINEERING EXPORTS

Engineering products amount to more than 40 % of total Swedish exports and imports. Thus, Swedish trade does not seem to be very highly specialized as regards its content of engineering products. Those products are, however, heterogeneous in terms of technique of production, end-use and complexity, just to mention a few well-known characteristics, and it has consequently been assumed that the Swedish specialization appears within the trade of engineering products more than between such products and other major commodity groups.

The main interest of the study is to analyze how some macroeconomic determinants affect the structure and development of engineering production and trade in Sweden given the structure (and development) of consumption, world trade and tariffs. Among different macroeconomic determinants we have settled for those generally used in such foreign trade theories as the theories of factor proportions, human skills, product cycle, etc.

Apart from its concentration on Swedish engineering trade (and production) the study differs mainly in three respects from what is common in most empirical analyses of the structure of trade of a given country. Since the aim of the

study is to search for major macroeconomic determinants, that is, to try to explain as much of the trade structure (and its development) as possible, it was not regarded as sufficient just to test the explanatory power of certain trade theories. This constitutes one of the three distinguishing features of our study. Another one, also related to the level of ambition of the study, is the emphasis on an explicit analysis of the empirical relevance of some common assumptions of the factor proportions theory, such as perfectly tradeable goods, homogeneous goods within each commodity group, and the existence of factor reversals. Although the analysis consists of a series of partial studies, much of the analysis is thus set out in a frame-work on or outside the borderline of existing trade theories. A third difference from other empirical studies of foreign trade is that ours is looking not only at the existing structure at a given point in time but rather takes a special interest in studying the structural development. In doing so we make use of two different concepts of the term comparative advantage. One is used when the existing structures of trade and production are analyzed and is called the historical (or established) comparative advantage of Sweden. The other is used to describe changes in those structures on the margin and is consequently called the marginal comparative advantage of Sweden.

In going beyond the frame-work of existing trade theories some rather bold empirical assumptions had to be made. This was also necessitated by the fact that much of the empirical analysis for practical reasons had to be carried out on a commodity rather than industry basis. Consequently, no such data as factor intensities were available. Some new empirical concepts were therefore developed in order to analyze the pattern of specialization on technologically unique engineering products and that of product differentiation in Sweden and other industrial countries.

The International Specialization and Development of the Swedish Metal Products Industry

The aim, outline, models and methods of this study are basically the same as those of »The Growth and Structure of Swedish Engineering Exports». The investigation was initiated by a committee set up by the Ministry of Industry to study the structural and regional problems and prospects of the metal products industry and will be published as an appendix to the official report of that committee. Although basically the same, this report focuses in more detail on the specialization and development of this specific industry and its subindustries.

Investigator: Lennart Ohlsson.

#### THE PRINTING INDUSTRY

During the autumn 1971 several of the major enterprises in the printing industry revealed plans to rationalize their technical operations, the consequences of which will be a reduction of the labor force of more than a 1000 persons. The decisions are especially disadvantageous to the lower skill category of typographical workers who make up the larger part of those considered superfluous. Behind the decisions can be found the technical changes in printing methods presently taking place with a switch from letter press to lithographic printing methods. The concentration in time of these decisions is most probably due to business conditions in general. Looking further ahead new printing methods, today useful in laboratories only, can be counted on to be introduced in the production.

One of the main reasons for this investigation of the printing industry, which is done in collaboration with the Ministry of Industry, is to analyze the likely consequences of future technical changes specially regarding the demand for qualified labourers.

Structural changes initiated by new techniques are hardly unique to the printing industry. Almost all branches of industry have been affected, particularly after the war. More often than not the new techniques have been large-scale biased implying a concentration of production to large plants. The printing industry has so far escaped such disturbances due to particular factors affecting the branch such as the geographic dependency between customer and printer. This is illustrated by the fact that the number of plants in the printing industry during the period 1955–1968 increased by more than 11 % while the number of plants in manufacturing industry as a whole decreased by 6 %.

Investigator: Bertil Lindström.

#### PROFITS, RATE OF RETURN AND GROWTH

This study constitutes an extension of the study on » The Credit Market and Manufacturing Investment Behaviour» (by Gunnar Eliasson) that was published by the Institute in 1967. The previous analysis investigated the impact of economic policy — notably monetary policy — on short term variations in investment activity during the postwar period. In the present study principal emphasis has been put on factors behind observed growth trends in various sub-industries of Swedish manufacturing.

The theoretical basis for the empirical inquiry is the presumption that expectations about future profitability are fundamental for business investment decisions. For this reason rate of return calculations have to be carried out for

the subindustries studied. For several reasons it has been found convenient to organize this study as a series of separate investigations. The project that is now about to be completed concerns a theoretical and empirical analysis of the relationships between wage determination and profit performance.

As a starting point the market expectations of firms have been studied as a factor directly influencing annual production plans and indirectly influencing demand for manpower. The design of the theory is based on experience from a series of interviews on long range planning practices within U.S. and European companies that was initiated in 1969. From the wage-profit model, a so-called profit function can be derived. This profit function has been estimated for seven subindustries of Swedish manufacturing. One important result seems to be that mistaken expectations as to future prices play an important role in explaining short term fluctuations in gross profit margins and profitability. An analysis of the feed back effects of inflation on firm planning decisions and profit performance is a natural ingredient of the investigation.

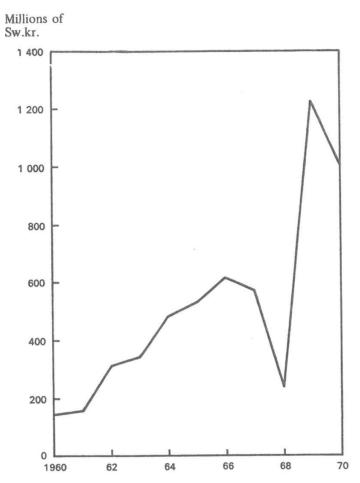
Investigator: Gunnar Eliasson.

#### INDUSTRIAL DEVELOPMENT AND THE LONG TERM SUPPLY OF CAPITAL

In the latest long term survey carried out by the Institute, the industrial rate of investment was a central question. The survey pointed out the financial needs which would have to be met in order to realize the desired rate of investment. Among other things, the need of institutional changes in the capital market was discussed, for example in order to increase the supply of capital not averse to risk. However, no further analysis of the relationship between the character of investment and the source of finance was possible within the frame-work of the long term survey. It was assumed that these problems would be analyzed more thoroughly in the investigation concerning the capital market. Against this background the Institute has been asked by the Ministry of Finance about the possibility of following up the study of real growth in Swedish industry in the 1970's made by the Institute for the long term survey with an analysis of the problems of finance. An investigation of these problems was started in the fall of 1971.

The firm's demand for external capital and its willingness to replace internal financing with borrowing in various forms can probably be clarified only in the context of a total evaluation of all the essential decision variables at the discretion of management, such as the rate of investment, the desired rate of return, the rate of diversification, the solvency ratio, the extent of new stock issues, the dividend policy, the extent of foreign production, the evaluation of risk, etc.

Figure 5. Swedish Direct Investment Abroad According to Balance of Payment Statistics, 1960–1970



Source: The Bank of Sweden, 1960-1970.

1965 and/or 1970. In general, the companies have been very cooperative despite the fact that completing the forms meant a considerable amount of work for many of them.

In view of the demand for information concerning the developments during the latter part of the 1960's part of the material will be published already during 1972. This preliminary report will, among other things, contain data on the number of selling and manufacturing subsidiaries abroad and total assets, number of employees, and sales of the latter as well as their imports from the Swedish parent groups. The final report will contain a full presentation of the material collected along with the results of the analysis.

Investigators: Birgitta Swedenborg, Eva Thiel.

#### FOREIGN DIRECT INVESTMENTS IN SWEDEN

The investigation of foreign owned companies in Sweden has been divided into two parts. The first consists of a questionnaire survey of the foreign owned sector of Swedish industry. Here we try to get information about the extent and growth of this sector in terms of number of employees, foreign owned capital, turnover distribution by industry and country of control, etc.

The purpose of the second part of the project is to study the transfer of technology by the international firms that have subsidiaries in Sweden. The choice of problems can be seen in the light of the importance of technology transfer for economic growth and international competitiveness. This has, for example, been observed in OECD's study *Gaps in technology*, where the importance of the international firm in the diffusion of technology and the reduction of the so-called technology gap has been emphasized.

The importance of such diffusion depends among other things on whe technological contents of the activities of the foreign owned companies in Sweden and the competitive surroundings in this host country. Manufacturing companies can, in this context, be assumed to have greater significance than companies that only practice assembly or trade activities. Likewise there will be an influence from the assortment of products in the foreign owned companies in the sense that those who produce and/or sell producer goods and technologically advanced products can be assumed to influence the productivity of the nationally owned companies in a higher degree than those only selling traditional consumer goods.

There can also be transfers when the foreign owned companies have Swedish subcontractors whom they instruct and sometimes educate. Different kinds of knowledge can also be transferred via education of employees, for example, when they are sent to affiliates abroad for training or education.

Finally we can mention, in this context, the impact on the host country of research and development in foreign owned companies and via the access that these companies may have to results from research and development performed in foreign affiliates.

Investigator: Hans-Fredrik Samuelsson.

#### EFFECTS OF TRADE BARRIERS ON THE SWEDISH ECONOMY

During the afterwar period there has been a successive liberalization of barriers to trade in industrial products in the form of import duties and quantitative import restrictions, in particular inside the European trade blocs, the EEC and the EFTA. Besides the tariffs there remains, however, a broad group of restrictive policy

measures, ranging from production subsidies in several forms to government purchases and national safety and industrial product standards which tend to discriminate against imports. The attempts to eliminate these non-tariff barriers have met with great difficulties, even inside the trade blocs.

The existence of trade barriers can be expected to affect the economy structure of a country - the distribution of production, resources and consumption, and the volume and composition of trade. It might also affect the output obtainable from a given supply of resources. This study aims at an estimation of the order of magnitude of these effects of existing trade barriers on the Swedish economy. The first step is an attempt to describe and measure the different forms of barriers affecting different sectors of Swedish exports and imports. To be useful for the analysis such a description must include a comparison of the restrictiveness of different forms of barriers, to make it possible to evaluate the combined effects of the whole complex of trade barriers on the economic structure. In the absence of a numerically specified and disaggregated model, a way of assessing the effects of existing barriers is to study the effects of past changes in trade policy. For this reason an attempt has been made at empirical estimation of the effects on the Swedish economy of the establishment of EEC and EFTA. The results support the hypothesis that the discriminating tariff changes have substantially affected the volume and composition of Swedish exports and imports. According to table 3 the Swedish export loss on the Common Market has outweighed the export gains in the Free Trade Area. The liberalization of trade would also be expected to lead to an increase in productivity, as an effect of several factors, among which are a more efficient resource allocation, better utilization of scale economies, and the use of more efficient methods of production as a result of a stronger competitive pressure. There is some empirical evidence which points to a tendency for total factor productivity to increase at a higher rate in sectors which have been particularly exposed to increased import competition through the elimination of tariffs.

Table 3. Effects on Swedish Exports of Manufactures of the Tariff Changes in EEC and EFTA.
Effects are expressed as hypothetical changes in 1968 exports, millions of Sw.kr.

Exports to	SITC 6		SITC 7		Total
EFTA	+300		+560		+860
UK		+ 90		+200	
Nordic countries		+170		+300	
EEC	-550		-660		-1260
Germany		-290		-260	
Benelux		-160		-290	
Total	-250		-100		-350

Investigator: Lars Lundberg.

#### IMPORTS OF MANUFACTURES FROM LOW-WAGE COUNTRIES

In the period from 1958 on, the low-wage countries (defined as all countries whose gross national product (GNP) per capita in 1965 did not exceed 30 % of the Swedish GNP per capita) have increased their share of the world's exports of manufactures from about 4 to about 5 %. At the same time, this increase has been very unevenly distributed with respect to both the country of origin and the commodity groups involved in this trade. Hong Kong, with a population of only 3.7 million, was responsible for no less than 40 % of the total export increase of all the developing countries between 1956 and 1968. Textiles, apparel, and leather products make up half of Western Europe's imports from developing countries; the corresponding figure for Sweden is 70 %.

The purpose of the present study is to determine the magnitude and structure of manufacturing imports from the developing countries into Western Europe with particular emphasis on Sweden. A theoretical analysis of the determinants of these imports on both the demand and the supply side is made. This analysis forms the basis for an empirical investigation of the structure of Swedish manufacturing imports from developing countries.

Given the dominance of textiles and apparel in these imports, special attention is devoted to the effects of low-price imports on these industries, and the responses of firms experiencing increased foreign competition are examined in a special survey through interviews with affected firms.

A forecast of the development of imports from low-wage countries in the 1970's is made on the basis of the theoretical and empirical analysis as well as the textile case studies. A special sub-section deals with the particular case of Japan.

Investigators: Bo Carlsson, Åke Sundström.

# ENTRY TO THE SWEDISH MANUFACTURING INDUSTRIES AFTER THE SECOND WORLD WAR

The number of establishments in the Swedish manufacturing industries reached a maximum in the early 1950's and has since started a decline. If this decline is due to a higher rate of exit or a lower rate of entry of firms is unknown as no statistics on entry or exit are available.

This study attempts in the first place to provide a statistical description of the size and character of entry, exit and growth of firms in the Swedish manufacturing industries during the postwar period. A pilot study already made for the county of Blekinge for the period 1946—1968 showed that an extensive revision of available industry censuses and addition of supplementary data (through direct con-

tacts with a great number of industrial enterprises, through calendars and other data sources) are required to get reliable data. The scope of the investigation has therefore been restricted to the manufacturing of metal products and machinery in 1954–1969. For the period 1963–1969, however, all manufacturing industries will be covered.

The second purpose of the investigation is to search for explanations in variations of entry and exit rates among different industries and different years. The main emphasis is put on a model using cross section data and including as explanatory variables profits, entry barriers, rate of growth of demand and technical progress.

The principal finding of the pilot study of entry and exit in Blekinge is a sharply declining trend of the entry of new firms as shown in figure 6. The trendlines have been fitted with ordinary least squares methods.

Numbers

20

16

12

8

+++

4

0

1946

50

54

58

62

66

69

—Entry of firms

--- Exit of firms

Figure 6. Entry of Firms and Exit of Firms in Blekinge, 1946-1969

Investigator: Gunnar Du Rietz.

## RESEARCH AND DEVELOPMENT COSTS IN SWEDISH MANUFACTURING INDUSTRY

This study was initiated in the autumn of 1971 on the basis of a research grant from the Swedish Board for Technical Development (STU). The primary purpose is to show to what extent the research and development inputs influence production and productivity in the manufacturing companies. The objective is to estimate the importance of a company's research and development expenditures compared to other factors of production, such as labour and capital. Thus, calculations will be made to estimate the returns of research and development expenditures in different industries and companies. The study has at the very beginning been limited to the following branches: manufacture of paper and paper products, printing and publishing, industrial chemicals, other chemical products, drugs and medicines, petroleum refining, rubber products, plastic products, and basic metal industries. These industries cover about 55 % of the whole research and development expenditures in Swedish manufacturing industry in 1969.

The returns of research and development inputs depend on what type of research the companies undertake. Today, development work is the most usual form of research and development (87 %), while applied research is carried on less extensively (12 %). Finally, basic research takes only a fraction (about 1 %) of the total current expenditures for research and development activity. It is a task for the investigation to try to appraise to what extent the returns of these different research and development investments exceed the returns from alternative real capital investments.

If research and development investments give rise to greater returns than other investments, then research and development activities should increase over time. But the research and development data published by the Central Bureau of Statistics (SCB) do not show that any such expansive feature exists. On the contrary, the research and development inputs decreased by c. 12 % (number of man-years) between 1967 and 1969 in Sweden. The reasons for this can, of course, be of financial nature.

Investigator: Anita Lignell.

#### EFFECTS OF FISCAL POLICY

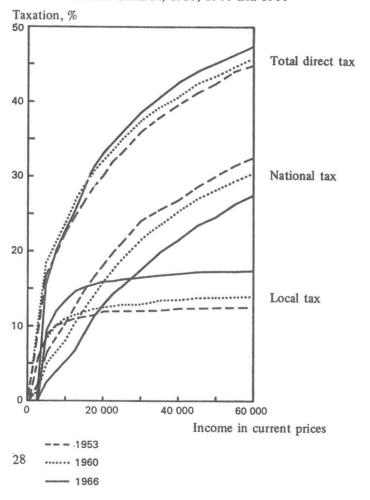
This work, which is a joint venture with the Department of Economics at the University of Lund, is an investigation of the personal income taxation in Sweden in 1952–1971. The core of the study is the construction of a model

of taxation, that from a given distribution of income before tax and a given set of public parameters computes the revenues from national and local taxation and from old age pension fees and medical insurance premiums.

The model also gives the distribution of tax payments on different income classes and family categories. Therefore, the distribution of income after tax but before transfers can be computed. An intrinsic property of the model is that the public parameters appear explicitly. So we can by simulation distinguish and compare the effects of different specified changes in the parameter set. The level and distribution of income before tax also appear explicitly which makes it possible to investigate the built-in flexibility of the tax system. The model covers at present the years 195 –1967, while the work to include the years up to 1971 is going on.

The period 1952–1967 is charachterized by repeated downward shifts in the schedules for direct national taxation. For the category unmarried people without children this is illustrated by figure 7. At the same time there have been successive raises of taxes by local governments. The result is that the schedules for total direct taxation have been more or less unchanged.

Figure 7. Tax Curves for Different Tax Types According to Unmarried People without Children, 1953, 1960 and 1966



But increasing incomes, during the period, in combination with the progressivity of taxes have caused a considerable increase in the mean tax rate as well as in the mean marginal tax rate which is illustrated by table 4, that also gives the development of different tax types. The comparisons that have been made between income dispersion before tax and after tax indicate a small increase during the period in the difference between these two dispersions which could be given the interpretation that the redistribution effect of direct taxation has increased somewhat during the 1950's and the 1960's.

Table 4. Mean Tax and Mean of Marginal Tax for Different Tax Types, 1953, 1961 and 1967. Percent.

3.7	National tax		Local tax		Total direct tax	
Year	Mean tax	Mean marginal tax	Mean tax	Mean marginal tax	Mean tax	Mean marginal tax
1953	9	18	10	12	19	31
1961	11	25	11	14	24	41
1967	12	28	15	18	29	49

Investigator: Ulf Jakobsson.

#### GOALS AND MEANS IN TRANSPORT POLICY

In 1963 the Swedish Riksdag took a major decision of principle in the field of transport policy. The railways got more commercial freedom, entry controls were lessened in the road haulage industry, existing hauliers would be able to expand their business more easily than before, and unremunerative railway and bus services in the sparsely populated regions were to receive increased direct grants.

The new transport policy was to be put into effect in three steps. The first two were taken on 1st July 1964 and 1st July 1966, respectively; the third step has been postponed, the main reason being that the work of a governmental commission on road track costs has not yet been completed. It was also said that the experiences of the first two stages had to be more fully evaluated.

However, the main points of the »liberalization programme» have been carried out. Therefore, it is very important to analyze the content and the effects of the new Swedish transport policy. The Institute has decided to carry out such a study in order to analyze developments within the transport sector before, during, and after the new policy was brought into being.

The main interest of the study is the transport of freight, as the new policy essentially dealt with this part of the transport sector. A fairly large part of the study will be devoted to international comparisons of goals and means in transport policy, especially the relation between road and rail, and regulatory systems geared to affect the development of road freight transport. Most countries seem to have the same goals when intervening in the road freight transport markets, but the means used have varied a great deal. A discussion of goals and means within this sphere might lead to interesting results.

The theoretical parts of the study will include an analysis of the determinants of demand and supply in different transport markets. In this connection it is important to make clear what the market structure would look like under a system without "traditional" governmental intervention, as compared with the present situation, characterized by entry controls, capacity restrictions, and price regulations.

The empirical parts of the study will be focused on the following points: the effects of the 1963 Act on the road haulage industry as to, e.g., size of firms, frequency of new entrants, and the development of transport costs and prices. The development of own account transport will also be analyzed as well as the competitive ability of the railways in different freight markets. The frequency of violations of rules concerning drivers' hours, maximum loads, etc., is also a matter of interest which will be covered.

When analyzing the statistical data it will be important to pay attention to, on one hand, the effects of the new transport policy and on the other, the effects of "external" factors, such as the business cycle. The 1963 Act will also be discussed from another point of view: did the change-over to the new policy take place in the "best possible way"? Should the transitional period have been longer? Was the timing of the various parts of the whole "package" the right one? Was the transition too much of a shock to the system, or did the procedure of deregulation take place in a smooth way?

Figure 8 shows the annual change from 1960 to 1970 in ton miles of freight by rail and by road hauliers on distances above 100 kilometers. As can be seen from the figure, rail sundries traffic has declined every year except in 1961, 1969 and 1970. As a contrast, wagon load traffic (iron ore from Lapland not included) has increased considerably, by 75 % from 1960 to 1970.

The curves in figure 8 show marked fluctuations from one year to another. The changes are very closely related to the business cycles; the recession in 1967 is clearly visible as is the boom in 1969 and 1970.

The data presented in figure 8 give no evidence that, on a short term basis, the development of rail and road freight transport would have been affected by the new transport policy measures adopted in 1964 and 1966.

+18 +16 +14 Road: Long distance (above 100 km) road haulage +12 Rail: Wagon load traffic (iron ore excluded) +10 +8 +6 +4 +2 Rail: Sundries traffic 0 -2-4 -61960 62 66 68 70

Figure 8. Annual Change (percentages) in Ton Miles, 1960 to 1970

Investigator: Lars Kritz.

#### COMPETITION ON EQUAL TERMS

In most countries public policy toward industry is becoming more active. Tendencies to more selective policies are obvious in several countries. The motives behind the interventions vary from case to case. Local policy, defence, a wish to protect industry sectors with problems, a wish to build up industry in sectors

that will expand fast in the future, have, among other things, been presented as the motives behind the governments' growing ambitions to actively influence the development.

It is obvious that this kind of political goals often conflicts with the traditional assumptions of free competition. The competition between firms and sectors is influenced nationally and internationally. The effects actualize different estimate criteria, such as equity aspects, effects on economic growth, the allocation of resources between firms and sectors, etc.

In this study the main emphasis is put on the importance of international competition as an explanation behind the selective actions. The international competition and the claims upon the individual country to maintain balance in its foreign payments can, in many cases, be considered as a cause of the growing extent of selective policy on the part of the government.

Investigator: Jan Bröms.

#### THE PROBLEM OF WAGE DRIFT

In order to investigate the problem of wage drift the Swedish Employers' Confederation (SAF) has collected data on wages in firms affiliated to the Confederation. In this investigation which refers to the second quarters of the years 1965—1968 the wage drift has been related to a number of wage determining factors. Then, these factors have been used as a base for a systematical grouping of the statistical material. In this way it has been possible to carry out some comparative analysis of wage developments for different groups of workers and firms as well as certain calculations regarding wage drift components.

However, this statistical material is unique in such a way that it is possible to analyze the wage developments of individual workers and therefore it is considered to be interesting to elaborate the material further.

Most commonly the problem of wage drift is studied by means of econometric methods on a relatively high level of aggregation. For instance different industrial branches are often compared with each other. However, now the material here permits a study of the wage drift from the viewpoint of the individual worker. Such a disaggregated analysis could possibly give a deeper insight into the factors behind the wage drift.

Investigator: Yngve Åberg.

## THE STRUCTURE OF SALARIES IN THE GOVERNMENTAL SECTOR OF SWEDEN

The number of employees in the governmental and state-subsidized sectors amounts to about 400 000 persons. If the 70 000 wage earners are added the sum covers about 12 % of the total labour force in Sweden.

Salary statistics have been collected and published by the Central Bureau of Statistics (SCB) since 1954 but they have not been analyzed. The aim of the current study is to see what factors have influenced the level of salaries for different groups of employees. What differences are there between employees with different educations when other factors are held constant such as age, sex, etc.? Are there differences among the various governmental activities, and can the differences in that case be explained by a quicker expansion of some activities? Are there salary differences that can only be explained by sex, so that given the same education, age and other circumstances women have lower salaries than men? Are there any regional differences, other things equal?

If possible the grouping of employees will be done in such a way that a comparison with privately employed persons can be done on an »other things equal» basis. Table 5 shows salaries of governmental and private employees by deciles. From this rough table it looks like women are better paid in the governmental sector.

The basis of the analysis sketched above is a comparison between different kinds of jobs. Another problem that will be studied is the individual earnings path through time. An attempt will also be made to trace the political element of the salary structure. Have the negotiations systematically favoured some special group of employees and has this been spoilt by wage drift?

Table 5. Salaries of Privately Employed Persons (within the SAF-sector) and Governmentally Employed by Deciles. Sw.kr. per month, in 1969

	Privately	employed	Governmentally employed		
Decile no.	men	women	men	women	
0.5	1750	950	1713	1331	
1	1950	1150	1907	1430	
2	2250	1350	2105	1512	
3	2450	1450	2210	1713	
4	2650	1550	2276	1814	
5	2850	1750	2388	1907	
6	3050	1850	2507	2006	
7	3350	1950	2746	2105	
8	3750	2150	3037	2210	
9	4550	2450	3723	2507	
9.5	5350	2750	4144	2746	

Sources: Central Bureau of Statistics (SCB), and Swedish Employers' Confederation.

Investigator: Siv Gustafsson.

# THE COSTS OF ALTERNATIVE METHODS OF REDUCING INDUSTRIAL WASTE DISCHARGES

In order for the authorities to be able to formulate the objectives for environmental policy in a rational way, the availability of some measure of the costs and benefits of reaching (and maintaining) a given environmental quality is of crucial importance. The absence of a market for environmental assets has resulted in the benefits being evaluated primarily on a political basis. Such evaluations generally take the form of establishing so called ambient standards for various environmental resources. The incomplete knowledge of the ecological characteristics of the recipients makes it difficult to establish with any accuracy how much discharges would have to be reduced in order to meet a given standard of environmental quality. Translating ambiant standards to effluent standards is complicated further by the fact that the assimilative capacity varies not only between different recipients but also between different periods for one recipient. In the absence of sufficient knowledge about these variations one is forced to make more or less simplifying assumptions about the relation between reductions in waste discharges and improvements in environmental quality. The uncertainty about these relations means that effluent standards should not be established without at least some knowledge of the cost to comply with these standards.

One of the major problems facing such cost estimates is how to separate the costs for environmental improvement from other costs. This is in fact nothing but the well-known problem of joint-cost allocation. When measures take the form of installation of equipment exclusively intended for waste treatment one can fairly well identify both investment costs and net operation costs. In some cases, however, the measures will take the form of alterations of the production processes. Such alterations can be made on existing as well as on new equipment. In the latter case, it might be quite difficult to identify that part of the total investment that should be regarded as pollution abatement investment. If it is at all possible to collect such information the most reliable sources ought to be the engineers and technicians of the various firms.

The purpose of this project is to calculate the costs of alternative methods at reducing the discharges of certain kinds of waste products and with the aid of these calculations try to answer the question of the effects of various measures of environmental policy (like establishing effluent standards, effluent charges etc.) on waste discharges, production volume, choice of production technique, etc. Even if the project basically limits itself to a five-year period, it will raise the important question whether or not the future costs of reducing waste discharges can be lowered by the introduction of new, less polluting production techniques and/or more efficient methods for treating and recycling waste — and, if this is the case, how to stimulate the development and diffusion of such new techniques. A lengthening of the time perspective would imply that

the cost calculations to a certain extent would be based on so called technological forecasting. The degree of uncertainty of such calculations varies from branch to branch, and in those cases where this uncertainty is particularly high one or two alternative calculations will have to be made.

Investigator: Johan Facht.

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