

Foss, Nicolai J.; Møllgaard, Peter

**Working Paper**

## Industrial Economics in Scandinavia: 1880-1980

Working paper, No. 18-2004

**Provided in Cooperation with:**

Department of Economics, Copenhagen Business School (CBS)

*Suggested Citation:* Foss, Nicolai J.; Møllgaard, Peter (2004) : Industrial Economics in Scandinavia: 1880-1980, Working paper, No. 18-2004, Copenhagen Business School (CBS), Department of Economics, Frederiksberg, <https://hdl.handle.net/10398/7539>

This Version is available at:

<https://hdl.handle.net/10419/208493>

**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.*



<https://creativecommons.org/licenses/by-nc-nd/3.0/>



**Copenhagen  
Business School**  
HANDELSHØJSKOLEN

# **Department of Economics**

Copenhagen Business School

**Working paper 18-2004**

## **INDUSTRIAL ECONOMICS IN SCANDINAVIA 1880-1980**

**Nicolai J.Foss    Peter Møllgaard**

# Industrial Economics in Scandinavia, 1880 – 1980

**Nicolai J. Foss**

Department of Management, Politics, and Philosophy  
Copenhagen Business School

Blaagaardsgade 23B; 2200 Copenhagen N; Denmark  
phone: +45 3815 2562; email: njf.lpf@cbs.dk

and

Department of Strategy and Management  
Norwegian School of Economics and Business Administration  
Breiviksveien 40; N-5045 Bergen; Norway

**Peter Møllgaard**

Department of Economics

Copenhagen Business School

Solbjerg Plads 3, C5; 2000 Frederiksberg; Denmark

Phone: +45 3815 2584; email: hpm.eco@cbs.dk

**21 December 2004**

Prepared for Henk de Jong and William Shepherd, eds.  
*Pioneers of Industrial Economics*, Edward Elgar.

## **Abstract**

Based on diverse research methods, we trace and map industrial economics research in the Denmark, Norway and Sweden in the period of 1880 to 1980. After describing this research in terms of key contributors, we argue that industrial economics developed rather unevenly in the Scandinavian countries. Danish research was mainly theoretical and strongly oriented towards the international context, whereas Norwegian research was largely industry analysis with a strong leaning towards managerial economics. Swedish research in industrial economics is very scant until the end of the 1960s.

## **Acknowledgments**

We are grateful to Tore Ellingsen, Bjarke Fog, Einar Hope, Lennart Hjalmarsson, Kjell Erik Lommerud, Tore Nilssen, Vibeke Ring, Kjell G. Salvanes, Erik Ø. Sørensen, and Claus Vastrup, for assistance and comments. Grith Ølykke and Nicolai Ginnerskov Pedersen provided valuable research assistance.

**JEL Code:** B1, B2, B3, D2, D4, L1, L2, L4

## Introduction

In the span of time covered by this chapter, the Scandinavian countries produced numerous famous economists, notably Knut Wicksell, Gustav Cassel, Erik Lindahl, Gunnar Myrdal, Bertil Ohlin, Frederik Zeuthen, Ragnar Frisch, Tryggve Haavelmo and Leif Johansen. However, none of these saw themselves as contributors to “industrial economics” (however defined), although at least Cassel (1901), Zeuthen (1929, 1930), and Frisch (1941a/b) made the occasional contribution that can be argued to lie within the interstices of industrial economics. Indeed, some of these have often been cited in the industrial economics (Zeuthen’s 1930 work on bargaining). Moreover, the majority of the famous Scandinavians in economics do their main work prior to or immediately after World War II, that is, largely prior to the emergence of industrial economics as a distinct and recognized field in economics in the 1950s.

Still, as we show in the following, the Scandinavian countries did produce interesting work in industrial economics, although there was comparatively little of it and much was written in the national languages. Specifically, in the ensuing pages, we map industrial economics in the Scandinavian countries — Denmark, Norway and Sweden — in the 1880 to 1980 period. For each country, we offer a broad survey of the state of industrial economics in the period, highlighting the contributions of the 3-4 leading economists in the field. We also discuss the relative performance of the Scandinavian countries, as well as their distinctive peculiarities.

## Methods and Data Sources

In this section, we briefly discuss the definition of industrial economics, and present our methods and data sources.

### **Defining Industrial Economics**

We adopt a broad definition of industrial economics as the "... disciplined application of economic principles to explain and predict real-world behaviour of firms, markets and industries" (vision statement of the editors of the *Journal of Industrial Economics*; URL). This includes the economics-based study of the "... nature of competition, the determinants and welfare effects of market structure, the variety of products that will be produced, and the price and sales policies of suppliers" (Krouse, 1990: xi). As Tirole (1988: 3) observes, the frontiers of industrial economics are "fuzzy," and a precise definition is impossible to forward because the field strongly overlaps with microeconomics and because it has strong implications for macroeconomics.

Observe also that the fuzziness may extend to what is meant by the "disciplined application of economic principles." Thus, modern industrial economists may not think of the use of economics by the first wave of industrial economists as particularly "disciplined" (see Krouse, 1990; Tirole, 1988). Moreover, if by the notion of "economic principles," is meant contemporary standard theory, this is definitely too narrow, first, because the pioneers simply did not have access to contemporary tools, and, second, because, contributions were made to what we would like to think of as industrial economics by contributors who thought of themselves as being outside of the economic mainstream. In Scandinavia, Swedes Erik Dahmén and Bo Carlsson are two prominent examples.

## **Methods and Data Sources**

We have relied on a broad spectrum of methods to identify Scandinavian industrial economics contributions in the relevant period. These are briefly discussed in the following.<sup>1</sup>

*E-mail questionnaire.* An e-mail was distributed to ten economics departments in Scandinavia. The mail requested responses on questions relating to key persons in

---

<sup>1</sup> In addition to those methods mentioned in the following, we also performed searches on google and the JEL database. However, these searches were, on the whole, fruitless, except for tracking a few publications by Swedish and Norwegian industrial economists in the 1970s.

industrial economics prior to 1980 and relating to their main contributions. About ten responses were returned.

**Search in relevant journals.** We searched all volumes of the following journals for articles on industrial economics by Scandinavian authors: *Nordisk Tidsskrift for Teknisk Økonomi* (*Nordic Journal for Technical Economics*; 1935-1955), *Nationaløkonomisk Tidsskrift* (*Journal of the Danish Economics Society*; 1873- ), *Økonomisk Tidsskrift* (*Scandinavian Journal of Economics*; 1899 - ), and *Journal of Industrial Economics* (1952- ). These journals were selected because publishing activity in the relevant period was still a fairly local affair, so that national journals would for many be a first choice. The *Journal of Industrial Economics* was included because it is the only specialist journal in the relevant period.

There are obvious limitations of this procedure. Most notably, the sample of journals is small — and it may well be *too* small. For example, we cannot entirely exclude the possibility that we have overlooked Scandinavian IO papers in journals such as *Economic Journal*, *Economica*, *Zeitschrift für Nationalökonomie*, or more obscure journals. However, we are confident that the procedures we have followed have resulted in a high probability of identifying Scandinavian IO contributions to at least the major journals. One reason for this is that an IO publication in a major journal is likely to make a splash in the relevant local economics community that is remembered, even years after.

**Library search.** We performed extensive search in the Royal Library in Copenhagen, and in the libraries of Copenhagen Business School and the Economics Departments at the University of Copenhagen. Inputs into the search were those names that we had identified through searched the above-mentioned journals or names that our key informants had provided us with.

**Key informants.** On the basis of responses to the above questionnaire, a number of key informants were selected. These were:

- Norway: Professor Einar Hope, Department of Economics, Norwegian School of Economics and Business Administration.
- Sweden: Professor Lennart Hjalmarsson, School of Economics and Commercial Law, Gothenburg
- Denmark: Professor Bjarke Fog, Copenhagen Business School

## Denmark

Microeconomics has always been an important topic for Danish economists, especially in the area of general equilibrium theory. Kærgård (1983, 1996) argues that marginal analysis penetrated Danish economic thinking already in the 1870s, that is, simultaneously with the independent discoveries of Menger, Jevons and Walras, sometimes even preceding them. These Danish economists (e.g. Frederik Bing, Julius Petersen and Harald Westergaard) were very adamant about the use of mathematics in economics and quick to adopt in particular Jevons' thinking. The dissemination of the ideas of the marginalist revolution was rapid in Denmark, not least because it quickly got connected with economic policy, for example, issues concerning the determination of the "rational wage."

By 1880, Denmark was thus "equipped" with mathematical economists with knowledge of and interest in microeconomics and marginal analysis. It thus seemed well posed to take on industrial economics. In fact, four persons can be identified as pioneering Danish IO in the 20<sup>th</sup> century: Frederik Zeuthen started off on oligopoly, bargaining and general equilibrium. He inspired Winding Pedersen to work on price theory, Hans Brems to work on monopolistic competition (among other subjects) and Bjarke Fog to study pricing empirically.

### **Frederik Zeuthen**

Frederik Zeuthen (1888-1959) was in many ways an excellent example of an early Danish professor of economics. He was interested in many different areas and

covered both economic theory and social policy (Philip, 1974: 367). He was one of the very few Danish full professors of economics at that time, and had broad interests. However, he distinguished himself from his peers by contributing to three strands of the international economic literature (Brems, 1974: 347-8): Monopolistic competition and a re-interpretation of Cournot including “business stealing effects” in a sort of Bertrand model of differentiated goods; bilateral monopoly as a “dynamic game” of “alternating” offers; and Walrasian equilibria with non-negativity constraints. We focus here on the first two contributions that fall within industrial economics.

Arguably, Zeuthen’s best-known contribution was to the literature on imperfect or monopolistic competition. His first paper on this was in Danish and appeared in 1929, just after (and referring to) Hotelling (1929) and preceding the contributions by Chamberlin (1933), Robinson (1933) and von Stackelberg (1934). He made this contribution available in English in his monograph on *Problems of Monopoly and Economic Warfare* that was first published in 1930 with a preface and a recommendation by Joseph Schumpeter.

Zeuthen’s take on monopolistic competition was surprisingly modern. He defined monopolistic competition as “... the instance in which several entrepreneurs have at the same time so great a share in the production that they may be, and are, interested in influencing the price even at the cost of some reduction of their own sales ... The actions of one entrepreneur will be adjusted to those of the others, and vice versa. Many economists, therefore, think that no stable equilibrium can be obtained in this instance, but others are of the opposite opinion. The different points of view depend, however, on the choice of hypotheses.” (Zeuthen, 1930: 24). Today we would describe this situation as *oligopolistic* competition rather than monopolistic competition and Zeuthen was indeed thinking of competition *à la* Cournot (as “further explained by Wicksell”, p. 26), Bertrand and Edgeworth. He explains the difference in approaches as stemming from different assumptions as to the degree to which a unilateral reduction of the price extends the firm’s business by “taking



customers from the other party" (diversion<sup>2</sup>) or "by capturing some of the unsatisfied consumption" (business growing) (Zeuthen, 1930: 41). Zeuthen thinks of Cournot's duopolists as price setters (!) and uses the parameterized ratio of "diversion" to "business growing" as an explanation why different oligopoly models reach different results. He thus arrives at a re-interpretation of Cournot equilibria (differentiated Bertrand) that is novel (Brems, 1976: 355) and based on rigorous, but graphical, analysis.

Zeuthen's other contribution within the field of IO dealt with the determination of prices in bilateral monopoly, that is, the "case when two monopolistic concerns face one another as buyer and seller" (Zeuthen, 1930, p. 64). In today's terminology and following Brems' (1976) exposition, Zeuthen defined the threat point utilities that up- and downstream firms<sup>3</sup> would obtain in case of breakdown of negotiations. Denote these  $u$  and  $d$ . He defined the probability  $q$  that a breakdown would occur and the price  $p$  of the intermediate good in case of successful negotiation. Let  $U(p)$  and  $D(p)$  be the payoff or utility to each party in case of agreement on a price  $p$ . At round  $t$  of the negotiations, the upstream firm offers to sell at  $p_u(t)$  and the downstream firm offers to buy at  $p_d(t)$ . The upstream firm can accept  $p_d(t)$ , thus obtaining utility  $U(p_d(t))$  or reject the offer which means that with probability  $q$  it gets payoff  $u$  and with probability  $1-q$  it gets payoff  $U(p_u(t))$  since the upstream firm accepts its offer. Thus the upstream firm will be indifferent between accepting and rejecting if  $q$  takes the value  $q_u(t)$  that satisfies the indifference condition

$$U(p_d(t)) = q_u(t)u + [1 - q_u(t)] U(p_u(t))$$

Similarly, the downstream firm will be indifferent between accepting the offer of the upstream firm or rejecting, if  $q$  takes the value  $q_d(t)$  that satisfies

$$U(p_u(t)) = q_d(t)d + [1 - q_d(t)] U(p_d(t))$$

---

<sup>2</sup> Diversion as a concept is used to calculate the unilateral effects of mergers. The diversion ratio shows the fraction of demand for a certain brand that is captured by a rival brand (the ratio of the cross-price elasticity to the own price elasticity), see e.g. Shapiro (1996).

<sup>3</sup> Zeuthen was mostly interested in applying the theory to the labour market so he phrased his theory in terms of a workers' union and an employers' confederation.

Zeuthen assumed that firm  $j$  would accept if the actual  $q > q_j(t)$  since the risk of conflict was too large and would reject if  $q < q_j(t)$  where  $j = u, d$  denotes whether the up- or the downstream firm is in focus. Thus  $q_j(t)$  is the maximum "probability of conflict to which they are willing to expose themselves by maintaining an ultimatum." (Zeuthen, 1930: 110). Zeuthen then assumed that the party to cave in at round  $t$  would be the one with the lowest  $q_j(t)$ . Caving in, however, did not mean accepting the counterpart's offer but making a new offer at round  $t+1$ . He further assumed that both parties would revise their offers in the next round such that the new set of offers would be less favourable to the party with the lowest  $q_j(t)$  of the previous round and more favourable to the other party. This process would ensure convergence on an agreement. The last couple of assumptions were clearly *ad hoc* to ensure the convergence and not founded in fundamentals, the main problem being that the two firms do not see continued rounds of bargaining as an option when setting up the indifference conditions. Thus, Zeuthen did not treat the problem as fully dynamic. However the setup is ingenious and is an early version of a dynamic bargaining problem that was finally solved by Ariel Rubinstein (1982) in terms of a fully dynamic model of sequential alternating-offers bargaining. This was more than fifty years later and the solution exploited all the progress in the field that arose from the rigorous incorporation of game theory.

In 1939, Zeuthen organized the 9<sup>th</sup> European meeting of the Econometric Society in Elsinore, Denmark. In P. de Wolff's (1940) account of the meetings in *Econometrica*, the first day of the meeting was chosen to coincide with the last day of the annual meeting of the Society of Nordic Economists. However,

"... on account of the political situation of the moment, most non-Scandinavian members were prevented from attending... This, however, had the advantage that nearly all participators in the meeting of the Nordic Economists were present during all the lectures of the Econometric meeting." (de Wolff, 1940: 284)

At the meeting many topics of IO or border lining it were discussed: Barfod of Aarhus contributed a paper on the theory of advertising; Professor E. Schneider of Aarhus discussed price policy of firms in periods of depression; Thorkil Kristensen of Copenhagen discussed a multi-product monopolist for which demands were interdependent; and Prof. Winding Pedersen of Copenhagen discussed problems of monopoly, arguing that duopoly pricing is indeterminate because the "solution depends entirely on the assumption made about the entrepreneurs' opinions about their mutual policy. ... [S]uch a solution can be given only by a dynamical theory." (de Wolff, 1940: 284)

At the Econometric Society meeting, Zeuthen discussed price theory, arguing that the study by Hall and Hitch (1939) that showed that firms use full-cost pricing (rather than the marginal principle, see below) was not theoretically satisfying since the profit margin is determined by an arbitrary (unmodelled?) collective pricing policy. "[Zeuthen] underlined the importance of the publications of Winding Pedersen and Thorkil Kristensen, treating different forms of price policy and their consequences and showing that, even in the case of several competing enterprises, deviations from the liberalistic thesis may occur." (de Wolff, 1940: 284). Brems (1951c) elaborated on Zeuthen's critique of Hall and Hitch (1939) and provided a re-interpretation of full-cost pricing as consistent with the marginal principle in the long run.

While being one of the first Danish economics professors with a formal training in mathematics, Zeuthen was no great believer in too complicated math as a tool in economics (Brems, 1976: 359). He also developed an interest in managerial economics and was open to collaboration on cost theory with engineers (Ivar Jantzen) and economists of other countries, notably Erich Schneider of Germany. But he was generally well connected internationally; witness the preface by Joseph Schumpeter, the fact that Bertil Ohlin was one of the discussants of this doctoral dissertation, and his organization of the European meeting of the Econometric Society. And he inspired younger Danish economists such as Brems, Fog, and Winding Pedersen.

## **H. Winding Pedersen**

Hans Winding Pedersen (1907-1999) could be said to be the grand old man of Danish antitrust economics. He contributed many books and articles in Danish on price theory and competition and participated in the Trust Commission that prepared the Monopolies and Restrictive Practices Act of 1955; see Trust Commission (1953) and Winding Pedersen (1953) for the political economy of the proposal. He also served for many years as a highly respected member of the Monopolies Council that decided antitrust cases according to this Act.

Winding Pedersen (1936) compared and analysed the decline of competition, comparing the American antitrust tradition represented by Burns (1936) with von Stackelberg's (1934) work on oligopoly. He concluded that imperfect competition will lead to stable prices rather than extra volatility. In his 1939 treatise on modern price theory, he formulated a hypothesis of indeterminacy of oligopoly prices and argued that rivals' conjectures are important in resolving this problem. He further concluded that the importance of conjectures necessitates a dynamic approach to finding the equilibrium since firms will react to each other's actions with a lag.

His later books were mainly textbooks. Winding Pedersen (1965) treats the structure, conduct and performance of manufacturing and was intended for use in a course on industrial policy and trade policy. Winding Pedersen (1979) deals with price theory and competition, focusing on oligopoly, buyer power and full cost pricing. This textbook was intended to supplement Bain (1972).

### **Hans Brems**

Hans Brems (1915-2000) was mainly known for his work on the history of economic thought and quantitative modelling, but he did work on issues of industrial economics, too. After receiving his doctorate from the University of Copenhagen on "Some problems of monopolistic competition" in 1950, Brems taught at the University of California at Berkeley, before joining the University of Illinois in 1954. Early on he was interested in the micro-foundation for macroeconomics – a passion he maintained through his career (e.g. Brems, 1944, 1947, 1952a).

In 1970, Brems was awarded an honorary doctorate from the Swedish School of Business in Helsinki, Finland, for his contribution to the theory of monopolistic competition. He also received an honorary doctorate from Copenhagen Business School in 1992 for the same contributions.<sup>4</sup> Examples include Brems (1948, 1949, 1951a, 1953) but he also analysed oligopolies (Brems, 1951b), and cost and production functions with indivisibilities (Brems, 1952b, 1964) tracing his ideas back to engineer-turned-economist Ivar Jantzen (1924, 1948).

In terms of prestigious international publications, Hans Brems is certainly the most successful of the Danish economists that dealt with IO. He maintained contact with Scandinavia and often returned to give talks in Denmark and Sweden.<sup>5</sup>

### **Bjarke Fog**

Bjarke Fog (1921 -) was doing traditional industrial economics research in more than four decades after World War II, and doing it at an international level. He received his master's degree in economics in 1946, was a non-matriculated student at Harvard University in 1947, and took up academic positions in Aarhus (DK) the same year. In 1949, he joined the Copenhagen Business School where he became full professor 1958, the year in which he defended his doctorate. His opponents were Frederik Zeuthen (1958) and H. Winding Pedersen (1958). In difference to his more theoretical colleagues, Fog's approach was based on hands-on experience as member of several boards and as a consultant to numerous firms.<sup>6</sup>

Even his very early work was written in English. Fog (1946) dealt with dynamic oligopoly pricing using an adaptive-expectations reaction function duopoly with

---

<sup>4</sup> The official reason was the importance of Brems' contribution to the theory of monopolistic competition, a body of theory that was central to the development of the distinct approach to marketing developed by Barfod (1937) and Rasmussen (1955).

<sup>5</sup> Indeed Brems (1954) provides an overview of the state of competition policy in all three Scandinavian countries.

<sup>6</sup> Brems (1950) and Fog (1950) is a debate of what "free competition" means, whether there is any competition left in Denmark (given its lax competition rules and pervasive post-war regulation), and what in what dimensions competition may take place (price, advertisements, quality). It is very clear that Brems is a theoretician and that Fog is based on the empirical side of the divide.

conjectural variations. The article was based on a talk given at Harvard University and the author thanks Wassilij Leontieff of Harvard and Hans Brems for comments. The article's point of departure is a model of Winding Pedersen (1939).

Fog (1948) dealt with a recurrent problem of his research: To what extent is price theory descriptive of what businessmen do? Do businessmen use the marginal principle when setting prices? His doctoral dissertation (Fog, 1958, 1960) has a long discussion of this and sets out to investigate the problem empirically. Based on semi-structured interviews, he describes the pricing policies of 139 Danish manufacturing companies. As in the study of UK that inspired him (Hall and Hitch, 1939), he found full-cost pricing (or average-cost pricing) to be the most dominant pricing policy but also that the margin to be added to average costs might vary, for example due to changes in demand. He concludes that while businessmen do not think that they use the marginal principle in the short run, this does not preclude that their pricing is consistent with the marginal principle in the long run. This study is much cited, for example, by Scherer and Ross (1990) and Hay and Morris (1979).

Another much cited work is Fog (1956) that describes how cartel prices are negotiated between members of a cartel. At the time, formal price-fixing agreements were not immediately illegal and Fog interviewed members of six cartels and found that cartel agreements often do not express cordial cooperation but are rooted in distrust, necessitating the signing of formal contracts. One of the sources of conflicts internally in cartels was found to be that some firms were more short-sighted than others. In today's wording we would say that the discount factor of some firms were too low to allow cartels the full benefits of cooperation. Fog's work on cartels has been cited as recently as by Connor (2001).

In sum, Fog built an international recognition on his work on topics that were central to IO and his research methodology fell within the mainstream at the time. His monograph from 1994 represents the accumulated knowledge of a life-time of research of empirical IO.

## Summing Up

As the above shows, Danish research in industrial economics had a strong theoretical orientation in the 1930s, and was pioneered by Zeuthen, followed by Winding Pedersen and Hans Brems in the 1950s. Bjarke Fog epitomizes empirical IO in the 1950s. In the 1960-1980 period rather little happened, although a few researchers published working papers on oligopoly pricing (Mossin, 1978) and articles on dynamic models of entry deterrence (Waagstein, 1982, 1983), mergers and acquisitions in Danish industries (Øhlenschläger Madsen, 1983), or competition in quality space for industrial goods (Hjort-Andersen, 1981, 1988).<sup>7</sup>

## Norway

In Bergh and Hanisch (1984) — a history of economics in Norway from about 1835 to 1980 — no explicit mention is made of industrial economics or anything resembling it. Norwegian economics research appears to have evolved around distributional and macroeconomic issues, often with a very close link to bureaucrats and politicians.

However, some pockets of industrial economics research did exist, notably at Norwegian School of Economics and Business Administration ("NSEB"; Norges Handelshøyskole) in Bergen and, from about 1950, also at Bergen University. Norwegian research efforts in industrial economics were therefore commonly referred to as the "Bergen group" ("Bergen-miljøet"). Most of the Norwegian industrial economics research, with a few exceptions constituted by Frisch (1941a/b) and Munthe (1959, 1960, 1961), appears to have been strongly descriptive and much focused on individual industries. A peculiar manifestation of this is the establishment of professorships that were (and to some extent still are) designed to address the economic concerns of particular industries, notably shipping and fisheries. In spite of the relatively atheoretical character of much of this work, it still owes a peculiar

---

<sup>7</sup> This research was by and large undertaken in the late 1970s.

debt to a particular theoretical emphasis in Norwegian economics, namely the fundamental work of Ragnar Frisch on production and investment theory; thus, much of it may be seen as an attempt to make empirically concrete Frisch's heavily theoretical work.

### **Ragnar Frisch**

Ragnar Frisch (1895 – 1973) made seminal contributions to a number of fields, for which he (jointly with Jan Tinbergen) was awarded the first Nobel Prize in 1969. One of the areas to which Frisch made very significant contributions was production theory. In fact, a case can be made that much of what today is called as “neoclassical production theory” is, in fact, the brainchild of Frisch, although much of work here for a long time only circulated in the form of memos. Although Frisch began his work on the fundamental theory of production in the mid 1920s, and soon produced a Norwegian volume on the subject, Frisch's perfectionism did not allow him to publish an English language book-length statement of his theory of production until four decades later (Frisch 1964). The book impresses by its magisterial quality, but there was probably relatively little in it that was new when it was published.

It is open to some debate whether Frisch may be classified as an industrial economist in the modern sense of that term. His concern with production seems ultimately to have been motivated by his interest in macroeconomics and business cycle theory rather than in constructing a foundation for industrial economics.<sup>8</sup> However, Frisch published one paper that explicitly deals with a classical industrial economics topic, namely his 1941 paper on horizontal price-agreements. Moreover, he lectured on forms of competition (Frisch, 1941a), giving a — for the time — advanced treatment of alternative competitive forms, and explicitly dealing with, and introducing, the notion of “conjectural variations” as an important aspect of what he call competition in “polypolies.” The direct Norwegian descent of this kind of work is represented by the work of Preben Munthe about two decades later.

---

<sup>8</sup> However, it is noteworthy that the Department of Economics at Gothenburg University singles out as one of its main research areas, “... the Scandinavian approach to industrial economics, developed by Ragnar Frisch and Leif Johansen in Oslo” (<http://www.hgu.gu.se/item.aspx?id=4767>).



Moreover, it is arguable that Frisch's emphasis on the theory of production influenced subsequent work on issues relating to firm-level production, although most of this later work can be categorized as either business economics (e.g., Coward 1937, 1944; Hellern 1940) or empirical analysis of the cost and production characteristics in specific industries (Wedervang 1965; Hope 1967).<sup>9</sup> Frisch himself had published an early exemplar of this kind of research, namely the 1934 paper, "The Principle of Substitution: An Example of Its Application in the Chocolate Industry"!

### **Preben Munthe**

The Norwegian economist who comes perhaps closest to the traditional concerns of the industrial economics area is Preben Munthe, who after studies at NSEB and Oxford University received his doctorate from NSEB and later became a Professor at the University of Oslo where he is still active as an emeritus. Munthe was in regular contact with Bjarke Fog in Denmark. Although his early research was strongly theoretically informed, and thus in some ways closer to the concerns of Danes H. Winding Pedersen and Hans Brems than to Fog's strongly empirically driven approach, Munthe was also interested in using industrial economics to throw light over empirical phenomena, such as sales cartels in whaling, dental manufacturing, and rubber footwear (Munthe 1961). In fact, like Fog he was interested in applying industrial economics to the understanding of firm strategies, rather than in understanding the aggregate welfare implications that may follow, given assumptions about firms' behaviours.

Although Munthe later broadened his research interests very considerably (e.g., to doctrinal history), his early work, mainly published as monographs, dealt with such favorite industrial economics topics as entry conditions (Munthe 1959), vertical relations (Munthe 1960) and horizontal cartels (Munthe 1961).

---

<sup>9</sup> However, the work of Finn Førsund, briefly discussed in connection with Lennart Hjalmarsson, is very clearly in the formal Frisch tradition.

The latter is Munthe's doctoral thesis. Using diagrammatical analysis, Munthe analyses the necessary conditions for the formation of cartels (i.e., the expectation of gains from forming the cartel), the conflicting incentives of cartel members, and the resulting chiselling. A slightly earlier work (Munthe 1960) is taken up with vertical relations, in particular how a producer's advertising decisions relative to end consumers is influenced by whether he can fix retailers prices or not. Thus, Munthe treats a topic that after the publication of, in particular, Yamey (1954) conquers center stage at the time. Surprisingly, however, he refrains from drawing any welfare and antitrust conclusions. His main aim seems to be to give an economics-based interpretation of how pricing may interact with marketing decisions, thus staying closer to the concerns of Arne Rasmussen (1955) in Denmark than to the traditional antitrust concerns of most industrial economists.

### **Frøystein Wedervang**

The son of influential economist Ingvar Wedervang (see Bergh and Hanisch 1984), Frøystein Wedervang (1918 - ?) studied at the NSEB, but received his doctorate in statistics from the University of Oslo. He returned to NSEB as a Professor in Business Administration. While at NSEB he wrote his major work, *Development of a Population of Industrial Firms*. The monograph is a major study of the evolution of a large subset of the population of Norwegian firms in the period 1930 to 1948. The main interest lies in tracing major structural characteristics of this population, such as the number of employees and the value of fixed capital in establishments (taken to be a proxy of firm size), and the capital-labour ratio and the ratios between added value and each of the input factors (gross labour productivity and gross capital productivity, respectively). Also, C4 concentration ratios, rates of entry and exit by sectors, and much else are calculated. This is done in painstaking detail, and is by itself quite impressive, given the computing power and the data sources of the time.

However, the overall purpose of this major statistical exercise is not entirely clear. Although findings on the size distribution of Norwegian firms and how this changes over time is compared to findings such as those of Simon and Bonnini (1958), there is

no overall attempt to ground such population dynamics in an overarching perspective (as in Downie, 1958). The overall impression is somewhat negative; for example, Wederwang finds that it is not possible to fit a Cobb-Douglas function to the data, and he also observes that Gibrat's Law is contradicted by his findings. However, this does give rise to much theoretical reflection in his part. Wederwang does not seem to have published any of his findings from the study in an international journal (i.e., there are no hits in the JEL database).

### **Einar Hope**

Einar Hope (1937 -) spent two years as a graduate student at the University of Minnesota in the mid-1960s, and his 1967 PhD thesis *Kostnader og bedriftstørrelse (Costs and the Size of Firms)* (Hope, 1967) bears a strong US imprint with respect to its references and its econometrics approach. However, in analysing the cost structure of a single industry it may be argued to be directly in the Norwegian tradition of concern with production and cost characteristics of single industries. Hope's thesis is an attempt to clarify whether and to what extent increasing returns to scale characterizes Norwegian banking. Because of data limitations, Hope begins from cost functions rather than production functions, and finds, using standard regression techniques, that increasing returns do indeed characterize the banking industry. He explicitly chooses not to discuss any possible efficiency implications of this finding.

Most of Hope's professional career has taken place at NSEB, where he has been instrumental in developing teaching industrial economics and where he served for some time as the director of the Institute for Industrial Economics. Hope has also been the Director General of Norwegian Competition Authority (1995-1999), and has served on numerous government committees. He produced numerous contributions to industrial economics up through the 1970s, many of which were highly descriptive and some of which were taken up with the methodology of industry analysis (Hope, 1977). Hope's interest in electricity markets pushed his research interests in the direction of energy economics (he is professor of energy economics at NSEB), although he continued to be a prolific contributor to industrial economics.

## **Summing Up**

To sum up, Norwegian research efforts in industrial economics were relatively scant, and had a mainly empirical orientation. Apart from Munthe's work, very little or no theoretical work appears to have been undertaken. Internationalization also came late to Norwegian research, and may well have been limited to Munthe's close contacts to Bjarke Fog in Denmark.

## **Sweden**

Around the turn of the century (1900), Sweden was endowed with four great economists: Knut Wicksell of Lund/Stockholm (1851-1926); Gustav Cassel of Stockholm (1866-1945); David Davidson of Uppsala (1854-1942) and Eli F. Heckscher (first Uppsala then Stockholm; 1879-1952). They were to some extent rivals, eagerly debating utility theory, Walrasian general equilibrium models, marginal productivity, and international trade. Like in Denmark, the preconditions for applying microeconomics to problems of industrial organization were good, but somehow the interest was never really sparked in Sweden – until the 1970s.

### **Hans Thorelli**

Hans Thorelli writing a doctoral thesis half a century later (Thorelli, 1954) appraised the early development of the American federal antitrust policy, dealing with "a broad range of problems in the field of industrial economics and public policy in relation thereto." (p. viii). Thorelli offers "a synthesized social science interpretation of the origination and institutionalization period of [the federal antitrust policy]." (p. vii). At the University of Stockholm, Thorelli was a student of Gunnar Heckscher, the son of Eli F. Heckscher. He moved on to Northwestern University and through numerous teaching and research institutions, ending his career at Indiana University's Kelley School of Business, where he is now a distinguished Professor Emeritus. During the 1960s, Thorelli's research interests changed to strategic

management and marketing, and he developed simulation systems to facilitate strategic decisions in a multinational world.

### **Erik Dahmén**

Erik Dahmén (1950) provided a detailed study of the development of Swedish manufacturing between World War I and WW II. In addition to being a professor of the Stockholm School of Economics, he acted as director of the Industrial Research Institute in Stockholm, 1948-1950.<sup>10</sup> Dahmén's main influence appears to lie in coining the notion of "development block" in the context of his inquiry into the evolution of Swedish industry (Dahmén 1950). The notion is an important early anticipation of contemporary ideas on the role of complementarities in economic development. The main inspiration for it appears to be the ideas of Joseph Schumpeter.

### **Bo Carlsson and Lennart Hjalmarsson**

More recently, Bo Carlsson and Lennart Hjalmarsson have been pioneering Swedish industrial economists. They shared an interest in the measurement of efficiency, tracing their roots back to Eli Heckscher's (1918) work on Swedish problems of production in which he presented a diagram that preceded the Salter (1960) diagram by forty-two years.<sup>11</sup> Their academic ancestors also include Gustav Åkerman (1931) who investigated the distance between best practice and average practice in Swedish saw mills and Ingvar Svernilson (1944) who followed in the same track.

**Bo Carlsson** got his BA from Harvard University in 1968 and his MA and Ph.D. from Stanford University (1970 and 1972, respectively). Today he is *E. Mandell de Windt Professor of Industrial Economics* at Case Western University and has published widely

---

<sup>10</sup> The Industrial Research Institute was founded in 1939 by the Federation of Swedish Industries and the Swedish Employers' Confederation with the aim of conducting research "on economic issues of importance for long-term industrial development in Sweden" ([www.iui.se](http://www.iui.se)). One of the major research programmes deals with industrial organization and many Swedish academics have spent time at the Institute in Stockholm that in this way assembles the largest concentration of industrial economists in Sweden.

<sup>11</sup> The (Heckscher-) Salter diagram shows a ranking of the different unit costs of different plants starting with the lowest and ending with the highest. The abscissa measures the capacity of the different plants and the ordinate the unit cost.

on industrial dynamics and technological systems. His early work (Carlsson, 1972) on the measurement of efficiency in production was awarded the David Davidson Prize in Economics. He measured efficiency in twenty six Swedish manufacturing industries and found that "tariffs adversely affect efficiency and that the four-firm concentration ratio is positively and strongly associated with efficiency." He argues that the latter result shows that "the concentration ration reflects economies of scale and specialization rather than the market power of the largest firms." In a report for the Industrial Research Institute, Carlsson (1980) analyses technical change and productivity in Swedish industry in the post-war period. Later articles appeared among others in the *Journal of Industrial Economics*, *the Journal of Economic Behavior and Organization*, and the *International Journal of Industrial Organization*. In one of these, his Presidential Address to the European Association for Research in Industrial Economics, Carlsson (1987) makes an interesting attempt to separate what he calls "industrial dynamics," a more evolutionary/Schumpeterian approach, from supposedly more static mainstream industrial economics. His later research has clearly concentrated on elaborating the industrial dynamics program, leading to publications in, for example, *Research Policy* and *Journal of Evolutionary Economics*.

**Lennart Hjalmarsson** (1944 -) received his Ph.D. in economics 1976 at the University of Gothenburg. His thesis was entitled *Studies in a Dynamic Theory of Production and its Applications* and his supervisor was Prof. Leif Johansen of the University of Oslo. Already before that time he had published in the *Swedish Journal of Economics* and in the *European Economic Review*. In Førsund and Hjalmarsson (1974) he initiated a productive collaboration with Norwegian economist Finn Førsund of the University of Oslo. In this article, they use static efficiency measures for inhomogeneous production functions in a dynamic setting of structural change. They argue that from a policy point of view the problem is not to force the current structure close to the best practice frontier but rather to optimize an on-going process.

Another early study, Førsund and Hjalmarsson (1979) analyses technical progress in Swedish dairy plants in terms of the production function. Shifts of the production

function are translated into a reduction in unit costs (a generalization of Salter's (1960) measure) and further split into constituent parts consisting of proportional technical advance, factor substitution and increase of optimal scale. They are able to trace the changing efficiency frontiers from 1964 through 1973 and show that it is a movement of the frontier along a ray towards the origin that is responsible for a 9-13 percent reduction of unit costs at the optimal scale. Hjalmarsson is the author of numerous articles in very prestigious journals since 1980 and has ventured into energy economics along with his Norwegian co-author, Finn Førsund.

### **Summing Up**

As the above shows, Swedish research in industrial economics was rather sparse and scattered until around 1970. In the 1970s, Bo Carlsson, Lennart Hjalmarsson and their Norwegian colleague Finn Førsund did an impressive amount of work of a high quality, especially in the area of efficiency measurement. It is also noteworthy that with the exception of Hjalmarsson, the major early contributors to industrial economics either did not have industrial economics as a major research area, or took industrial economics into distinctly non-orthodox and usually Schumpeterian directions (Dahmén, Carlsson, Gunnar Eliasson). In fact, for a long period in the 1980s and 1990s, the Stockholm-based "Industriens Utredningsinstitut" (see, e.g., Dahmén and Eliasson 1980) became a hotbed for these kind of ideas.

## **Concluding Discussion**

### **The Relative Performance of the Scandinavian Countries**

There are some remarkable differences in the way that industrial economics developed in the Scandinavian countries. Thus, while the Danish research had a strong leaning towards a more formal approach — arguably a Zeuthen legacy (and perhaps going back even earlier)—, Norway was almost completely dominated by empirical, industry-specific inquiry, in spite of the strong emphasis on formal methods that the "Frisch revolution" (Bergh and Hanisch, 1984) marked in

Norwegian economics. There were no Norwegian counterparts to Zeuthen, Brems and Winding Pedersen of Denmark. In fact, much of the relevant Norwegian research is so much characterized by meticulous industry studies that "industrial economics" may be a bit of a misnomer, at least as that term is understood today. The Frisch influence was often indirectly present in such work, namely in attempts to fit specification of production function to the data. Still, some contributions exist that may be categorized as industrial economics proper, the names of Preben Munthe, Frøystein Wedervang and Einar Hope being representative.

Sweden presents a picture rather similar in some respects to that of Norway. Swedish research in economics has historically been almost completely dominated by monetary economics, trade theory and general equilibrium theory, and until the 1970s, very little research in industrial economics appears to have been undertaken. A distinct Swedish peculiarity is the importance of Schumpeterian ideas, notably in the work of Dahmén and Carlsson.

In terms of internationalisation, Denmark appears to have been the first-mover. However, in spite of having the two advantages of some emphasis on formal methods and some internationalisation of the relevant research already around the Second World War, Danish research in industrial economics did not take off in the sense of building a research group. Research was largely concentrated on two professors, namely Winding Pedersen and Bjarke Fog, and the perhaps most internationally prolific Dane, namely Hans Brems, immigrated to US already in 1951.

### **What Explains the Scandinavian Research Effort in Industrial Economics?**

One may speculate that a reason for the relatively little interest in industrial economics in the Scandinavian countries have to do with, first, the relatively lax antitrust regimes that have historically characterized these countries: Because of the nature of these regimes, there were simply rather few antitrust cases into which an economist could sink his analytical teeth. Another possible reason has to do with the strong dominance of research in macroeconomics and general equilibrium in the Scandinavian countries, the former tendency no doubt being partly prompted by



(and lending partial legitimacy to) the ongoing development of the Scandinavian welfare states.

One may further speculate that absent these historical peculiarities, industrial economics could have gained more momentum in the Scandinavian countries. This is not the least because of the existence of one important institution that could have organized research efforts in industrial economics, namely the *Nordisk Tidsskrift for Teknisk Økonomi* (*The Nordic Journal for Technical Economics*) (1935-1955). As Tjalling Koopmans (1977: 261) noted in his Nobel Prize Speech, this journal provided an internationally recognized "important medium" for discussions of production theory and of ways of conceptualising and measuring the internal efficiency of firms. However, the journal never seriously took industrial economics on board. In fact, it closed its operation at about the time (1955) when industrial economics became recognized as a field in economics.

### **Later Developments**

Since 1980 there has been an upsurge of research in industrial economics. In Norway, Lars Sørgaard of the Norwegian School of Economics and Business Administration in Bergen has been the prime driver of research in industrial economics. In Sweden, Norwegian Tore Ellingsen has an impressive track record. Lennart Hjalmarsson and Finn Førsund have continued their cross-border collaboration with good results. Danish economists who have contributed to industrial economics in the last twenty-five years include Morten Hviid, Svend Albæk, Per Overgaard and Christian Schultz. What they have in common is that they base their research on the international literature and that they are not "burdened" by the legacy of the pioneers of the preceding century. The link is missing.

## References

- Bain, Joe S. 1972. *Essays on Price Theory and Industrial Organization*. Boston, MA.
- Barfod, Børge. 1937. *Reklamen i Teoretisk-Økonomisk Belysning*. København.
- Berg, Trond and Tore J. Hanisch, eds. *Vitenskap og Politik: Linjer I Norsk Socialøkonomi Gjennom 150 År*. Oslo: Aschehough.
- Brems, Hans. 1944. "Prisstivhed," *Nationaløkonomisk Tidsskrift* 82: 341-361.
- . 1947. *Monopoly and employment*. Copenhagen: The Association for Education of Young Business Men, Copenhagen Business School.
- . 1948. "The interdependence of quality variations, selling effort and price", *Quarterly Journal of Economics* 62: 418-440.
- . 1949. *Some problems of monopolistic competition*. Copenhagen: (No publisher information available).
- . 1950. "Er den frie konkurrence død? I: Indlæg," *Det danske marked* 9: 216-227.
- . 1951a. *Product equilibrium under monopolistic competition*. Cambridge, MA.: Harvard University Press.
- . 1951b. "On the theory of price agreements", *Quarterly Journal of Economics* 65: 252-262.
- . 1951c. "Omkostninger og prispolitik. Nogle nye britiske bidrag og et forsøg på fortolkning," *Nationaløkonomisk Tidsskrift* 89: 1-20.
- . 1952a. "Employment, prices, and monopolistic competition", *Review of Economics and Statistics* 34: 314-325.
- . 1952b. "A discontinuous cost function," *American Economic Review* 62: 577-586.
- . 1953. "Foreign exchange rates and monopolistic competition", *Economic Journal* 63: 289-94.
- . 1954. "Monopoly and competition in Scandinavia" in E.H. Chamberlin, ed. *Monopoly and Competition and Their Regulation*. New York.
- . 1964. "Cost and Indivisibility," *Journal of Industrial Economics* 12: 142-150.
- . 1976. "Frederik Zeuthen" in *Socialøkonomisk Samfund* (1976): 347-366.
- Burns, Arthur R. 1936. *The Decline of Competition*. New York: McGraw-Hill.
- Carlsson, Bo. 1972. "The Measurement of Efficiency in Production: An Application to Swedish Manufacturing Industries 1968", *Swedish Journal of Economics* 74(4): 478-485.
- . 1987. "Reflections on 'Industrial Dynamics'," *International Journal of Industrial Organization* 5: 135-148

- Cassel, Gustav. 1901. "Kartell- og trustvæsendet från socialekonomisk synspunkt". (*Cartel and antitrust authorities from an economics viewpoint*), *Ekonomisk Tidskrift*
- Chamberlin, Edward H. 1933. *The theory of monopolistic competition*. Cambridge, Mass.
- Connor, John M. 2001. "'Our customers are our enemies': the lysine cartel of 1992-1995", *Review of Industrial Organization* 18: 5-21.
- Coward, Dag. 1937. "Standardisering af Industrielle Selvskostendeberegninger i Norge," *Nordisk Tidsskrift for Teknisk Økonomi* 3: 121 - 141.
- Coward, Dag. 1944. *Kostnadsregning i Industribedrifter*. Oslo: Aschehoug.
- Dahmen, Erik. 1950. *Svensk industriell företagarverksamhet*. (Swedish manufacturing). Stockholm: Industrial Research Institute (IUI).
- Dahmén, Erik. 1971. *Entrepreneurial Activity and the Development of Swedish Industry, 1919-1939*. Homewood: Richard D. Irwin.
- Dahmén, Erik and Gunnar Eliasson, eds. 1980. *Industriell Utveckling i Sverige*. Stockholm: Almqvist & Wiksell.
- Downie, Jack. 1958. *The Competitive Process*. London:
- Einarsen, Johan. 1937. "Reinversteringssyklus. Særligt Bygget på Data fra Norsk Skibsfart," *Nordisk Tidsskrift for Teknisk Økonomi* 3: 25 - 40.
- Fog, Bjarke. 1946. "Dynamic price problems under monopolistic competition", *Nordisk Tidsskrift for Teknisk Økonomi* 22: 257-270.
- . 1948. "Price theory and reality", *Nordisk Tidsskrift for Teknisk Økonomi* ??: 89-94.
- . 1949. "Det internationale glødelampekartel" [The international cartel in the incandescent lamp industry], *Økonomi og Politik* 23: 326-345.
- . 1950. "Er den frie konkurrence død? II: Svar," *Det danske marked* 9: 227-232.
- . 1956. "How are cartel prices determined?" *Journal of Industrial Economics* 5: 16-23.
- . 1958. *Priskalkulation og prispolitik: en analyse af prisdannelsen in dansk industri*. Copenhagen: Einar Harcks Forlag.
- . 1960. *Industrial Pricing Policies: an Analysis of Pricing Policies of Danish Manufactures*. Amsterdam: North Holland. [A translation of Fog (1958)].
- . 1994. *Pricing in Theory and Practice*. Copenhagen: Handelshøjskolens Forlag.
- Frisch, Ragnar. 1935. "The Principle of Substitution: An Example of its Application in the Chocolate Industri," *Nordisk Tidsskrift for Teknisk Økonomi* 1: 12 - 27.
- . 1941a. *Polypolteori*. A summary of Professor Frisch's Lectures at Oslo University. Oslo.
- . 1941b. "Priskartellisk prisdannelse," *Statsøkonomisk Tidsskrift* 55.
- . 1941c. *Indledning til produktionsteorien*. Oslo: Oslo Universitet.

- . 1948. "Overdeterminateness and Optimum Equilibrium," *Nordisk Tidsskrift for Teknisk Økonomi* 12: 95 – 105.
- . 1964. *Theory of Production*. Dordrecht: Reidel Publishing Co
- Førsund, Finn and Lennart Hjalmarsson. 1974. "On the Measurement of Productive Efficiency," *Swedish Journal of Economics* 76(2), 141-154.
- & --. 1979. "Frontier production functions and technical progress: an application to milk processing in Swedish dairy plants". *Econometrica* 47(4): 883-900.
- Hall, R.L & C.J. Hitch. 1939. "Price theory and business behaviour". *Oxford Economic Papers* 2: 12-45.
- Hay, Donald A. & Derek J. Morris. 1979. *Industrial economics: theory and evidence*. Oxford University Press.
- Heckscher, Eli F. 1918. *Svenska Produktionsproblem*. (Swedish production problems). Stockholm: Bonniers.
- Hellern, B. 1940. "Industriens behov for produksjonsteknisk forskning," *Nordisk Tidsskrift for Teknisk Økonomi* 6: 93 - 103.
- Hjort-Andersen, Christian. 1981. "Price and quality of industrial products: some results of an empirical investigation," *Scandinavian Journal of Economics* 83(3): 372-389.
- . 1988. "Evidence on agglomeration in quality space," *Journal of Industrial Economics* 37(2): 209-223.
- Hope, Einar. 1967. *Kostnader og bedriftsstørrelse*. Bergen: Samfunnsøkonomisk Institut ved NHH.
- . 1977. "Industry studies in theory and practice, in *Festschrift to Professor Olav Harald Jensen: Business administration in theory and practice*, Oslo: Bedriftsøkonomens Forlag.
- , ed. 2001. *Competition Policy Analysis*. London: Routledge.
- Hotelling, Harold. 1929. "Stability in Competition," *Economic Journal* 39: 41-57.
- Jantzen, Ivar. 1928. "Voxende Udbytte i Industrien," *Nationaløkonomisk Tidsskrift* 62: 1-62.
- . 1948. "Laws of production costs," *Econometrica* 16: 44-48.
- Kaurel, Finn. 1944. *Almen bedriftsøkonomi*. Oslo: Grundt Tanum.
- Koopmans, Tjalling. 1977. "Concepts of Optimality and Their Uses," *American Economics Review* 87: 261-274.
- Krouse, Clement. 1990. *Theory of Industrial Economics*. Oxford: Basil Blackwell.
- Kærgård, Niels. 1983. "Marginalismens gennembrud i Danmark og mændene bag," *Nationaløkonomisk Tidsskrift* 121(1): 20-42.

- . 1996. "Denmark and the Marginal Revolution," *Research in the history of economic thought and methodology* 14: 247-258.
- Mossin, Axel. 1978. "A Theory of Oligopolistic Price Formation", *Blue memo* 71, Institute of Economics, University of Copenhagen.
- Munthe, Preben. 1959. *Freedom of Entry into Industry and Trade*. Bergen: Skrifter fra Norges Handelshøyskole.
- . 1960. *Produsentenes vertikale markedspolitik som pristeoretisk problem*. Bergen: Skrifter fra Norges Handelshøyskole.
- 1961. *Horisontale karteller*. Bergen: Skrifter fra Norges Handelshøyskole.
- Myrvoll, Ole. 1948. "The Profit Motive and the Theory of Partial Equilibrium of the Firm," *Nordisk Tidsskrift for Teknisk Økonomi* 12: 178 - 186.
- Øhlenschläger Madsen, Ole. 1983. *Virksomhedsovertagelser og fusioner i dansk industry*. Copenhagen: NNF.
- Philip, Kjeld. 1976. "Socialpolitikeren Frederik Zeuthen" in *Socialøkonomisk Samfund* (1976), pp. 367-375.
- Rasmussen, Arne. 1955. *Pristeori eller Paremeterteori*. København.
- Robinson, Joan. 1933. *The Economics of Imperfect Competition*. London.
- Rubinstein, Ariel. 1982. "Perfect Equilibrium in a Bargaining Model", *Econometrica* 50(1): 97-110.
- Salter, W.E.G. 1960. *Productivity and Technical Change*. Cambridge University Applied Economics Monographs.
- Scherer, Frederick M. and David Ross. 1990. *Industrial market structure and economic performance*, 3<sup>rd</sup> edition. Boston: Houghton Mifflin Company.
- Schönheyder, K. 1941. "Konjunktorenes sammenheng med vedlikeholdet av maskinbestanden i industrien," *Nordisk Tidsskrift for Teknisk Økonomi* 7: 226 - 236.
- Shapiro, Carl. 1996. "Mergers with differentiated products," *Antitrust*: 23-30.
- Simon, Herbert A. and Charles P. Bonini. 1958. "The Size Distribution of Business Firms," *American Economic Review* 48: 607-
- Socialøkonomisk Samfund. 1976. *Danske Økonomer* (Danish Economists). Copenhagen: Samfundsvidenskabeligt Forlag.
- von Stackelberg, Heinrich. 1934. *Marktform und Gleichgewicht*. Vienna and Berlin: Verlag von Julius Springer.
- Svennilson, Ingvar. 1944. "Industriarbetets växande avkastning i belysning av svenska erfarenheter". *Studier i ekonomi och historia tillägnade Eli F. Heckscher* 24-11-1944. Stockholm.

- Thorelli, Hans. 1954. *The Federal Antitrust Policy. Origination of an American Tradition*. Stockholm.
- Tirole, Jean. 1988. *The Theory of Industrial Organization*. Cambridge: MIT Press
- Waagstein, Thorbjørn. 1982. "Fixed costs, limit pricing and investments in barriers to entry", *European Economic Review* 17(1): 75-86.
- . "A dynamic model of entry deterrence," *Scandinavian Journal of Economics* 85(3): 325-337.
- Wedervang, Frøystein. 1965. *Development of a Population of Industrial Firms*. Oslo: Universitetsforlaget.
- Winding Pedersen, H. 1939. *Omkring den moderne pristeori*. København: Nielsen & Lydiche.
- . 1958. "En disputats om priskalkulation og prispolitik" (*A thesis on pricing policies*), *Nationaløkonomisk Tidsskrift* 96: 133-140.
- . 1965. *Industriens struktur og sammenslutninger*. Copenhagen.
- de Wolff, P. 1940. "Report on the Elsinore Meeting, August 25-26, 1939", *Econometrica* 8(3): 279-288.
- Zeuthen, F. 1929. "Mellem konkurrence og monopol" (*Between competition and monopoly*), *Nationaløkonomisk Tidsskrift* 67: 265-305.
- . 1930. *Problems of Monopoly and Economic Warfare*. London: Routledge & Sons. Reissued 1967 by Routledge and Kegan-Paul.
- . 1958. "En disputats om priskalkulation og prispolitik" (*A thesis on pricing policies*), *Nationaløkonomisk Tidsskrift* 96: 141-148.
- Åkerman, Gustav. 1931. "Den industrielle rationaliseringen och dess verkningar". (*Industrial rationalising and its effects*). SOU 1931:42, Stockholm.