AGRICULTURE LEADING THE TAKE-OFF: THE EXAMPLE OF DENMARK

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A This is an excellent, original paper. I'd like to keep a copy. Can you arrange? Make sure Mulhall gets statistical data + sources.

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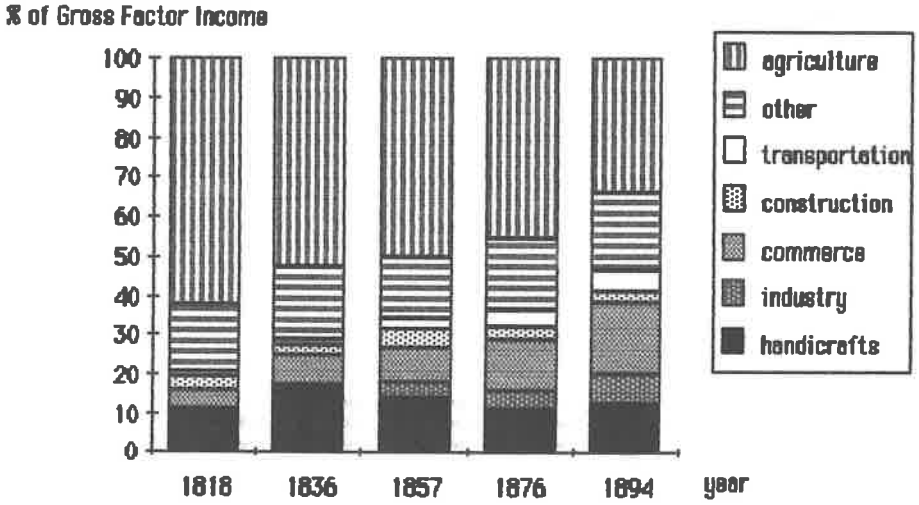
INTRODUCTION

Graphs 1 and 2 tell much of the story of Denmark's economic development in the 19th century. As the 19th century progressed, agriculture's share of economic activity shrank, while commerce, industry, and transportation grew in importance. Yet agriculture continued to supply the great bulk of exports, while industry remained oriented to the domestic market.

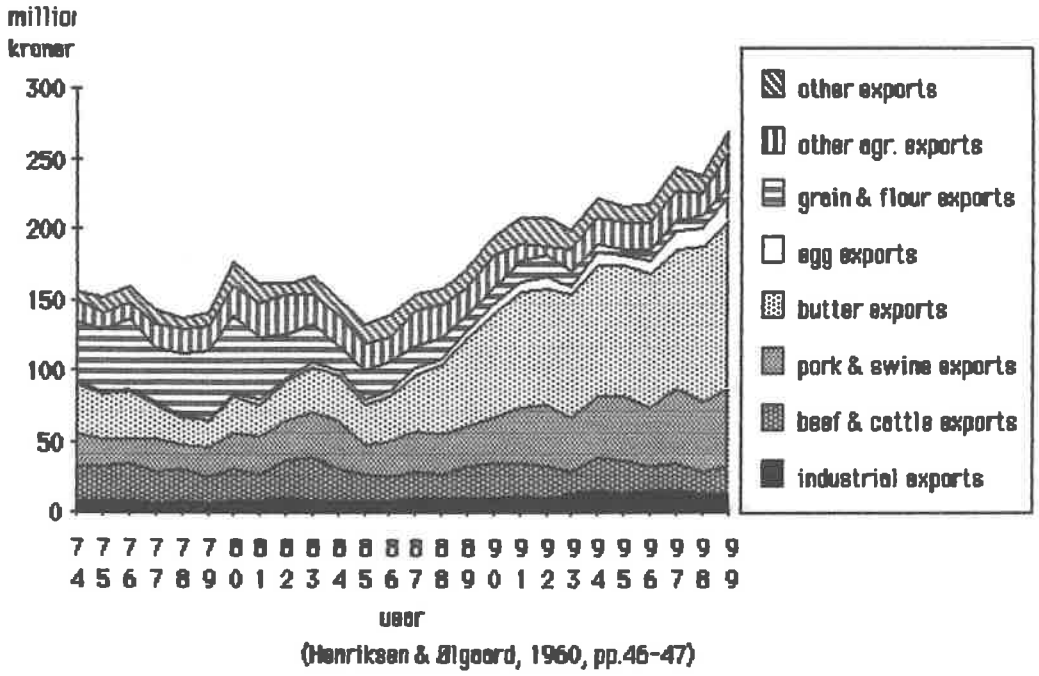


(S.A. Hansen, 1972, p.315)

CHART 1: SECTORAL COMPOSITION OF GFI, 1818-1894

A striking feature of Chart 2 is the reduction in grain exports beginning in the mid 1880s, and the corresponding increase in dairy products. This event marks the true beginnings of industrialized agriculture in Denmark; industrialized in the sense that agriculture began to import cheap raw materials from abroad (grains and oilcake) to be processed into high value-added products (butter and pork). This paper proposes to investigate this transformation of Danish agriculture; to look

at the institutional preconditions, the stimuli which called this transformation forth, and the ramifications of this transformation on other sectors of the Danish economy.



(Henriksen & Bigaard, 1960, pp.46-47)

CHART 2: EXPORT COMPOSITION, 1874-1899

The Danish peasantry is ultimately responsible for the change in compostion of agricultural output, and my description of the "preconditions" deals with the process whereby a class of serfs was transformed into a class of entrepreneurial farmers. Dealing with the take-off, I briefly describe the transformation in agriculture, and then treat the interrelations between agriculture and industrial development. The development of the transportation infrastructure is, in one sense, a precondition to the take-off in agriculture, but in another sense represents an independent source of spread effects into industry, so its effects are also discussed. I conclude with some observations, drawn from this paper, of relevance to Development Economics.

PRECONDITIONS TO TAKE-OFF

institutional constraints on the peasantry

A natural starting point in an examination of the evolution of the Danish peasantry seems to lie in the 1660s. At this time Denmark had just lost a war with Sweden, and the Swedes had occupied the eastern third of the country, the populous provinces of Skåne, Halland, and Bliking, which Denmark never regained. This loss plunged the nation into a political crisis from which the King emerged as absolute ruler, no longer answerable to the nobility (Olsen & Winding, 1941, p.59).

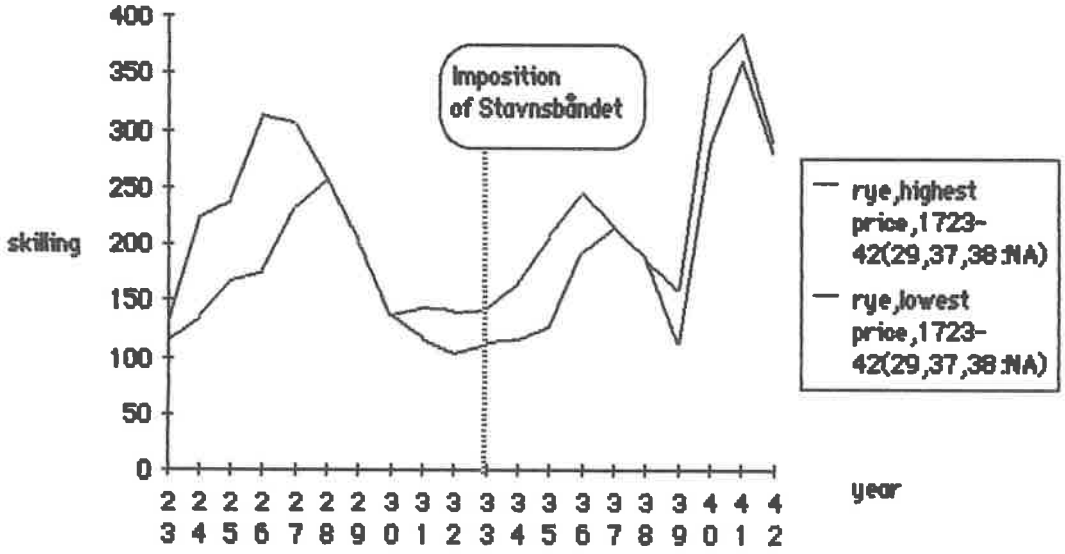
In the countryside, the peasants experienced a gradual change in their overlords. The ancient nobility, whose ties with the peasants were based on custom and mutual respect, were gradually replaced by a new aristocracy, composed primarily of Germans who had proven their loyalty to the King in the army. These proprietors were mainly interested in exploiting their domains for all they could get; their military backgrounds made the new masters harsh disciplinarians, and the peasants found little to welcome in the transition (Baack, 1977, p.4, note 11).

Serfdom in Denmark never assumed the extreme forms it took elsewhere in Europe, though the islands east of the Store Bælt did -starting in the fourteenth century- have the institution of **Vornedskab** , which served to bind male peasants to the estate on which they had been born. As part of the monarchy's policy to weaken the nobility, Vornedskab was abolished in 1702, though only for those peasants born after 1699.

At the same time, the King strove to develop a military which relied neither on the nobility nor on mercenaries for its manpower. Peasant males between the ages of 14 and 35 were required to serve part

time in a national militia, with one recruit being drawn from roughly every three peasant households. This **Landmilits** was abolished in 1730, though it established the important precedent of using peasant conscripts in the nation's army.

Around 1730, several factors conspired to worsen the plight of the peasants. Prices for agricultural commodities were falling, and the lag effect of the abolition of Vornedskab was strongly felt in eastern Denmark. Many of the landlords were now the King's loyal supporters, and could rely on his favor in their petitions for greater control over peasant labor. In addition, concern in military circles grew over the country's ability to supply conscripts for the army. All these factors resulted in a 1733 regulation binding male peasants, between the ages of 14 and 35 (later expanded to 4 and 40), to their parish of birth. This institution, called the **Stavnsbånd**, ostensibly served to facilitate military recruitment, but was supported by the landlords since it guaranteed them a regular labor supply (Baack, 1977, p.3).



(Friis & Glamann, 1958, pp.207-224)

CHART 3: RYE PRICES, 1723-1742

the organization of agricultural production

Peasants throughout Denmark, since the 12th and 13th centuries, had been organized in villages (Brogård, 1973, p.35). Agricultural production was conducted communally, on the "three field" system. The village was surrounded by its lands, which were divided into three large fields. Each villager held plots evenly distributed between the three fields, and the village as a whole would let one field lie fallow, while cultivating the other two, one with winter grain (rye), the other with spring grain (barley or oats) (Brogård, 1973, p.41).

The idea behind this system was to ensure that all peasant households were equally prosperous. Landlords encouraged the equitable distribution of land so as to facilitate and make uniform the payments by peasants of labor and produce to the manor. Clearly not all land within the village was of equal quality, and the result of equalization was the atomization of holdings, with each land-quality type being divided among all households. A peasant would thus usually cultivate around 100 plots, scattered throughout the village area. This atomization made individualized production impossible, since the actions of a farmer in plowing, draining, sowing, harvesting, etc. would affect the plots of his neighbors (S. Jensen, 1942, p.73).

In the early 18th century only about 1% of all farmland was held by freeholders, though in some areas such as Jutland, the percentage of freeholds was as high as 7% to 8%. 75% of the arable land was organized into large estates, owned by several hundred landlords, with the remainder held by the Crown or the Church. Most of this land was cultivated by villages, whose members leased the land from the manor. About 13% of Danish farmland was organized into large farms directly managed by the

landlord. The trend of taking land out of communal production for direct, large-scale production began in the 16th century, and received additional impetus from the new class of landlords following the 1660s (Baack, 1977, pp.1-2).

Labor employed on these large farms did not come from a rural proletariat, but from the peasants, in the form of labor obligations known as **Hoveri**. Over the years Hoveri had tended to increase, since its duration and character had never been contractually fixed by Danish law, and landlords could use indebtedness to force extra labor from their peasants. By the eighteenth century, the average peasant household was liable for about 300 days per year of labor services to the manor. This included roughly 100 days per year of plowing and hauling, using horses and equipment which the peasant was required to provide himself (Baack, 1977, p.3). Even freeholders were required to perform Hoveri, though only one-quarter as much as tenants working farms of comparable size (Skrubbeltrang, 1961, p.166).

The old nobility of Denmark had enjoyed an exemption from taxes; this privelege was extended to the new aristocracy, in a restricted form. Nobles were not required to pay taxes on their "principal manors", but they were made responsible for collecting taxes from the peasants, so that when peasants fell into arrears on their taxes, it was the landlord and not the state that suffered a loss in revenue[1] (E. Jensen, 1937, p.41).

The matter of taxation is important for the impact it had on land tenure. Nearly all peasants got life tenancy. However, only about 45% managed to hang unto their farms until death; the rest falling into arrears on their taxes and eventually losing their leases. Those who didn't forfeit their lease could, about two-thirds of the time, arrange for a relative to

inherit their tenancy (Skrubbeltrang, 1961, p.167). The overall result seems to have been an attenuation of the ties peasants felt to particular pieces of land, reducing motivation for improvements such as draining.

the character of the peasantry

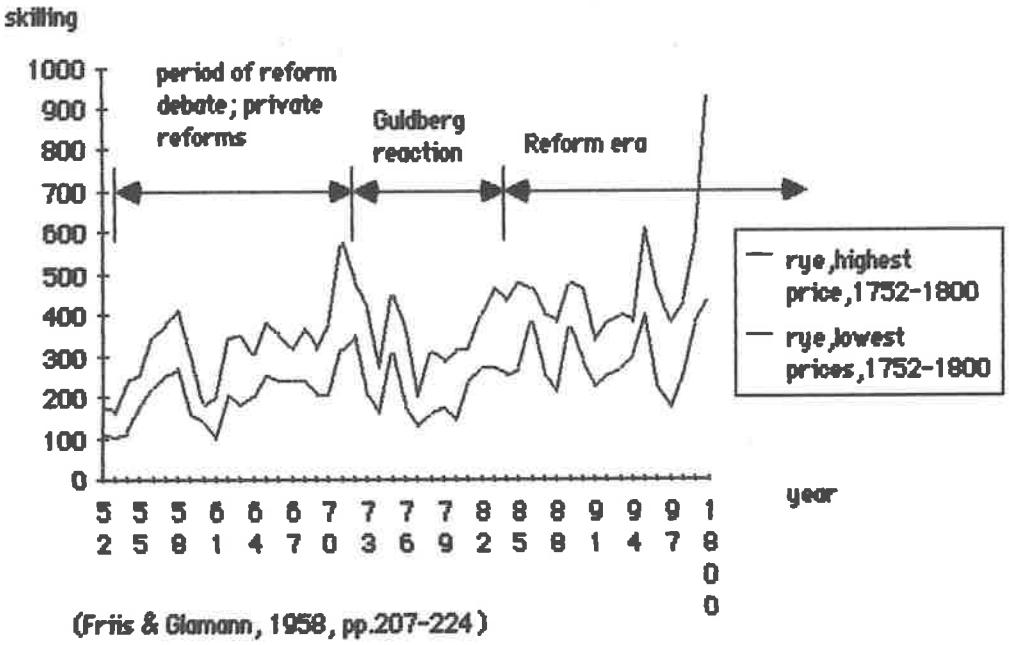
The Danish peasantry in the middle of the 18th century had a reputation for idleness and stupidity (Winding, 1946, p.20). The character of the peasantry seems understandable when viewed as an adaptation to their position in the social system. The arbitrary nature of Hoveri made it impossible for the peasant to plan on spending time on his own land (S.Jensen, 1942, p.76); the communal character of production discouraged individual initiative; the general rigidity of the system, in which the peasants were tied into the service of a single landlord, made laziness a virtue; and high rents and taxes made it unlikely that a peasant would be able to pass his farm on to his son, or even cultivate it until the end of his life.

private reforms and public debate

After about 1750, agriculture prices began to rise. This was due to the beginning of industrialization in England and the expansion of an import market for grain there, as well as wars which pulled labour out of production in other countries, creating inflation (S. Jensen, 1942, p.70). Landlords were eager to increase output and take advantage of this shift in relative prices, but found it difficult to extract more labor from a stubbornly apathetic peasantry.

Enlightenment ideas were then circulating in Denmark, and it was fashionable to feel concern for the "common welfare". These ideas combined in the minds of intelligent estate owners with their desire to increase productivity on their lands (S. Jensen, 1942, p,71), and a number

of important private reforms took place in the 1750s-1770s. The most important of these was the reform conducted 1764-67 by Count Andreas Peter von Bernstorff, on the very large Bernstorff estate owned by his uncle Count J.H.E. von Bernstorff, "the most influential statesman in Denmark" (Baack, 1977, p.5), near Copenhagen. This reform was important because of its pecuniary success, and because the estate's proximity to Copenhagen and the status of the owner made it extremely well-known and often emulated.



(Friis & Glamann, 1958, pp.207-224)

CHART 4: RYE PRICES: 1752-1800

Reforms undertaken at Bernstorff included the following points:

1) The many tiny parcels of individual peasants were consolidated into one or two large holdings, so as to encourage individual initiative and increase the efficiency of land use.

2) "Copyhold" tenure was introduced; i.e. peasants were given tenure based on "the custom of the manor", rather than on the whim of the estate

owner. This was perceived as a substantial increase in the security of peasant tenure.

3) Hoveri was commuted to annual cash payments, encouraging peasant production of a marketable surplus, and ending the uncertainty peasants felt over how much time they could devote to their own plots.

4) Infrastructure improvements were made: land was drained and brought into production, and roads were built to give easy access to the Copenhagen markets. (Baack,1977, pp.6-7)

Discussion of, and agitation for, agrarian reform was widespread particularly among government administrators. When the Royal Agricultural Society (Den Kongelige Husholdningsselskab) was founded in 1769, almost 170 of the original 210 members were from Copenhagen, mostly public officials (Baack, 1977, p.8). The Danish Crown's chronic shortage of funds led these officials to examine carefully any method of raising additional revenues (Skrubbeltrang, 1961, p.166). During the 1760s and 1770s Crown land was sold, and often ended in the hands of peasants (Bjørn, 1961, p.120).

Landlords as a whole tended to view efforts toward reform with suspicion. Posterity has not bothered to preserve many of the arguments of those who opposed the reform movement. Perhaps their arguments carried little weight even in the 18th century; the example of Norway (united with the Kingdom of Denmark at this time), where over half of the peasantry owned their own land[2], gave the lie to any assertions that the peasants were incapable of initiative and responsibility.

state-sponsored reform

Initial reform initiatives set forth by the state in the 1760s sought to encourage the consolidation of fields, and the extension of

copyhold or freehold tenure to peasants. These decrees were issued by Christian VII, who unfortunately proceeded to go mad. His physician, J.F. Struensee, obtained power and attempted to push through a series of radical reforms. By 1772 he had alienated such a large spectrum of the population that he was easily overthrown by conservatives, under O.H. Guldberg, who reversed Struensee's edicts and delayed the possibilities of reform for 12 years (Baack, 1977, p.10).

The period from 1770 to the early 1780s was marked by poor prices and harvests, and these factors combined with the conservative government to slow the process of consolidation and tenure change in the countryside (Skrubbeltrang, 1961, p.172). But in 1781 the Guldberg administration issued a decree which was to have great effect on the organization of Danish agriculture. This edict proclaimed that a landowner (i.e. copyholder or freeholder) could demand consolidation of his parcels regardless of the attitude of the other members of the village. Thus one member pushing for consolidation could force a whole village to accept individual, enclosed holdings. As agricultural prices began to rise in the mid-1780s, villages began to break up all over Denmark; within ten years communal production had been dissolved for over half the land cultivated by peasants (S. Jensen, 1942, p.76), by 1807 the "vast majority of farmland was consolidated" (Baack, 1977, p.20).

In 1784 a coup d'etat by Crown Prince Frederick put Count Andreas Peter von Bernstorff at the head of the government. Bernstorff placed his close friend, and fellow reformer, Count Christian Ditlev Reventlow, at the head of the Ministry encharged with agriculture and taxation. Reventlow had been strongly affected by his observations of English agriculture, and believed that it had its strong points (the spread

of enclosures) as well as its weak points (the dearth of peasant proprietorship). Together with the Norwegian lawyer Christian Colbjørnson, who was greatly influenced by the example of the free Norwegian peasantry, Reventlow formulated the decrees which fundamentally transformed Danish agriculture in the period 1784 to 1807 (Baack, 1977, pp. 12-13).

the reform decrees

From a 20th century perspective, the reforms seem far from radical, though it took all of Bernstorff's political gifts to push them through the Council of State (Statsrådet). Colbjørnson succinctly expressed the purpose of the decrees as

> "...to reconcile the civil liberty of the people with the rights of the landlord and to combine the prosperity of both classes with the welfare of the state."
>
> (Baack, 1977, p.15)

The first category of decrees were those relating to tenancy regulation. Between 1787 and 1790 various acts were passed to keep the landlords from cheating the peasants by: 1) requiring independent appraisals of property each time a peasant entered or exited a contractual agreement with the landlord, 2) forbidding leases of shorter than lifetime duration, and 3) giving widows the right to hold their deceased husband's lease until they in turn died. With the peasantry reasonably safe from the abuses of landlords, the government felt confident in dissolving the Stavnsbånd in 1788.

Reventlow used his financial connections to encourage loans to peasants purchasing property, and to landlords making improvements (Baack, 1977, p.16). The two public financial institutions associated with

Reventlow (Den Kongelige Kreditkasse and Enkekassen) generally loaned peasants about half the money they needed to purchase their own property, and at low interest rates, sometimes as low as 2%. But the remainder of the money usually came at around 4% or higher, and more often than not came from the very landlord from whom the peasant was purchasing his property (S. Jensen, 1942, pp.77-78). Thus landlords found that in the short run, extension of freehold tenure not only increased their income, but actually reinforced the peasant's dependent relationship to them. However, peasants were fortunate in that credit was widely available. During the wars surrounding the French Revolution, Denmark remained neutral and Danish merchants made tremendous fortunes in commerce. This influx of money tended to push down interest rates and encouraged the borrowing of peasants (Baack, 1977, p.20).

The problem of Hoveri was more difficult to solve. Various regulations were passed encouraging the fixing of Hoveri, or its commutation to an annual payment, but Reventlow and his circle were sensitive to fears that rash liberalizing in this sphere could lead to a sharp drop in output. In 1799, the fixing of Hoveri was made mandatory, but those peasants farming less than one tønder hartkorn[3] were not objects of this law (Baack, 1977, p.16). In other words, farmers with holdings large enough for commercial production were protected by this law, while cottars were still subject to the arbitrary labor demands of the landlords.

Sigurd Jensen (1942, pp. 72-73) succinctly puts the reform decrees in perspective:

> "These legal proclamations from above are the sharp corners in the transformation; but from below a transformation was also set in motion, much slower, with a gradual character,

> adapted to every region's idiosyncracies and conditions, braked by the peasant's caution for the new, and his suspicion of his superiors, restricted by his almost total lack of cash money, but led forward by the price change and reinforced by the time's pervasive unrest and attraction to innovations."

effects of the reform

Between 1750 and 1807 the grain harvest doubled while grain exports tripled; 12% to 25% of this increase was due to increases in productivity per unit land, primarily the result of consolidation. The number of cattle doubled between 1774 and 1804 (Baack, 1977, p.20), due to the diminished need of peasants to keep horses once Hoveri had been commuted to cash payments (S. Jensen, 1942, p.80). Differences in wealth had begun to appear within the peasantry; the communal villages had given way to prosperous farmers on the one hand, and impoverished cottars on the other. In general, farming methods were inefficient, and Danish grain was regarded as of poor quality in England (S. Jensen, 1942, pp.78-79).

Consolidated holdings generally employed a 5- to 11-field rotation method, introduced from Holstein. A typical plot on an 11 field system would see one year of wheat, followed by a year of barley, a year of rye, two years of oats, five years of sown grass, and a year of fallow before going back to wheat again (Baack, 1977, p.4). As Milward & Saul (1973, p.503) point out:

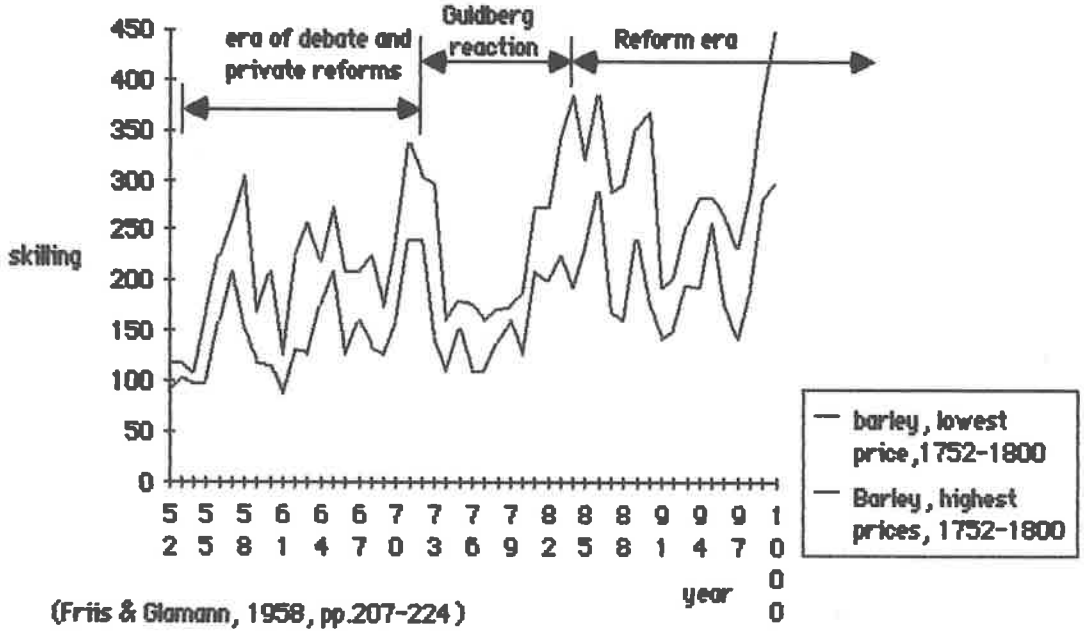
> "It was a system suited to a country with little permanent meadowland, no large home market for cereals, and a climate not ideal for wheat. It was geared to corn and cattle exports in a ratio roughly of 3:2....[Its] great advantage...was that the proportions could be altered in response to changes in the relative prices of farm products."

The inefficiency of the system resulted mainly from the lack of a plow capable of turning the soil to a depth that would prevent plants of a

previous year's rotation from sprouting up again. In addition, poor cleaning and processing methods tended to mix grain during threshing, so that both the marketed product and -even worse- the seedcorn tended to be a mixture of different grains (S. Jensen, 1942, p.79).

summary

Factors responsible for the form and outcome of the agrarian reform include: the examples of English enclosures and the free Norwegian peasantry; the persuasive power of Enlightenment ideology; the ability of an absolute monarch to force through change despite the opposition of the aristocracy; the precedence of profit over tradition as a value for some members of the nobility; the influx of money and subsequent easing of credit due to the coincident prosperity of Danish shipping; and -most importantly- the fortuitous rise in relative agricultural prices.



(Friis & Glamann, 1958, pp.207-224)

CHART 5: BARLEY PRICES, 1752-1800

Personalities are important shapers of historical events, particularly in authoritarian societies, and the role of Bernstorff,

Reventlow, Colbjørnson, etc. should not be overlooked. Yet the literature indicates that the reform movement was initiated by a shift in relative prices which provoked landlords to attempt to increase agricultural production. The reformers, frustrated by their inability to increase output under existing social relations, sought through experiment and debate to develop a new strategy for organizing agricultural production. Opposition to the eventual reform decrees did appear in the landlord class, but one should note that the reform was conducted in such a way as to be of pecuniary benefit to the landlords, and to guarantee them a supply of labor.

AGRICULTURE LEADS THE TAKE-OFF

interval of stagnation (1815-1835)

1807 is regarded as the end of the reform period. In that year, diplomatic blunders pulled Denmark into the war as Napoleon's ally; after which the Danish fleet was destroyed, Copenhagen bombarded, and the country rendered bankrupt (Baack, 1977, pp.27-28). Following 1815, falling prices discouraged further peasant movement into freehold tenure, and many who had bought land in the last part of the price rise found their land unable to produce the cash needed to pay off their debts (S. Jensen, 1942, p.86).

rising grain prices (1835-1875)

It wasn't until the late 1830s that prices began to rise again; a trend which continued for nearly 40 years, and which received a major boost from England's abolition of the Corn Laws in 1849, and the opening of a substantial grain market there (E. Jensen, 1937, p.58). But even by the mid-1840s commercial relations between Denmark and Britain, based on

Danish export of grain, were so well developed that Danish economic activity almost perfectly mirrored British business cycles (S.A. Hansen, 1972, p.310).

Rising prices led the peasantry to take an interest in improved methods of farming. Even critics began to acknowledge that the peasants, who as part of their legacy from Reventlow could now read and write, were no longer stupid but "had learned to think" (Winding, 1946, p.20). Yet the pace of change was slow and the engrained conservatism of the peasantry was well recognized by other classes in Denmark; in 1835 the Monarchy, in setting up Denmark's first regional elected assemblies, sought to load the bodies with prosperous peasants, knowing that these men would be faithful allies against the rising wave of urban liberals (Winding, 1946, pp.30-36).

One of the time's major innovations, a deeper-cutting, yet lighter plow, equipped with a moldboard to turn the soil, began to be introduced in the 1830s and was established throughout the country by the first few years after 1850 (Rasmussen, 1942, p.93). One of the assets of this plow was that it required less tractive power, reducing by half the number of horses needed by farmers, and allowing a doubling in the number of cattle they kept (E. Jensen, 1937, p.58). Other agricultural implements, such as threshers and binders invented in America, were introduced in the 1870s, but only on large estates, where the desire to replace hired labour prevailed (E. Jensen, 1937, p.170).

Soil drainage, using burned clay pipes, began on large estates in the early 1850s, barely a decade after the technology had been developed in Britian. Peasants didn't begin to drain their land until the 1860s and early 1870s when a great deal of drainage was done due to the prosperity

of those years (E. Jensen, 1937, p.160). In general, agricultural investment gave substantial returns, i.e. had a low capital/output ratio, and thus was not a great devourer of funds (S.A. Hansen, 1972, p.312).

However, the improvements of the time (marling, draining, and deeper plowing) did little to improve soil fertility. The larger estates were the first to notice diminishing yields, in the 1850s, and it was on the large estates that the solution began to first appear in the form of an increased emphasis on animal husbandry (E. Jensen, 1937, p.59). Thus Danish dairying on a commercial basis first arose on large estates as a way of obtaining ample stocks of manure, which could be used to restore fertility to over-exploited fields (S.A. Hansen, 1972, p.311).

At mid-century the large estate owners led in innovation and export production. Their cosmopolitan commercial and social contacts made them aware of alternative patterns of land use, as in dairying, which was introduced in imitation of methods utilized in Holstein and Holland. The peasants had not yet completely given up their old ideal of village self-sufficiency to establish production solely for the market (Winding, 1946, p.21-22).

A technological constraint also operated to keep peasants out of dairying. Butter was the primary commercial product, and high quality butter required a large amount of fresh cream, which should be churned unspoiled and unshaken by transport. Peasants, with their small herds, were forced to wait several days while accumulating cream, resulting in butter of inferior quality. Estate butter thus sold for a 25% to 50% premium over peasant butter. Nevertheless, dairying continued to spread among the peasantry throughout the 1860s and 1870s, and to become an increasingly important export item, so that by 1873 the money value of

dairy and meat exports exceeded the value of grain exports by 50% (E. Jensen, 1937, p.59).

declining grain prices (1875-1895)

The transition to animal products clearly began as early as the 1850s in Danish agriculture. However, in the early- to mid-1870s relative prices of cereals began to drop sharply, a result of cheap grain flooding in from the railroadizing United States. Jørgen Pedersen (1938, p.126) shows that the trend for wheat prices dropped precipitiously around 1873, while barley prices declined by a somewhat lesser amount. Butter prices, however, continued on an upward trend until around 1880, and never fell at the rate of cereal prices.

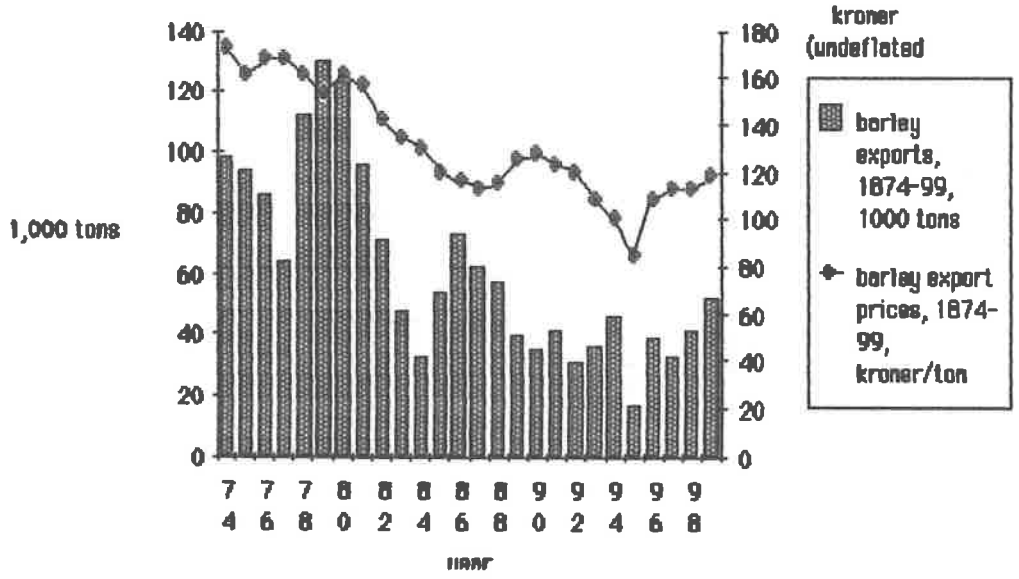


CHART 6: BARLEY EXPORT PRICES AND QUANTITIES, 1874-1899

This price shift provoked a crisis in rural Denmark, marked by a heavy migration of rural folk to urban areas in the late 1870s and early 1880s (Olsen, 1943, p.136). Land values plummeted, and many farmers who had borrowed heavily now found themselves unable to meet their debts. It

was a period of social chaos, as well, with many peasants advocating bimetalism as a means of relaxing the debt crisis (Westergaard, 1922, p.67).

However, Danish agriculture managed to respond to this challenge with great vigor, throwing its resources into the production of animal products and using the cheap American grain as inputs. The most remarkable thing about this response was that it came from the peasantry; a class that ninety years before had been locked into virtual serfdom now took the initiative in leading the Danish economy out of a crisis.

the "Danish Folk Schools"

Much credit for the awakening of the peasantry has been given to the Danish Folk Schools[4] (De Danske Folkehøjskoler). These schools stemmed from the ideas of Bishop N.F.S. Grundtvig, one of the greatest Danish cultural figures of the 19th century, who developed his ideas during the period of crisis following the Napoleonic Wars. The schools were to be places where "the Nordic Spirit" could be reawakened in the Danish people; where the curriculum would consist of the Danish language and the country's history; where lectures and singing would be used to expose peasants to patriotic feelings and a broader outlook on life. Vocational training or reading and writing skills were left to other schools; the Folk Schools sought to promote curiousity and the habits of reading and thinking, while fostering distinct Christian and nationalistic sentiments.

Although the first Folk Schools were founded in the 1840s, it was not until the defeat of Denmark in 1864, and the loss of Slesvig, Holstein, and Laurenbourg, that the movement really took off[5]. By 1870 there were "sixty to seventy" schools, where sons and daughters of farmers would spend about five months, in a different region of the

country, establishing new friendships and studying (E. Jensen, 1937, pp.100-104). From these schools emerged certain alumni with a deep desire to advance the common welfare; these people often had central roles in the foundation of the cooperative societies which were directly responsible for the successful restructuring of Danish agriculture (Milward & Saul, 1973, p.509).

The cooperative movement

The invention of the "cream separator" by L.C. Nielsen in 1878 had fundamental consequences for the dairy industry. Under the old system of butter-making, cream was separated from milk by gravity, and milk therefore could not be transported any great distance, since the shaking and jarring of transport greatly reduced the ability of cream to float to the surface of the milk. The cream separator, however, used centrifugal force to seperate cream, and procured more cream than the gravity method, even when the milk had been transported (E. Jensen, 1937, pp.175-176).

This immediately opened the way for dairying operations in which milk could be collected from a number of small peasant producers for processing in a single butter-making plant. Experiments at these kinds of commercial dairies had been tried in the 1870s and had been found wanting, even after the separator had appeared. Difficulties occured primarily with the quality of milk provided by the peasants, which was often unclean or watered, but there were also problems associated with the disposing of skim milk and buttermilk, and obtaining transport (Westergaard, 1922, p.70).

As a result of these problems, the greater part of Danish dairy production eventually took place not within independent dairies but within

the organizational framework of cooperative societies. The first cooperative creamery was organized by farmers in Jutland in 1882, though a study of the cooperative movement reveals that institutional experiments had been going on in the Danish countryside since at least 1875 (E. Jensen, 1937, p.318). The "principles of organization" as set forth by the Jutland farmers came to serve as the prototype for other cooperative dairies.

> "The interested farmers contracted for a certain period of time to deliver to the creamery all the milk they produced...The milk should be handled in certain ways on the farm so as to be clean and fresh at delivery....Transport from the farm to the creamery was arranged for by the creamery. As practically every farmer joined, the wagon would stop at almost every farm; it carried large loads at small unit cost. At the receiving room door...butterfat and quality was determined, and thereby value of the milk for...the accounting within the creamery. Butter was produced under the direction of a hired creamery manager with good technical training, and the proceeds from the sale of the product after deduction of all costs...were paid back to the farmers in proportion to the amount of milk delivered....The skim milk was taken back daily to the farmers, as much to each as corresponded to his deliveries of whole milk."
>
> (E. Jensen, 1937, pp.319-320)

This kind of arrangement gave the peasants the advantages of large scale economies,and proved to be so successful and so emulated that by 1909 five-sixths of Denmark's cows produced milk for cooperative dairies. Skim milk and butter milk are useful as hog feed, and increased pork production certainly owed a lot to the Danish farmer's need to dispose of the by-products of butter production (Westergaard, 1922, pp.70-71).

Cooperative organization quickly spread to other areas of agricultural production, such as slaughterhouses (1887) and egg production (1895). There occurred horizontal integration of various local production

cooperatives into input-supply federations, service associations and export marketing associations (E. Jensen, 1937, pp.330-331). Export associations allowed farmers to bypass merchants in the export trade (Olsen, 1943, p.136) and, by standardizing quality across the country, were able to obtain the best prices for Danish products.

tenure developments

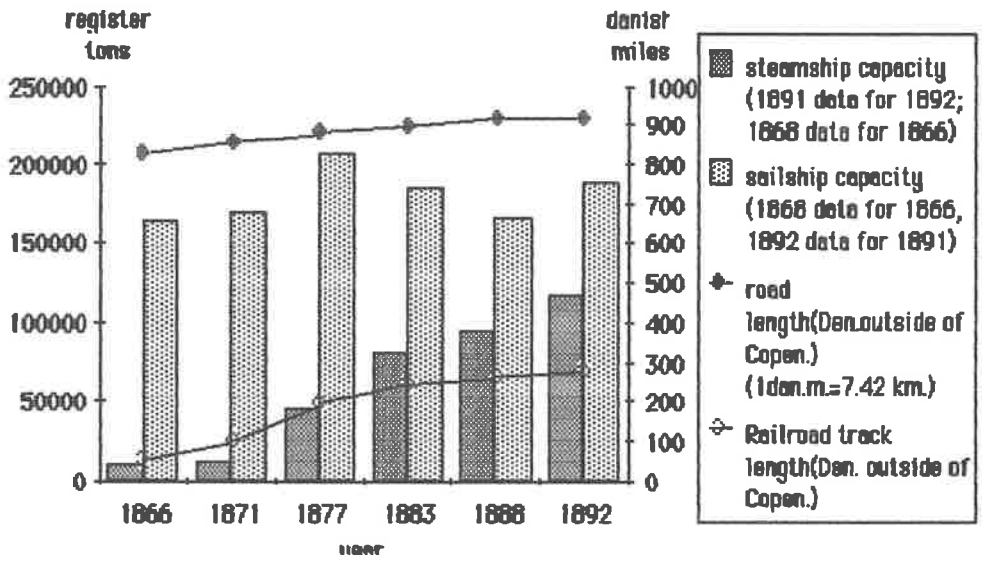
Throughout the 19th century, peasants continued to purchase their own farms, while the rural popultion continued to grow[6]. The most striking feature was the increase in the number of cottars, a sign that population increase was creating an agricultural proletariat. It is noteworthy that this agricultural proletariat usually held at least some land, and that the category of landless country residents scarcely grew from 1860-85.

summary

The story of the period following the reform is one of increasing conversion of Danish agricultural land into peasant freeholds, and the gradual development of entrepreneurial capacity in the character of the peasantry. By the mid 1830s, literacy was widespread, and peasants participated in elected assemblies, though they remained dogmatically conservative and tended to represent their own narrowly-defined class interests (Winding, 1946, pp.33-36). By the mid 1870s, many peasants were fairly well-educated (not just literate), imbued with strong nationalistic sentiments (not just class identity), and capable of experimenting with fundamental institutional change (no longer bound to tradition).

TRANSPORTATION INFRASTRUCTURE

Svend Aage Hansen (1972, p. 310) has pointed out that lack of an efficient transportation system constrained Danish export agriculture in the 1840s and 1850s; it was only in the 1860s and 1870s, with the establishment of railroad and steamship services, that Denmark was able to enter into agricultural export in a big way.



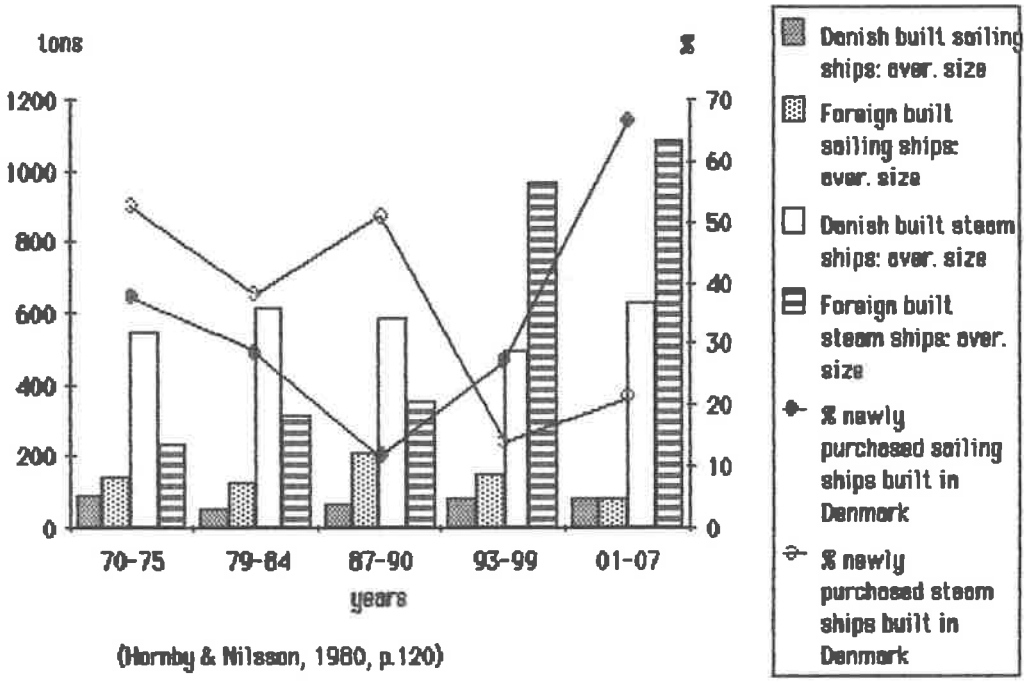
(Danmarks Statistik, 1893, pp.126-127, pp.98-99; 1889, pp.96-97; 1880, p.99, pp.90-91; 1874, pp.48-49)

CHART 7: DANISH TRANSPORTATION CAPACITY; STEAMSHIPS, SAILING SHIPS, HIGHWAYS, AND RAILROADS; 1866-1892

Transportation investments have multiple effects. Not only do they establish connections which make feasible large scale exports, they also create forward and backward linkages in manufacturing, and allow economies of specialization between regions (Rostow, 1971, p.223).

Denmark's lack of coal and iron ruled out the extensive development of these industries as a spread effect associated with railroadization or the coming of steamships. However, though I lack systematic information, it seems that steamships, in particular,

stimulated the growth of a thriving engineering industry. The chart below indicates that Danish shipyards tended to supply the smaller ships (both sailing and steam) to Danish shipowners[7] (note the inverse relation between average size of ship purchased and percentage of ships supplied by Danish yards).



(Hornby & Nilsson, 1980, p.120)

CHART 8: NEWLY-PURCHASED SHIPS; AVERAGE SIZE AND PERCENTAGE CONSTRUCTED IN DENMARK, 1870-1907

Coastal shipping appears important in the introduction of marine steam power. In the mid-1860s, 36.5% of all cargoes shipped between Danish ports, on Danish-registered vessels, were carried on steamships. During this time, only 17.1% of cargoes moving between Denmark and foreign ports, under all flags, were on steam-powered vessels. By the mid-1880s, steamships carried 56.6% of the cargoes moved in coastal shipping. In foreign trade, however, the figures were much higher; e.g. Russian-bound cargoes, under the Danish flag, were 71.2%

steam-carried; for British-bound cargoes, the figure was 88.3%. Thus coastal shipping served as a training ground for steam technology, but it soon fell behind shipping engaged in foreign trade. This slow development was possibly due to the competition of railroads (Hornby & Nilsson, 1980, pp.131-133).

Transportation investments did create an economic restructuring of the Danish countryside. Since the Middle Ages, roughly half of Denmark's urban population has lived in Copenhagen, the other half in a network of market towns spread across the country. These towns were granted certain hinterlands of peasants and estates who were forbidden to engage in trades practiced in the towns, and who were required to market their produce only in their alloted town. Only a small surplus passed from these regions into world trade, and few items were imported. Self-sufficiency was normative, both on the level of the peasant village, and on the level of the region comprising a town and a peasant hinterland.

Turnpike construction on Sjælland in the late 1700s began to dissolve the boundaries of some of these semi-autarkic regions, expanding the hinterland of Copenhagen (Olsen, 1943, p.141). Sjælland's first railroad, in 1847, continued this process (Olsen, 1943, p.126).

> "The main lines of the Danish railway network were opened between 1856 and 1870. They linked up 14 of the 20 larger, including the most important 8 towns, and altogether connected 25 provincial towns along the way. The building of secondary lines continued in the 1870s, taking in another 19 medium-sized and small towns by 1880. The railways reduced overland freight rates by 70%-90%...and were often preferred to easily available water transport. As local markets were linked by the railways this must have benefited specialised industry, possibly at the expense of the older and smaller firms with their more localised markets..." (Lind, 1979, p.116)

Olsen (1943, p.142) echoes this observation, remarking that provincial towns began to see their role in specialized production for all of Denmark, rather than in serving a narrowly defined hinterland. Philip (1972, p.300) notes: "Railroads made possible the domestic division of labor, steamships the international".

Steamships and railroads therefore seem to have had their primary effects as openers of export trade and promoters of regional specialization within Denmark. Steamships appear to have had substantial stimulating effect on Danish manufacturing[8], and railroads may well have also, but little information was found on this subject.

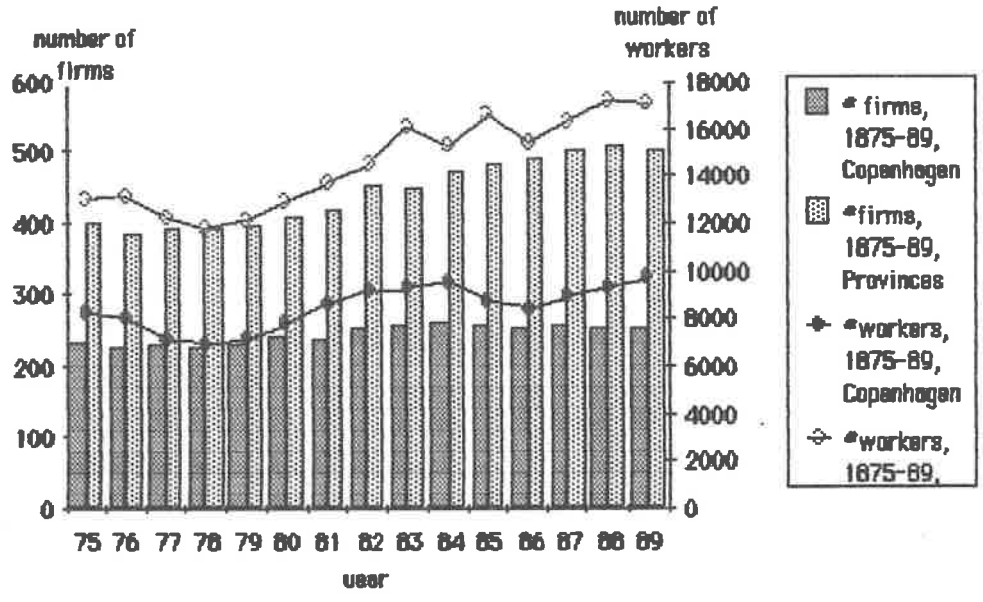
THE SPREAD OF INDUSTRY

1840-1872

Figures from the 1840s do not differentiate industry from handicrafts. The largest firms (and there were only nine[9] employing more than ten workers) were not usually found in the cities, but at those rural locations, rare in Denmark, where water power could be utilized. Large urban industries arose with the spread of steam power (Willerslev, 1954, pp.246-247).

The first Danish steamship began operation in 1819 (Hornby & Nilsson, 1980, p.113), the first Danish railway in 1847. A Copenhagen paper maker, in the 1820s, employed the first steam engine used in Danish manufacturing (Winding, 1946, p.26). Provincial censuses show that steam power first came into widespread industrial use in distilling, which used over half of the total steam power employed in provincial towns in 1855 (Lind, 1979, p.107). Distilling was one of the more flourishing industries in the Danish provinces, with a large number of producers and high sales even in bad times (Winding, 1946, p.24). It was an industry which used

local agricultural products as inputs and found its market in the local peasant population. Many other technical improvements were adopted by distillers in this period and it is noteworthy that distilling was the only sector of production in provincial towns to register a decline in the number of firms from 1855-72 (Lind, 1979, p.105); certainly a sign of technology's use as a competitive weapon, leading to a shake-out and concentration within the industry.



(Willerslev, 1954, pp.252-254)

CHART 9: NUMBER OF WORKERS AND NUMBER OF FIRMS; COPENHAGEN AND THE PROVINCES; 1875-89

By 1872, 58 firms employed more than ten workers; 49 of these were in urban areas, 30 in Copenhagen alone (Willerslev, 1954, p.251). Most of the industrial growth (measured as quantity of labor used) leading up to 1872 was concentrated in the years 1855-57 and 1866-72 (Lind, 1979, p.104). Copenhagen's industry grew faster in the period 1855-72 than did that of the provincial towns (Willerslev, 1954, p.250; Lind, 1980, p.105). Growth occured in almost all sectors of the economy, though

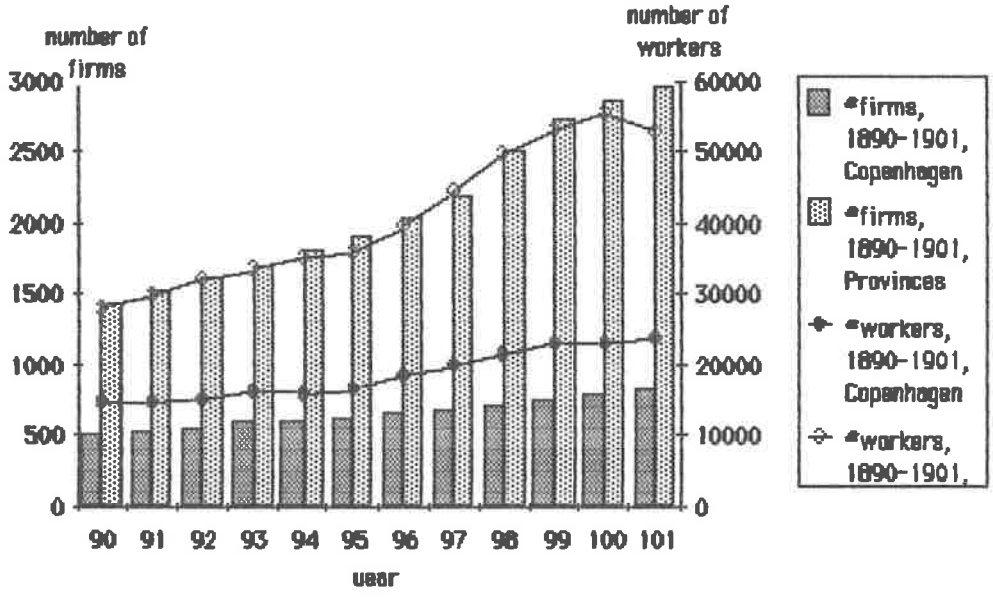
textiles and tile-making grew at a pace above average. Lind (1979, p.104) speculates that the end of the peasantry's self-sufficiency sparked a growth surge in those industries from which peasants began to purchase[10].

Net investment ranged from a high of about 7% in 1855 to a low of about 2.5% in 1867; however, these figures include investment in all sectors, not for industry alone (S.A. Hansen, 1972, p.311). During the early 1860s, railroads absorbed nearly a third of net investment (S.A. Hansen, 1972, p. 312), and the establishment of the trunk lines, as well as legislation 1857-62 abolishing guild restrictions and town privileges (Olsen,1943, p.125), served to free up both the factor and product markets.

1872-1906

Between 1872 and 1906 industrial employment grew at a higher pace in provincial towns and rural areas than it did in Copenhagen (Willerslev, 1954, p.256). New industries, first appearing in this period, exhibit the highest rates of growth: e.g. cement, sawmills, and slaughterhouses for the export of pork (Lind, 1979, p.104). Food processing industries (e.g. dairies, oilcake crushers, and coffee roasters) enjoyed high growth, and tended to be organized in small firms, often in the provinces (Willerslev, 1954, p.259). The high point of the founding of dairies was in 1887 and 1888 with respectively 168 and 251 new dairies (Willerslev, 1954, p.253).

Charts 9 and 10 give some rough figures for this period. In 1889 there occured a change in the criteria determining which industrial workplaces entered the government registers. Thus it was necessary to place the 1875-1906 data in two charts, since the data before and after 1889 are not comparable.



(Willerslev, 1954, pp.252-254)

CHART 10: NUMBER OF WORKERS AND NUMBER OF FIRMS; COPENHAGEN AND THE PROVINCES; 1890-1901

These charts should be compared with Chart 1, which shows the proportion of Gross Factor Income occupied by industry. Though industry grew as a proportion of GFI, by 1894 it was still below handicrafts in importance[11]. Most commentators agree that industrialization was a more gradual process than in other countries (Milward & Saul, 1973, p.511; Westergaard, 1922, p.21); even today, some of Denmark's best-known exports, such as furniture, are manufactures with a high handicraft component. Industrial exports were never important in the 19th century, even in 1913 only 6% of industrial production was exported while 64% of agricultural output went abroad (Milward & Saul, 1973, p.511). Eventual industrial exporters usually relied on selling a technologically sophisticated, unique product (Milward & Saul, 1973, p.512). Wages in Denmark tended to be high, in part because agriculture continued to

increase its demand for labor (Milward & Saul, 1973, p.510), partly because emigration to America drew off many seeking a better life (Larsen, 1982, p.127).

Larger towns tended to benefit most from industrialization. Their established position in the hierarchy of Danish cities, their location advantages with respect to water transport, and the entrepreneurial talent of their merchants, all conspired to give these towns a lead in the industrialization of the country (Lind, 1979, p.115). Copenhagen[12] in particular owed a great deal to the entrepreneurial ability of its merchants, who invested funds obtained in international commerce (Milward & Saul, 1973, p.513).

industrial financing

Savings Banks and Credit Associations became fairly common beginning in the 1840s. Peasants used the Savings Banks of provincial towns in large numbers (S. Jensen, 1942, p.89). But Lind (1979, p.115) argues that "the first introduction of organized banking into the largest provincial towns little affected industrial growth rates, less because it did not involve itself in industry, but rather because it did not confine its operations to its immediate local environment." Nielsen (1983) has undertaken a detailed study of investment in the Copenhagen tobacco and iron industries in the period 1840-1914. He finds little influx of provincial funds to these industries. Firms largely relied on internal finance for investment, and large loans were most often used to transfer ownership, not for productive improvements. Credit Associations were an important source of external financing, until 1890 second only to private loans in importance. After 1890, banks become especially important to the large credit demands of the new joint stock companies (Nielsen, 1983,

pp.96-97).

interrelation between agriculture and industry

This sketchy outline of the spread of Danish industry should suffice to discuss the interrelations between agriculture and industry. First, various writers mention that farm implement manufacturing arose as a response to agricultural growth; dairy machinery was also a Danish speciality (Milward & Saul, 1973, pp.512-514). Second, rising peasant incomes, and their increasing reliance on the money economy, stimulated industries producing textiles, foodstuffs, building materials, etc. Third, the railway network, which was seemingly built for the purpose of assembling agricultural exports (S.A. Hansen, 1972, p.310), allowed regional specialization, a widening of the market, which writers since Adam Smith have indicated as a stimulant to industry. Fourth, savings from farmers were used as a source of funds for industrial investment. Fifth, the processing of agricultural products, as in dairying and slaughtering, constituted a significant portion of industrial output.

CONCLUSION

Without trying to come up with a date[13] for the Danish take-off, this paper has attempted to describe the preconditions of the take-off, the take-off with agriculture as the main leading sector, and the spread effects generated by agriculture.

It is my feeling that Denmark's history has something to teach Development Economists. I will discuss some of the points raised in my own mind by the reading I did for this paper.

✓ The amount of time between the introduction of institutional reforms, i.e. the establishment of the preconditions, and their bearing fruit in economic prosperity, i.e. the take-off, was extremely long. Between the agrarian reform era and the switch to animal husbandry there elapsed 90 years; three generations of farmers were modified, step by step, until a generation capable of industrial agriculture appeared. Yet every facet of Denmark's transformation had deep roots in the past; followed from some trend already present. For example: dairying's rise after the shift in relative prices was based on the commercial dairying practiced as an aid to soil fertility, the rise of cooperative societies certainly had its roots in the communal life of pre-reform villages, and the entire agrarian reform can be seen as the product of many years of debate and experimentation.

The moral of this is that economic development is a slow evolutionary process: even the preconditions have preconditions, so that everything accomplished in the present must be built on the past.

✓ The price system performs a role as a mediator of economic change between one country and the next. The voracious appetite of the booming British textile industry in the 1830s pushed up cotton prices and led to the opening of new cotton land in the American South; likewise, the growth of large industrial cities and the saturation of U.S. wheat growing capacity inflated wheat prices in the 1890s and led to the opening of new wheat land in the Canadian West. Denmark, however, could not respond to price changes by opening up new land; with the exception of the Jutish heaths, no expanse of uncultivated land stood available. The response thus was not an imperialistic one of conquering more resources from weaker peoples, but a managerial response consisting of devising more efficient

ways to utilize existing resources.

✓ An important part of this managerial response consisted of building up human capital and encouraging "economic democracy". That is, education was used to create a large reservoir of entrepreneurial and technical talent, while measures were taken to more broadly distribute productive assets. To a certain extent, the motivation for this response seemed to lie in the nation's perception of its own weakness, in the perceived need for national strengthening. This perception encouraged the nation to reformulate inefficient social relations, and helped to overcome the opposition of those who expected only diminished privileges from institutional change.

✓ The agrarian reform and the cooperative movement both involved major institutional changes. Both occured at times of great economic growth, which seems important in allowing the transition to occur without provoking great conflict. That is, economic growth allowed the landlords to be bought off, to actually receive a fair pecuniary equivalent, in return for slipping loose some of the land and labor they had hitherto controlled. Likewise, the merchants who were by-passed by the newly-founded cooperative export associations, were able to quickly find new opportunities in the expanding economy.

✓ Consolidation and the selling of land to peasants served to increase the amount of work peasants put into their holdings. However, the breakup of production into individualized operations precluded the introduction of technologies and products characterized by large-scale economies. Moreover, the dogmatic conservatism of the peasantry further restricted technological improvements, diversification of production, and quantity of output marketed.

Thus the continued maintenance of some large estates in the period 1790-1880 seems to have worked some beneficial effects. First, they served as a conduit for the introduction of new technologies from abroad. Second, they seem to have provided a large proportion of Denmark's agricultural exports. Third, they provided an example, to the peasantry, of the benefits associated with large-scale operations. It was with the example of the manors before them that the peasants formed dairying cooperatives to achieve large-scale economies.

✓ Distributing land to the peasants seems to have had a beneficial effect on industry. One striking feature of Danish industry is its domestic orientation, its focus on the demands of Danish workers. If land had remained in the hands of estate owners, the set of commodities demanded by these men could have scarcely been supplied by Danish industry. In other words, it seems the land reform allowed the subsequent development of a mass market for simple commodities, easily produced in Denmark, and precluded the monopolization of buying power by men who would consume imported luxuries.

✓ Denmark's well-developed urban hierarchy, along with the nation's topography which made supplying bulk transportation comparatively easy, was of incalculable benefit in permitting small producers to market their surplus (Johnson, 1970, p.24). That is, the country's system of central places allowed the effect of world price changes to penetrate into every nook and cranny of the Danish countryside.

1) The revenue shortfall experienced by the Danish state had important repercusions on its dealings with agricultural questions. Mercantilist policy sought tax revenues as a means to finance armies and allies during the highly volatile 16th to 18th centuries in Europe. The Danish Crown reaped substantial revenues from the Øresund tolls until 1857 (Winding, 1946, p.25); but the chronic pecuniary distress of the monarchy encouraged it to look closely at any scheme designed to generate more income from the peasantry (Skrubbeltrang, 1961, p.166), who were the principal taxpayers of the Kingdom.
2) By the late seventeenth century in Norway, many peasants had already begun to buy farms; by 1750, more than half the peasants in Norway were freeholders. This transition was connected with the extensive sale of agricultural land belonging to the Church and Crown after 1660. Because of falling agricultural prices, the new landlords found that their land gave them a low return and tried to recover their investments by raising rents. This stimulated peasants to purchase land themselves, which allowed the landlords to sell and transfer their investments to more profitable enterprises such as lumbering and mining (Holmsen, 1961, p.152).
3) "One tønde hartkorn, or barrel of hard grain, was a unit of tax valuation indicating productivity and thus land area. In the survey of 1688 it was equal to:

    i) The area of land that could be sown with 2 to 3 tønder of barley or rye. A tønde of grain is equal to 4.5 cubic feet or 139.1 liters.

    ii) Meadowland that gave twenty-four to forty-eight cartloads of hay. The cartload is extremely difficult to define as a unit of measure. The best approximation is 480 lbs.

    iii) Grazing land for twenty-four to forty head of cattle.

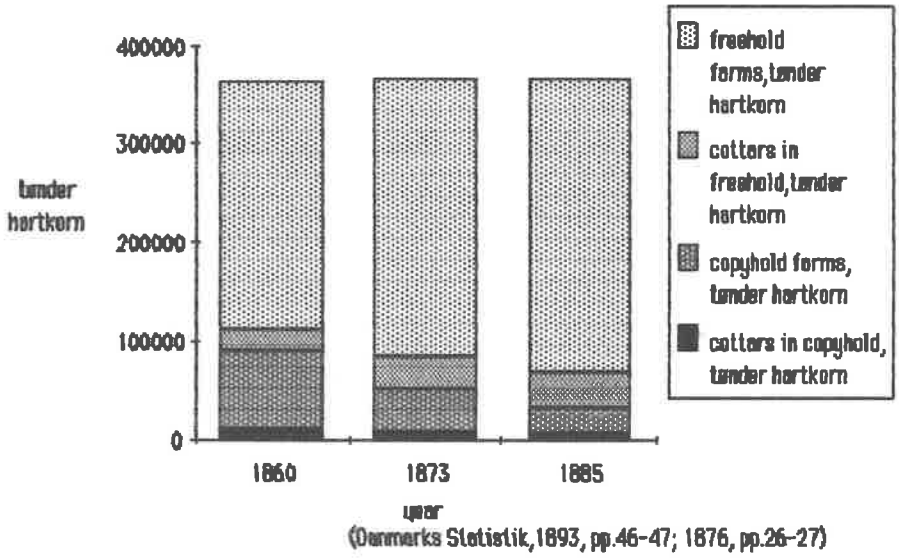
    In actual area the tønde hartkorn varied from 6,300 square meters to 94,500 square meters according to the quality of the soil. In the soil survey of 1802 to 1826 approximately 15 acres equaled one tønde hartkorn on the islands, whereas in Jutland

where the soil is light and sandy, the equivalent was approximately 36 acres. For all of Denmark the average was roughly 24.5 acres to one tønde hartkorn." (Baack, 1977, p.30)

4) Johnson (1970, p.22) is an example and gives references to other authors.

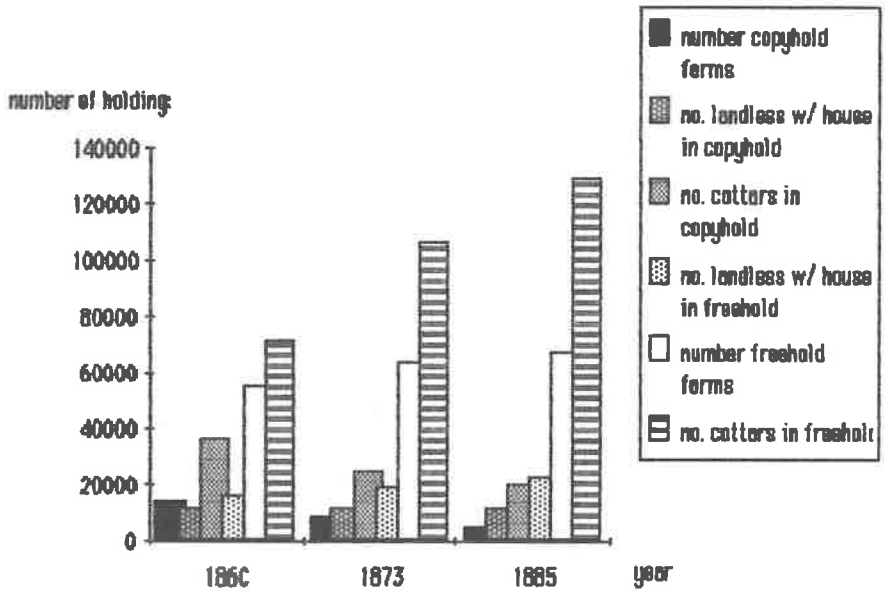
5) This was apparently just one manifestation of the nation's efforts to strengthen and heal itself; also at this time the great stretches of heathland on Jutland were colonized and cultivated under the motto "What we have lost externally, we will regain internally" (E. Jensen, 1937, p.179).

6) The following two graphs give a good picture of these changes:



(Danmarks Statistik, 1893, pp.46-47; 1876, pp.26-27)

CHART 11: AMOUNT OF LAND HELD UNDER VARIOUS TENURE FORMS; 1860, 1873, 1885



(Danmarks Statistik, 1893, pp.126-127, pp.98-99; 1869, pp.96-97; 1880, p.99, pp.90-91; 1874, pp.48-49)

CHART 12: NUMBER OF RURAL HOLDINGS UNDER DIFFERENT FORMS OF TENURE; 1860, 1873, 1885

7) Danish shipping was very big business, much bigger than the trade of Denmark alone could justify; the large deficit run by Denmark in the balance of merchandise trade during the last thirty years of the 19th century, was compensated largely by the very substantial earnings of Danish shipping firms (Henriksen and Ølgaard, 1960, p.9).

8) Denmark eventually developed a substantial export manufacture of ships. By the time the Copenhagen firm of Burmeister & Wain built the world's first diesel ship in 1912, Danish shipbuilding had attained a high degree of technical sophistication. However, for the period 1870-1900, the ship export data I have found are unsatisfactory. Hornby & Nilsson (1980, p.122) give a table which is internally inconsistent, and contradicts very sharply with Henriksen & Ølgaard (1960, pp.46-47), who list no export of new ships until 1897.

9) Six of these nine firms were grain mills, one was a rifle factory, and of the two located in an urban area (both in Copenhagen) one

was an iron-casting shop and the other a cotton spinning plant.

10) Though other ports handled most of the agricultural export trade (after 1874, Esbjerg was the most important), Copenhagen remained the port where most imports landed (Olsen & Winding, 1941, p.111). The role of Copenhagen as the head of a pre-existing distribution system may thus have given the town an initial advantage in serving the newly created peasant market. However, one would expect peasant purchases to benefit provincial industries, particularly before the installation of the completed railroad network.

11) The conceptual line separating "industry" from "handicrafts" shifted somewhat from one 19th century industrial census to another, as is only proper in a period marked by so much technological change and economic restructuring. The three fundamental distinguishing traits of industry, emphasized differently from one year to the next, are as follows:
   a) Industry processes standardized products in large quantities for sale to middlemen.
   b) Industry employs a division of labor such that unskilled labor is more predominant than in handicrafts.
   c) Industry uses machinery in the production process.

12) Until 1857, Hamburg, not Copenhagen, was the highest city in the hierarchy of the Danish urban system. Provincial merchants operated on Hamburg credit, selling goods from Hamburg wholesalers, particularly on Jutland (Winding, 1946, p.23). In 1857 a financial crisis hit Hamburg especially hard, and the last traces of Hamburg's pre- eminence were erased by the 1864 war with Germany (Olsen & Winding, 1941, 104).

13) Kjeld Bjerke (1955, p.148), using gross investment as percentage of GDP, comes up with figures over 10% as early as1870. Svend Aage Hansen (1972, pp.311,316), uses net investment as percentage of GFI, and gets figures well below 10%, in fact usually below 5%, until the mid 1890s. At this point, investment for non-agricultural sectors exceeds 10%. Hansen cites (p.316) Rostow's criterion of 10% as an indication that the take-off was reached in the 1890s; Rostow (1971, p.42) merely

indicates the period 1870-1900. Since: a) the cost of transportation investment was relatively low, b) agricultural investment exhibited a low capital/output ratio, and c) population growth was restrained due to large-scale emigration, investment need not have attained 10% to push Denmark into take-off. Regardless of the point in time one wishes to call the take-off, it seems that the really significant decade in this period was the 1880s, when the restructuring of the Danish economy took place.

A comparison with Sweden might be interesting some time.

Baack, Lawrence J. 1977, Agrarian Reform in Eighteenth-Century Denmark, University of Nebraska Studies: new series, no.56, (Lincoln: University of Nebraska Press)

Bjerke, Kjeld 1955, "The National Product of Denmark, 1870-1952", pp. 123-151 in Income and Wealth, Series 5, ed. by Simon Kuznets, International Association for Research in Income and Wealth, (London: Bowes & Bowes)

Bjørn, Claus 1977, "The Peasantry and Agrarian Reform in Denmark", Scandinavian Economic History Review, v.25,pp.117-137

Brogård, Peter 1973, Om det danske landskabs historie, (Copenhagen: Kunstakademiets Arkitektskole)

Danmarks Statistik 1874, Sammendrag af Statistiske Oplysninger angående Kongeriget Danmark, no.6,(Kjøbenhavn: Bianco Lunos Bogtrykkeri)

1876, Sammendrag af Statistiske Oplysninger angående Kongeriget Danmark, no.7,(Kjøbenhavn: Bianco Lunos Bogtrykkeri)

1880, Sammendrag af Statistiske Oplysninger angående Kongeriget Danmark, no.8,(Kjøbenhavn: Bianco Lunos Bogtrykkeri)

1885, Sammendrag af Statistiske Oplysninger angående Kongeriget Danmark, no.9,(Kjøbenhavn: Bianco Lunos Bogtrykkeri)

1889, Sammendrag af Statistiske Oplysninger angående Kongeriget Danmark, no.10, (Kjøbenhavn: Bianco Lunos Bogtrykkeri)

---

*Following Danish usage, the letters Ø,Æ,Å are placed at the end of the alphabet

1893, Sammendrag af Statistiske Oplysninger angående Kongeriget Danmark, no.11, (Kjøbenhavn: Bianco Lunos Bogtrykkeri)

Faber, Harald 1918, Co-operation in Danish Agriculture, (London: Longmans, Green and Co.)

Friis, Astrid & Glamann, Kristof 1958, A History of Prices and Wages in Denmark, 1660-1800, published for Institute of Economics and History, Copenhagen, (London: Longmans, Green & Co.)

Hansen, Svend Aage 1972, "100 År Økonomisk Vækst", in Nationaløkonomisk Tidsskrift, v.10, no.5-6, pp.304-331

Henriksen, Ole Bus & Ølgård, Anders 1960, Danmarks Udenrigshandel, 1874-1958, Studies from Copenhagen's University's Economic Institute, no.2,(Copenhagen: G.E.C. Gads Forlag)

Holmsen, Andreas 1961, "The Transition from Tenancy to Freehold Peasant Ownership in Norway", Scandinavian Economic History Review, v.9,pp.152-164

Hornby, Ove & Nilsson, Carl-Axel 1980, The Transition from Sail to Steam in the Danish Merchant Fleet", in Scandinavian Economic History Review, v.28, no.2, pp.109-134

Hovde, B.J. 1943, The Scandinavian Countries, 1720-1865: the rise of the middle classes, (Boston: Chapman & Grimes)

Jensen, Einar 1937, Danish Agriculture: its economic development, (Copenhagen: J.H. Schultz Forlag)

---

*Following Danish usage, the letters Ø,Æ,Å are placed at the end of the alphabet

Jensen, Sigurd — 1942, "De Store Landboreformers Århundrede", Vi og Vores Fortid, no.1,pp.70-90

Johnson, E.A.J. — 1970, The Organization of Space in Developing Countries, (Cambridge: Harvard University Press)

Larsen, Ulla M. — 1982, "A Quantitative Study of Emigration from Denmark to the United States, 1870-1913", Scandinavian Economic History Review, v.30, no.2, pp.101-128

Lind, Gunner — 1979, "Development and Location of Industry in Danish Provincial Towns 1855-1882", in Scandinavian Economic History Review, v.28, no.2, pp.101-120

Milward, Alan S. & Saul, S.B. — 1973, The Economic Development of Continental Europe, 1780-1870, (London: George Allen & Unwin Ltd.)

Nielsen, Peter B. — 1983, "Aspects of Industrial Financing in Denmark 1840-1914", in Scandinavian Economic History Review, v.31, no.2, pp.79-108

Gunnar, Olsen — 1943, "De Danske Købstæder gennem Tiderne", Vi og Vor Fortid, no.10

Olsen, Gunnar & Winding, Kjeld — 1941, "Københavns historie", Vi og Vor Fortid, no. 5

Pedersen, Jørgen & Pedersen, O.S. — 1938, An Analysis of Price Behavior During the Period 1855-1913, (Copenhagen: Levin og Munksgaard; London: Humphery Milford, Oxford University Press)

---

*Following Danish usage, the letters Ø,Æ,Å are placed at the end of the alphabet

Philip, Kjeld 1972, "1872", in Nationaløkonomisk Tidsskrift, v.10, no.5-6, pp.299-303

Rasmussen, Holger 1940, "Landsbyen i vore Dage", Vi og Vores Fortid, no.1, pp.90-105

Rostow, W.W. 1971, The Stages of Economic Growth, 2nd edition, (Cambridge: Cambridge University Press)

Skrubbeltrang, F. 1961, "Developments in Tenancy in Eighteenth-Century Denmark as a Move towards Peasant Proprietorship", Scandinavian Economic History Review, v.9,pp.165-175

Westergård, Harald 1922, Economic Development in Denmark, before and during the World War, Carnegie Endowment for International Peace, Division of Economics and History, (Oxford: Clarendon Press)

Willerslev, R. 1954, "Træk af den Industrielle Udvikling 1850-1914", Nationaløkonomisk Tidsskrift, v.92, no.5-6, pp.242-262

Winding, Kjeld 1946 "Danmark i 1840 - Statsforhold og Erhvervsliv", Vi og Vores Fortid, no.2, pp.7-36

Ølgård, Anders 1966, Growth, Productivity and Relative Prices (Amsterdam: North-Holland Publishing Company)

*Following Danish usage, the letters Ø,Æ,Å are placed at the end of the alphabet