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**A DESCRIPTIVE ANALYSIS OF
THE SEAFOOD MARKET
IN SWEDEN**

**by
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A Descriptive Analysis of the Seafood Market in Sweden

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Abstract

The background for the paper is the analysis of determinants influencing the Norwegian export of smoked salmon to Sweden. The conditions for export of smoked salmon from Norway have deteriorated after Sweden became a member of the European Union in 1995, due to a 13% ad valorem import duty. This paper links the market for smoked salmon to the Swedish fish market in general. The paper describes landings of fish, production of aquatic species, import and export of fish and the development of the consumption of seafood.

The analysis shows that the total consumption of fish has stagnated in Sweden, even though it is possible to identify differences at product level. The interesting thing is that both import to and export from Sweden are increasing steadily. The per capita consumption of seafood is low, also relative to consumption of meat. There is an unrealized potential for further growth in the Swedish seafood market. A realization of the growth potential is a matter of offensive marketing and not least supplying fish at competitive prices relative to food prices and quality in general.

JEL classification number: Q22, E3, F1, D1

Keywords: Fishery statistics, Sweden, consumer trends, smoked salmon

1 Introduction

The objective of this paper is to give a brief overview over the fishing industry in Sweden, and to shed some light on the salmon smoking industry.

Sweden plays a double role for the Norwegian seafood industry – one positive and one negative. First of all Sweden represents an important export market. Norway exported seafood to Sweden for about 1.7 billion Norwegian kroner in 2006. On the other hand Sweden processes fish and represents a competitive supplier and challenges the Norwegian fish processing industry in some products areas.

The paper is structured in the following way.¹ The next section describes how the population, aggregated consumption and gross national product have developed in Sweden during the last 30 years. Section Three gives an overview over the landings of fish for the last 20 years. This section also describes the catches in inland water fisheries and the aquaculture production. Section Four describes Sweden's external trade for seafood. Section Five analyses the consumption of fish, and takes a closer look at the market for smoked salmon. Finally, section Six concludes.

2 Macroeconomic data

It is assumed that the potential demand for fish in Sweden is influenced by the size of the population and the income level. Figure 1 shows how the indicators have evolved over time.

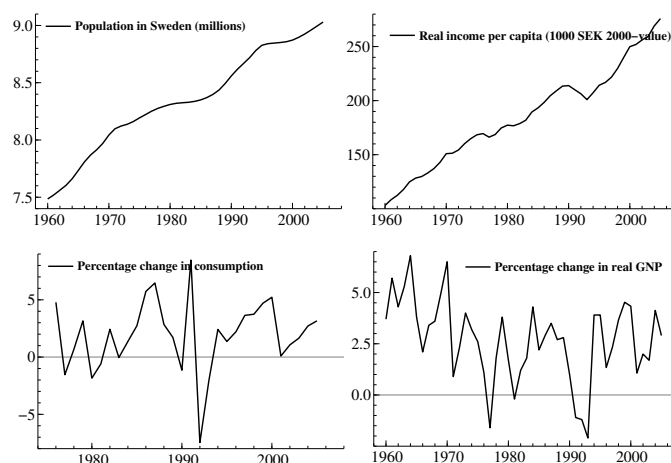


Figure 1: Population, real income per capita, change in consumption and change in gross national product GDP in Sweden 1960-2005.

Source: Statistics Sweden.

¹I would like to thank Market Analyst Kristin Lien, Norwegian Seafood Export Council, for information and comments.

Figure 1 shows that the population and the real income per capita have an overall positive trend during 1960-2005. The yearly percentage change is positive, except for 1977, 1981 and for the period 1991-1993. The change in real income has also influenced the real consumption of durable and non-durable goods. The consumption has increased during 1978-2005, except for 1977, 1980-81, 1990 and 1992-93. It is expected that the development in income and population in the economy will have some long-run influence on the demand and the size of the market for non-durable consumption items such as foodstuffs. Statistically, there exists a significant long-run relationship between aggregated consumption level and the level of real gross national product.² It does not follow from a general increase in consumption of durables and non-durables that the consumption of fish should increase by the same rate. The consumption of fish (and other foodstuffs) is not only a function of income level, it also depends on the relative prices between food items and, not least, the preferences for seafood. Consumers' preferences can also be influenced by public promotion. We have no information about how much resources suppliers of fish products in general spend on influencing the consumers' choices relative to what suppliers of substitutes, for example white and red meat, spend.

3 Landing of fish in Sweden

The following section describes the landing of fish by the Swedish fleet. The statistics give an idea of the yearly yield the Swedes realize from their natural resources.

3.1 Internal supply from natural resources

Figures 2 and 3 show quantity and landed value of fish in Sweden by the Swedish fleet for the period 1970-2004. Official statistics for Sweden (Statistics Sweden) do not provide any information about foreign landings of fish in Sweden.

²Estimation of the ADL-model $y_t = \alpha + \beta_1 y_{t-1} + \beta_2 x_t + \epsilon_t$, where y is natural logarithm of real aggregated consumption (durables plus nondurables) and x is logarithm of real gross national product (GNP), shows that the short run aggregated consumption increases by 0.6% if GNP increases by 1%. The static long-run model indicates that the aggregated consumption increases by 0.97% for a 1% increase in GNP.

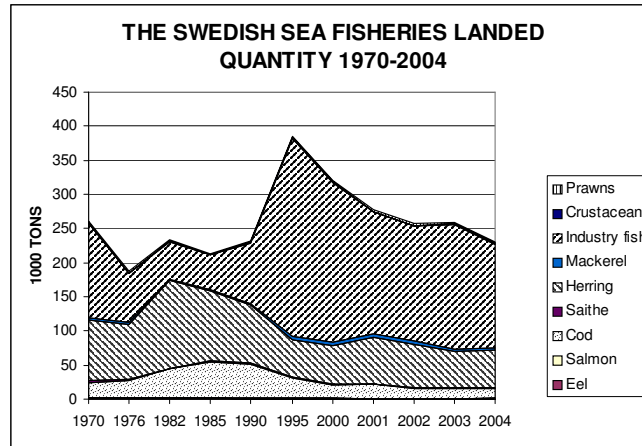


Figure 2: Landings of fish in Sweden 1970-2004.
Source: Statistics Sweden and Fiskeriverket.

The total landed quantity has been on a relatively stable level during the last 15 years. The level is about 200-250 thousand tons per year. On the other hand, the composition of species in the landings has changed over time. The catch of cod is reduced from the top level of about 50 thousand tons during 1985-1990 to about 14 thousand tons in 2004. Figure 2 also shows that there is a reduction in the landings of herring. Note also that the reduction in landings to some extent have been compensated by an increase in the catch of so called “industry fish”, i.e. fish which represents raw material in the production of fish oil and fish meal.

The Swedish fleet does also catch prawns (a stable average landing level of about 2 thousand tons per year), crustaceans (about 1 thousand ton), mackerel (about 4 thousand tons), saithe (about 1.5 thousand tons), Atlantic salmon (0.3 thousand tons).

If we look at the gross real first hand value of landed fish, the picture is more differentiated. Figure 3 shows that the total real value of the landings of fish in Sweden was reduced by about 400-500 million SEK (2006-value) during the thirty years period from 1970 to 2004.

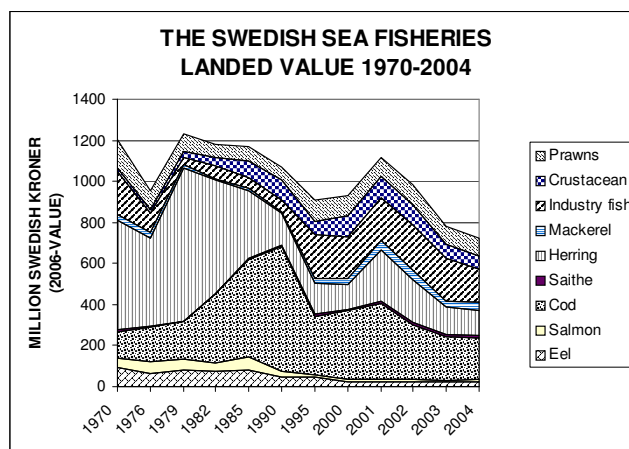


Figure 3: Landed value of fish in Sweden 1970-2004.

Source: Statistic Sweden and Fiskeriverket.

A closer look at figure 3 shows that the landed value has increased for some species and decreased for others. The landed value is relatively stable or has increased for the following groups: prawns (stable, and the average landing is about 90 million SEK per year), crustaceans (relatively stable during the last 20 years, and the landing amounts to about 70 million SEK per year) and industry fish (increased from the beginning of the 1990s, and is today relatively stable at about 150-200 million SEK). The value of the landings is reduced for a lot of groups. The quantity of landed cod is reduced significantly during 1990-2004, but the price of the cod has increased, so the gross value is reduced less than the reduction in quantity. This indicates that the numerical value of the demand elasticity is greater than 1. The yearly average landed value of salmon is today 5-10 million SEK and for eel about 20 million SEK. The value of saithe is relatively stable (about 10 million SEK). The value of herring is also reduced, and the average landed value amounts to about 120 million SEK per year. Figure 4 shows the real gross value (million SEK 2006-value) and quantity landed abroad by the Swedish fishing fleet.

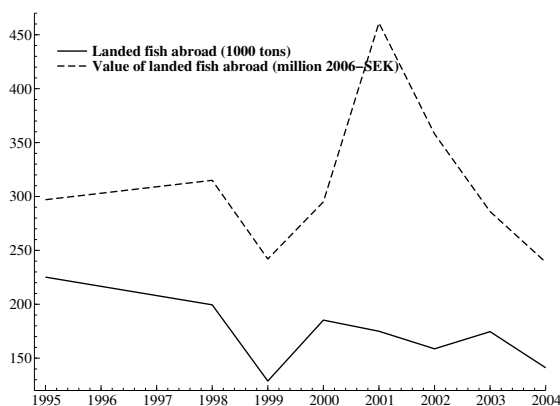


Figure 4: Landed fish abroad by the Swedish fleet 1995-2004.
Source: Statistics Sweden and Fiskeriverket.

The overall trend of the landed quantity is negative for the period 1995-2004. It is mainly fish used as raw material for production of oil and fish meal which is landed abroad – first and foremost in Denmark. About 50% of the value and about 80% of the quantity of the fish landed abroad is sold to the fish meal and oil industry. Figure 5 shows the catches of fish and crustaceans in the inland waters of Sweden by professional fishermen for the period 1987-2004.

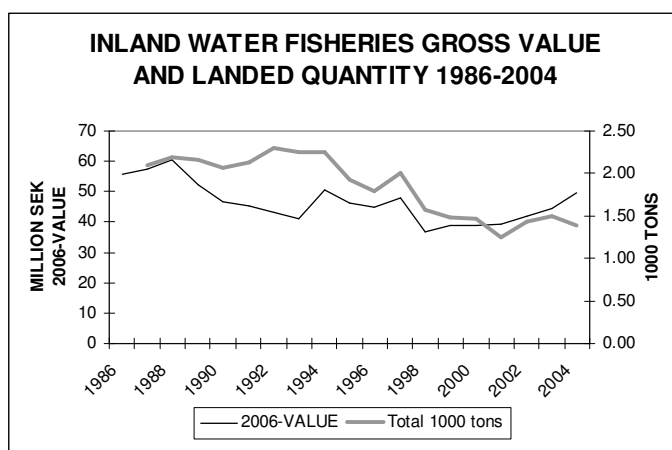


Figure 5: Value and quantity from inland water fisheries 1986-2004.
Source: Statistics Sweden and Fiskeriverket.

The catches have been relatively stable with a total of 2 thousand tons per year before 1994. After 1994 the figure shows an overall negative trend in the inland catches. Figure 6 shows the value of the catch by species.

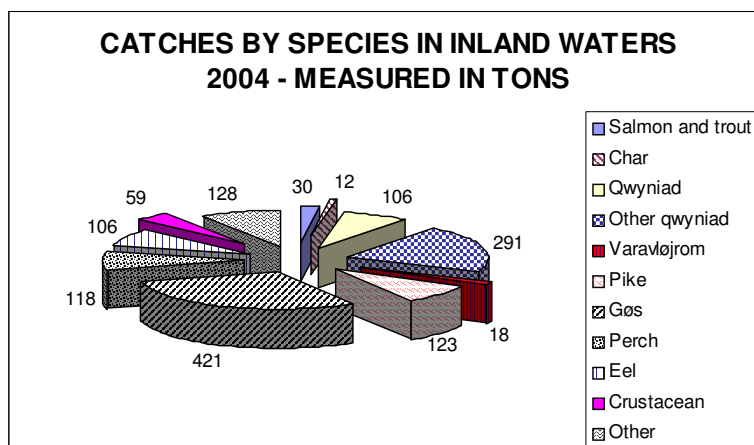


Figure 6: Catches by species in inland waters 2004.
Source: Statistics Sweden and Fiskeriverket.

The total gross value of the inland water fisheries amounts to about 50 million SEK (2006-value) for the last registered year, and the value has been relatively stable after 1994 – despite the reduction in total landed quantity.

Figure 7 shows the aquaculture production of food fish, lobster and mollusks in Sweden for the period 1986-2003.

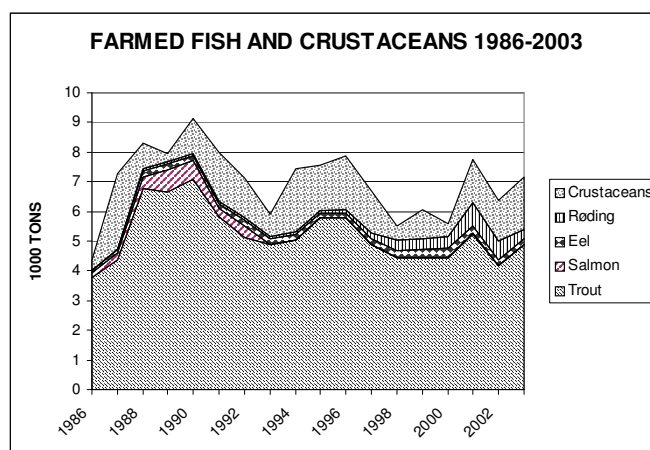


Figure 7: Farmed fish and crustaceans 1986-2003.
Source: Statistics Sweden and Fiskeriverket.

The aquaculture production is dominated by the farming of trout. The production is stable at about 5 thousand tons per year. The farming of Atlantic salmon is marginal – about a ton or so per year. The farming of char has increased after 1995. The farming of eel and shellfish is also stable at, respectively 0.4 and 1.5 thousand tons per year.

4 External trade

Figure 8 shows the export and import for different commodities of fish and crustaceans measured in 1000 tons for the period 1995-2004.

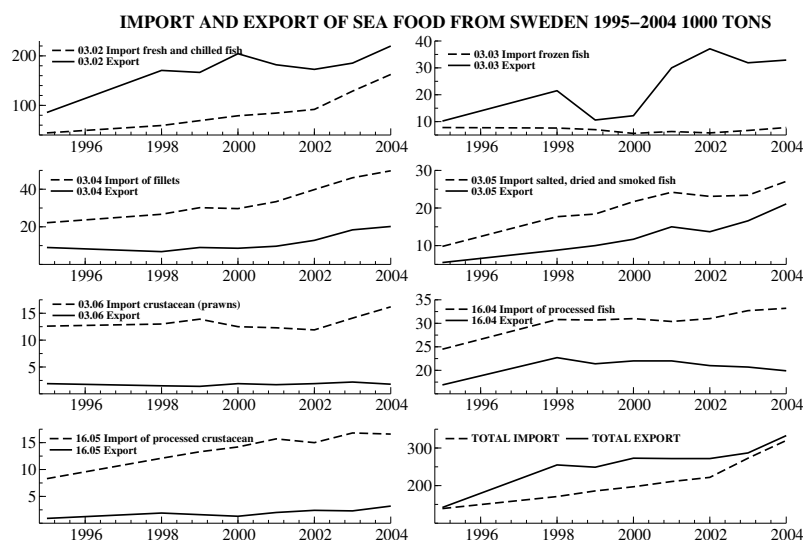


Figure 8: Export of fish and crustaceans from Sweden 1995-2004.
Source: Statistics Sweden and Fiskeriverket.

Figure 8 shows that Sweden has a net surplus in the external trade if we measure trade in quantity. All export and import curves are characterized by a positive trend, except for export of processed fish, HS-categorie 16.04 (HS-Harmonized System). The upper left curves show import and export of fresh, chilled fish (HS-03.02). A closer look at the curves reveals that Sweden exports and imports a great amount of Atlantic salmon. Salmon represented about 47% (103 thousand tons) of the total exported quantity in the 03.02-categorie in 2004, and the share has increased over time. The import of salmon (HS-03.02) amounted to about 113 thousand tons in 2004. However, we must not disregard that a certain share of the export is so-called

re-export. The second largest export item in this HS-group is herring (46 thousand tons in 2004). If we look at the relationship between total export and total import, the gap is evidently reduced after 2000.

The most important export markets (according to export value) for Sweden is respectively France (about 1 billion SEK, and the most important product is fresh, chilled salmon), Italy (about 1 billion SEK and the most important products are fillets, salted and dried fish), Denmark (about 0.8 billion SEK, and the most important products are fresh, chilled salmon and herring) and Germany (about 0.6 billion SEK, and the most important products are fresh chilled salmon and herring). The total export value of seafood was about 7 billion SEK in 2004. Figure 9 shows the import and export value of sea food from Sweden for the period 1995-2004.

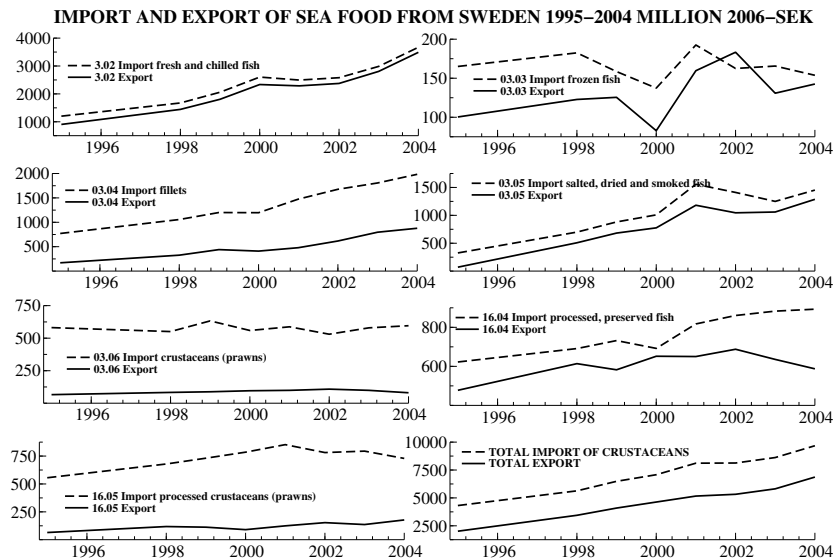
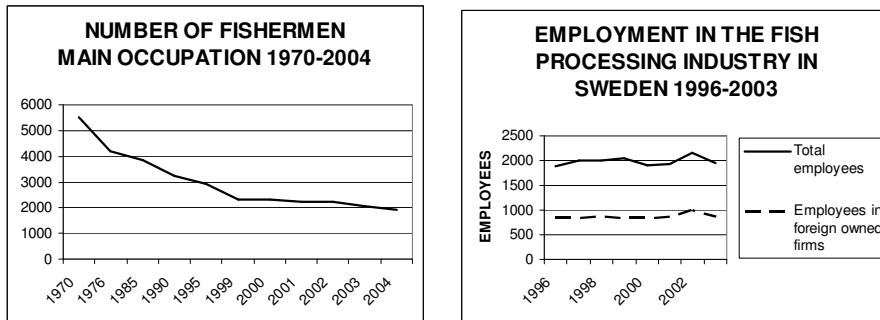


Figure 9: Import and export of seafood from Sweden 1995-2004.
Source: Statistics Sweden and Fiskeriverket.

Figure 9 shows that Sweden is a net importer of seafood for each and all HS-categories. The total import of seafood amounted to over 9 billion SEK in 2004. Note that the landings of fish abroad by Swedish fishing vessels are not included in the external trade statistics. The external trade deficit was almost at a constant level (actually it increases slightly) for the period 1995-2004, amounting to 2.8 billion SEK (2006-value) per year. Sweden's most important suppliers of seafood are; Norway (about 5.4 billion SEK in 2002) and the most important fish-categories are; fresh, chilled salmon with

fillets on the second place³, Denmark (about 1.2 billion SEK in 2002, and the most important commodities are processed and unprocessed cold water prawns and fillets. The third largest supplier is the Netherlands (0.2 billion SEK in 2002 and the most important commodity is fillets).

Figures 10 and 11 show how the number of fishermen (main occupation) and number of employees in the fish processing industry have developed over time.



Figures 10 and 11: Number of fishermen and employees in the fish processing industry in Sweden. Source: Statistics Sweden and Fiskeriverket.

The number of fishermen is reduced. Today Sweden has less than 2000 fishermen, and the reduction is a result of a more stringent quota policy, rationalization and restructuring of the fisheries. The number of employees on the other hand has been almost constant (about 2000) during the period 1996-2003. The figure also shows the employment in foreign owned fish processing plants in Sweden. In Norway about 10 000 are employed in the fish processing industry and about 12 000 work as fishermen (main occupation).

5 Consumption of fish in Sweden

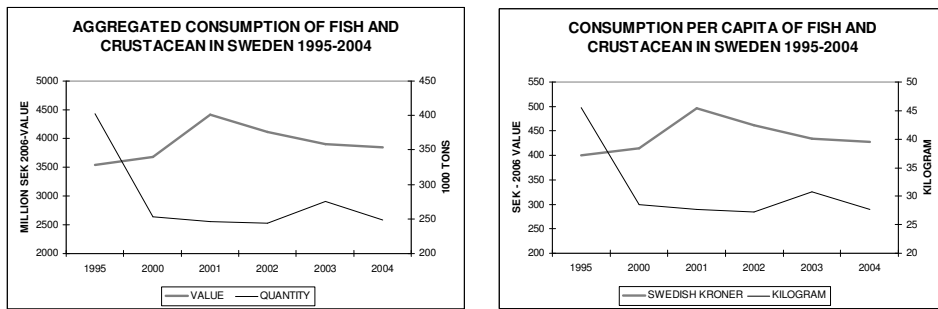
The import and export statistics show that Sweden exports a lot of fish and crustaceans products. Measured in quantity, Sweden exports more than it imports. The export of herring is larger than the import. But measured in value, statistics show clearly that Sweden is a net importer of fish and crustaceans. The aggregated consumption (C_t) of seafood in Sweden for year t can be expressed as the sum of landings (in Sweden) by the Swedish fleet (F_t), catches of fish in the inland waters (W_t), supply of fish by the

³Notice that the Statistics Norway reports that Norway exported fish and fish products to Sweden for about 1.5 billion Norwegian kroner (nominal) in 2002 (equal 1.8 billion SEK). The difference between 5.4 and 1.8 billion, i.e. 3.6 billion SEK measures probably the value of the transited Norwegian fish.

aquaculture industry (A_t), import of fish (I_t), minus export of seafood (E_t), i.e.

$$C_t = F_t + W_t + A_t + I_t - E_t$$

By applying the presented fisheries statistics, it is possible to get a rough measure of the aggregated consumption of seafood in Sweden. Figures 12 and 13 show the aggregated consumption of fish and crustaceans in Sweden for the period 1995-2004. The period 1996-1999 is extrapolated because of lack of data. By applying figures for the total population in Sweden, consumption per capita is also calculated.



Figures 12 and 13: Estimated consumption of fish and crustaceans in Sweden 1995-2004. Source: Calculations based on figures from Statistics Sweden.

Figures 12 and 13 show that the quantity level of consumption is reduced during the period 1995-2000, and thereafter flattens. The value of the aggregated consumption shows an increase for the period 1995-2001. After 2001 the aggregated value decreases. In 2004 the aggregated consumption of fish amounts to about 4 billion SEK (2006-value), and the quantity is about 250 thousand tons. The figure shows that the per capita consumption maps the same traits as the aggregated consumption in levels. The average per capita consumption of fish amounts to about 430 Swedish kroner per citizen per year and the quantity consumed is about 27 kilograms per year, or about 0.5 kilogram per week per person. Consumer analysis shows that in 1999 an average Swede consumed about 5.7 kilograms fresh, chilled fish, 2 kilograms frozen fish and 7.1 kilograms conserved and processed fish – a total of 14.8 kilograms per year. The same year the average consumption of meat was about 72 kilograms per capita (Source: Fiskeriverket 2002, p. 15-21). The calculations indicate that there is no growth in the aggregated consumption of seafood in the Swedish market. Indicators show that the Swedish processing industry is increasing their export of seafood. The main driving force in the Swedish market is the import of raw materials (commodities) which the industry in turn processes and exports. The Swedish home market for

seafood does not seem to be expanding at the moment. If the per capita consumption of fish is constant, then the increase in aggregated consumption is equal the growth rate of the population in Sweden. Estimation based on yearly data for the period 1995-2005, shows that the population grows at a rate of about 0,3% per year. The calculated numbers do not take into account the supply of fish from recreational fisheries and the fact that landed fish is measured in round weight. The last point contributes to an overestimation of the consumed quantity.

A closer look at the data for the fisheries indicates that the landings of fish for human consumption are falling or stabilized. Also the supply from the aquaculture industry and the inland water fisheries is falling, by respectively -0,4 and -3,3% per year. Descriptive statistics show that import to and export from Sweden are increasing (import 7,4% and export 9,4% per year). The implication of growth in export and aggregated consumption and stagnation in the domestic supply of fish is that import of seafood to Sweden will probably increase in the future.

5.1 Marketing of Norwegian seafood

The market organization Norwegian Seafood Export Council markets Norwegian seafood and crustaceans in different countries world wide. The market investments are financed by a lump sum tax per company of 15 000 Norwegian kroner and export fee on seafood between 0,6-1.05% dependent on product. The main objective of the promotion is to increase the demand for Norwegian seafood. In other words, the market investments are supposed to induce a positive shift in the demand for fish and strengthen the market position for Norwegian seafood. In 2003 Norwegian Seafood Export Council invested a total of about 150 million Norwegian kroner in marketing. The profile of the marketing is generic, i.e. the promotion is general and does not represent a financial support for particular companies. During 2003 Norwegian Seafood Export Council invested about 7 million Norwegian kroner in marketing of fish in Sweden. According to the market report (Norwegian Seafood Export Council 2003: "Market plan for 2003-2005 Norwegian Salmon and Trout", revised edition, May 2003), Norwegian salmon has a generally high status among consumers and according to Norwegian Seafood Export Council, there is also a potential for increasing the consumption. It is also mentioned in the report that Norwegian salmon competes with white meat (op.cit. p.16). The report does not mention anything about the market for smoked salmon or how intense the competition is between suppliers of seafood in Sweden.

5.2 The market for smoked salmon in Sweden

Even though the aggregated consumption of fish and crustaceans is stagnating, there are individual differences at commodity level. Figure 14 shows production, consumption (value and quantity) and import of Norwegian and Danish smoked salmon in Sweden for the period 1976-2004.

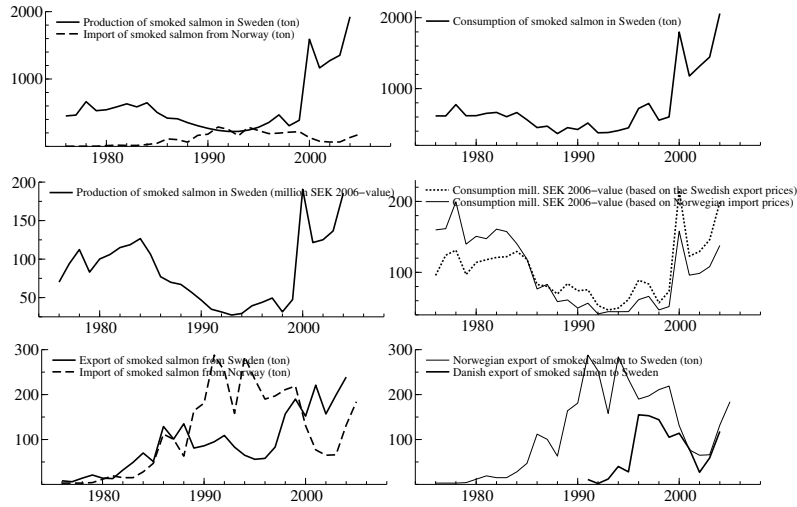


Figure 14: Production, consumption and import and export of smoked salmon to and from Sweden 1976-2004. Source: Statistics Sweden, Fiskeriverket and estimation.

The consumption of smoked salmon is estimated by applying the equation presented above. Note however that Statistics Sweden presents no official data for the period 1988-1997. The missing data are extrapolated by using state space modeling with Kalman filter (Harvey 1989).⁴

There exist no official statistics for the production value of smoked salmon in Sweden. The value is estimated by multiplying the production level by the export and, alternately, the import price of smoked salmon. The price of imported Norwegian salmon and the price of exported smoked salmon from Sweden are applied as shadow prices. (Note: Nominal Norwegian export prices are first multiplied by the average yearly Swedish exchange rate and thereafter adjusted for inflation by applying the Swedish consumer price index.)

⁴The production for 1988-1997 was estimated by using an univariate model: $y_t = \mu_t + \epsilon_t$ where the trend component is stochastic $\mu_t = \mu_{t-1} + \beta_{t-1} + \eta_t$, and slope is $\beta_t = \beta_{t-1} + \zeta_t$ and ϵ_t and ζ_t are respectively $NID(0, \sigma_\epsilon^2)$ and $NID(0, \sigma_\zeta^2)$.

Figure 14 shows that the production level is reduced during the period 1984-1994 for then to increase significantly. The profile of the calculated total consumption (measured in tons) is similar to the production profile. Note also that the production is recovered immediately after Sweden became an EU member in 1995.⁵ During the period before Sweden joined the EU, there was free trade on smoked salmon. After Sweden became an EU-member, the trade condition changed. Third countries like Norway were imposed a 13% ad valorem import duty on smoked salmon exported to Sweden – which is the barrier exporters from third countries are confronted with when they export their products to EU. The illustration in the upper left corner of figure 14 also includes imported quantity of smoked salmon from Norway. A visual inspection of the curve shows a recession of the Norwegian export after Sweden became a member of EU in 1995. Figure 14 also shows that Swedish consumption and production of smoked salmon increased significantly after 1995. The increase in the late 1990 looks like a structural shift.

The exchange rate between Swedish and Norwegian kroner has also change over time. Figure 15 shows how the exchange rate developed during the period 1976-2005.

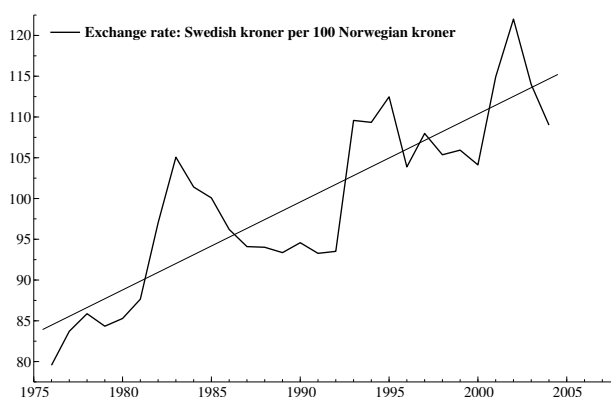


Figure 15: Exchange rate (nominal) between Swedish kroner and 100 Norwegian kroner. Source: Norges Bank.

Figure 15 shows that the Swedish krone has depreciated with an element of medium term oscillations vis a vis the Norwegian krone. The regression line in the figure illustrates the overall trend. The depreciation of the Swedish

⁵Lorentzen 2007 analyses whether there exists any statistical indication that the Swedish EU membership has had any influence on the Norwegian export of smoked salmon to Sweden.

kroner makes products from Norway relatively more expensive for the consumers in Sweden. The depreciation has both a negative income effect and it induces also a negative substitution effect, i.e. cheaper goods are substituted for more expensive Norwegian commodities, given all other things equal (*ceteris paribus*).

It is interesting to observe that Swedish export of smoked salmon has increased after joining EU in 1995. The export of smoked salmon and fillets has especially increased to Italy, Germany, Austria, Spain and Finland – all EU countries. Figure 16 shows the export of smoked salmon from Sweden to selected countries for the period 1995-2006. (Numbers for 2006 cover the period January to September).

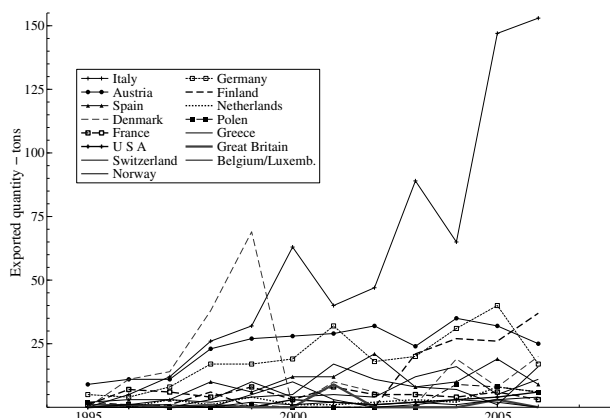


Figure 16: Export from Sweden of smoked salmon by country 1995-2006.
Source: Eurostat and Norwegian Seafood Export Council.

For the Swedish fish processing industry the EU membership has contributed to an elimination of the import duty on smoked salmon. From 1995 the Swedish industry has had free access to an enormous EU market. On the other hand, we must not look blindly to the explanation that EU membership is the “cause prima” for the decline in Norwegian export of smoked salmon. Statistics show that the Danish export to Sweden was also exposed to a recession in the years close to and after 1995. The Danish and Norwegian export to Sweden is shown by the illustration in the lower right corner of figure 14. Notice that the supply from these two countries is quite similar after 1997. If we look at the exchange rate between Norwegian and Swedish currencies, there is a strengthening of the Swedish exchange rate in the period 1995-2000 and weakening of the rate between 2000 and 2002. The changes in

the Norwegian export to Sweden can probably not be explained by changes in the exchange rate.

6 Concluding remarks

Descriptive statistics indicate that the total amount of quantity landed fish by the Swedish fleet has decreased slightly during the last 10-15 years. Especially the high valued species such as cod have been reduced significantly.

The changes in landings are more profound if we look at changes in the landed value over the last 20 years. The aggregated landed real value is reduced by about 500 million SEK (2006-value) during a period of 15-20 years. The landings abroad (first and foremost in Denmark) by the Swedish fleet have also decreased during the last 10 years. It is to be expected that changes in catches will affect the fishermen's income and the activity in the fish processing industry. The reduction in landings will probably also affect the import of fish. Figures show a significant reduction in the number of full time fishermen, but the number of employees in the fish processing industry has not changed over the period we are looking at. To some extent the reduction in quantity is compensated by a positive price effect, and the negative relationship between price and quantity will also contribute to a reduction in the variation in gross income.

The supply of fish and crustaceans from the aquaculture sector shows a relatively stable level of about 70 thousand tons per year. The supply of fish and crustaceans from the traditional inland waters fisheries shows a decreasing trend. The total catch amounts to about 1.4 thousand tons in 2004. We can therefore conclude that the aggregated supply of fish and crustaceans from the natural resources which Sweden controls is decreasing. In that respect the Swedish market is becoming more dependent on the international market for seafood, given that they will sustain or even increase their future consumption.

Calculations show that the aggregated level of consumption of seafood in Sweden is about 4 billion SEK (2006-value) per year. The aggregated consumption has nearly stagnated during the last years and the growth of the aggregated consumption of fish is equal to the growth rate of the population, i.e. a growth rate about 0,3% per year. The analysis of the Swedish market for smoked salmon shows that the calculated Swedish production has increased significantly after 1995 – when Sweden became a member of the European Union (EU). Consumption of smoked salmon has increased and most of the increase in consumption is covered by increased supply from the home industry. The stagnation of export of smoked salmon from Norway

to Sweden can probably not be explained solely by an increase in the trade barriers (13% ad valorem import duty), because the Danish export suffered partly from the same stagnation during the period 1996-2002.

Figures indicate that the aggregated consumption of fish is not growing at the same rate as the aggregated consumption in the Swedish economy. On the other hand, figures show that the consumption of smoked salmon has increased after 1995. Most of the increase in consumption is probably covered by companies located in Sweden. It looks like Norwegian exporters of smoked salmon are meeting tough competition from the home producers. The home producers have obviously, by artificial means, become relatively stronger because they can hide themselves behind an import duty. The Norwegian industry has to look forward. With a growing population and increase in income combined with a reduction in landings, it is a growth potential for Norwegian seafood in Sweden. It is therefore important that Norwegian Seafood Export Council allocates resources for investment in marketing in Sweden to stimulate the demand and, among other things, compensates for the increase in trade barriers.

This paper describes some selected segments of the Swedish seafood market, and it represents a good starting point for more detailed analyses of consumer trends, regulations, competition and market structure, firm strategies and market performance in the fishery sector.

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