

# The Salmon-Agreement between Norway and EU – A Welfare Economic Analysis

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## Abstract

In 1996 the 1 billion US dollar Norwegian salmon industry was accused for dumping and for having received subsidies in the infant phase of the industry build-up. The accusations were initiated by the Scottish and Irish salmon industry, which regard the Norwegian suppliers as aggressive competitors in their home market. The EU-Commission verified the accusations. Firstly EU wanted to use an anti-dumping duty to compensate for the negative effects from damaging dumping and subsidising. Even though diplomacy prevented this devastating outcome, another solution was worked out. June 1997 Norway and EU signed a five-year agreement, and the intention was to stabilise the salmon market.

The agreement contains the following six means; increased export tax on Norwegian salmon, tentative limits on export volume from Norway to EU, minimum import price on Norwegian salmon, surveillance mechanism, trilateral co-operation between the industry in Norway, Scotland and Ireland and a consultation procedure.

This paper focuses on the following questions: what welfare effects does the agreement have on the salmon industry in EU and Norway, and what is the effect of the agreement on the consumers? Who will win and who will lose? To answer these questions we apply a partial equilibrium analysis.

*Key words:* Trade dispute, salmon, anti-dumping measures, trade barriers, welfare effects.

## 1. Introduction

The Norwegian salmon aquaculture industry employs 3600 persons directly. Indirectly it employs between four and five thousand persons. The industry is thus important for the economic activity along the coast, and it is a typical export oriented industry. It means that the value of the fish is first realized when it's sold abroad. 90% of the production is exported. EU is the most important market, and during the last years between 70 and 80% of the export value is realised in this market. The export value of different kinds of salmon products was about 850 million US dollars in 1996. In 1998 the export value was 1.1 billion dollars, and in 2001 the export value was reduced to 723 million US dollars. The numbers show partly how dependent the industry is on the EU-market, and partly how vulnerable it is for changes in trade conditions.

During 1996 – 97 the night's sleep for many of the investors and employees in the Norwegian salmon industry were radically disturbed. After having provoked the Scottish and Irish salmon industry during the 80-90ties, EU threatened to induce an anti-dumping duty as a reaction on verified dumping and subsidies. But energetic diplomacy and negotiations prevented an anti-dumping duty. But even though diplomacy prevented anti-dumping duty, the Norwegian government had to sign a five-year "salmon-agreement" with EU in 1997. The agreement expired in the first part of 2002, but was extended to March 2003. Anyway it is time to look back and analyse some of the effects generated from the agreement.

This paper focuses on the following questions: what welfare effects does the agreement have on the salmon industry in EU and Norway, and what effect does it have on the consumers in EU? Who will win and who will lose on the agreement? To answer these questions we apply a partial equilibrium analysis. The structure of the paper is as follows: the first part describes shortly the background of the trade dispute. The second part analyses theoretically how the agreement can affect efficiency and distribution. The third part is empirical and estimates the welfare effects. Appendix gives an account on data and what method is applied to analyse the welfare effects induced from the agreement.

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## 2. The Agreement

After the technical problems in the salmon aquaculture industry were solved in the late 70-ties, the production and export has increased exponentially, and not surprisingly has temporary sales problems and price falls showed up. The expansion and the productivity in the Norwegian salmon industry has on the one side been a pleasure for the consumers, but on the other side it has been a threat to the profitability and expected development in the Scottish and Irish salmon industry. Here we seem to find the main cause to the trade dispute between EU and Norway.

July 1996 the professional and industrial bodies in the Scottish and Irish salmon industry accused the Norwegian salmon aquaculture industry for the EU-Commission. The Norwegian industry has not had an easy time before 1996 either – and it is to believe that the accusations which was delivered in 1996 was just a result of a process which started many years before. But I will here let history be history. The accusers argued that the Norwegian industry was subsidized in the build-up phase, and for having dumped salmon in the EU-market. After intensive investigations the EU-Commission verified the accusations. Firstly EU wanted to use a 14% anti-dumping duty to compensate for the negative effects from damaging dumping and subsidizing. Luckily for the Norwegians, diplomacy prevented this devastating outcome.

The agreement involves first of all the following four product groups, respectively fresh and frozen Atlantic salmon gutted with head on, and fresh and frozen fillets of salmon. The agreement contains the following six means (Norwegian Ministry of Fisheries 1997):

- Increased export tax on Norwegian salmon,
- Tentative limits on export volume from Norway to EU,
- Minimum import price on Norwegian salmon,
- Surveillance mechanism,
- Trilateral co-operation between the industry in Norway, Scotland and Ireland
- Consultation procedure

In the following we will discuss qualitatively what economic effects respectively export tax and minimum import price can induce. Afterwards we discuss how threats and anticipation of trade sanctions can influence the market equilibrium.

### 2.1 Export tax

As a part of the agreement between Norway and EU all export of salmon is taxed by an amount of duty of 3%. Actually it was increased from 0.75 to 3%. During the agreement period from 1997 to 2001 the yearly average ad valorem export tax sum up to about 25 million US dollars. If we disregard a situation where the demand is infinite elastic or competitive suppliers have an infinite elastic supply, the export duty contributes to an increase in the price level on salmon in the EU-market, and the volume consumed decreases (Salvanes & Steen 1995). The tax increase will have a negative welfare effect on the consumers in the form of loss in consumer surplus. The effects from an export tax are equivalent to tax on import. As a consequence of tax incidence the duty collectors in Norway confiscate part of the consumer surplus, and part of the loss in consumer surplus is increased profits realised by the EU-producers and other suppliers of Atlantic salmon. Depending on the relative values on the supply and demand elasticities, we also expect that a part of the tax will be levied on the Norwegian suppliers. The export tax forces the consumers prices up, and the export volume is reduced. Actually, relatively more of the salmon production will be allocated to alternative markets, included the home market for the industry. If more salmon is allocated to the home market, we expect that the price will fall. The home industry, which processes salmon, will experience that the competitiveness is increased vis-à-vis food industry producing substitutes. While the export-duty weaken the competitiveness by about 3%, and reduces the producers surplus in the Norwegian salmon industry, the instrument is favourable for producers in and outside EU, included all food industry which produces substitutes for salmon. But even though it is the Norwegian salmon industry which is taxed, it is positive that the income from the tax is decided, actually as a part of the agreement, to be used in generic marketing of salmon in EU. Successful marketing contribute positively to increase demand and prices. This is favourable for the industry – also for competitors in EU.

## 2.2 Minimum import price on salmon from Norway

The use of minimum import price on salmon from Norway is probably the most important instruments in the agreement. According to the agreement no exporter can sell Atlantic salmon to EU without the CIF-price being equal to or higher than the decided minimum price. During the agreement period the minimum price has been constant on 3.25 ECU per kg for fresh and frozen salmon, and 4.50 ECU per kg for fillets of Atlantic salmon. But what economic implications do the minimum price have? The effect is dependent on what level the minimum price is decided fixed on compared to the price formation in an economy organized without this instrument. If the minimum price is fixed on a level lower than the price formation under free trade, then we can disregard any economic effects on efficiency and distribution. During the first years of the agreement none of the producers did complain, and this reaction seems to indicate that the producers interpreted that the minimum price stopped the price fall, and a year after entering the contract the demand and price for salmon increased. The minimum price was for a long period not a binding restriction in the market, i.e. the actual price was higher than the minimum price.

Problems in connection to minimum price are expected to show up when the price is fixed on a level higher than the expected price formation under free trade. In such a situation, where the demand is lower than the supply, the exporters will compete to be the first to sell. And when exporters experience sales problems, they have incentives to evade the minimum price. This was the situation for the Norwegian suppliers from the middle of 2001 and probably to this day. In this situation the access to the market is threatened, and it should not surprise anyone that the industry's opinion on the agreement turned 180 degrees. The actors in the Norwegian industry have many times put pressure on the government and EU-Commission to adjust the minimum import price to a lower level. The problem is that the higher the minimum price, and the easier the suppliers in competing countries can increase their production, the higher is the risk that the suppliers from Norway are hindered to utilize their competitiveness, and the inevitable consequence is loss of market shares. When the minimum price is fixed on a higher level than the free trade level, consumers are inflicted a loss in consumer surplus. Part of this loss is realised as higher income to suppliers of salmon not regulated by the agreement, mainly producers from Chile, the Faroe Island and producers located in EU.

Further we expect that the EU-economy is inflicted a loss of efficiency, partly because inefficient producers got the opportunity to expand when Norwegian, probably more efficient, suppliers are squeezed out of the market, and partly because marginal consumers gave up consumption of salmon because of artificial increase in the price.

A possible positive effect of the minimum price-rule is that it can function as a collective price-claim from the Norwegian suppliers. If there exists a hard competitive climate between Norwegian suppliers in the export-market, the minimum price-rule can prevent that Norwegian suppliers squeeze the profit out of the market. On the other hand the minimum price-rule is special favourable for Norwegian suppliers if the structure of the demand side is concentrated, and has traits familiar to oligopsony. The minimum price-rule secures that the exporters get a certain share of the cake. The problem with the minimum price-rule is that the higher it is fixed compared to the free market price, the more difficult it is for Norwegian suppliers to take advantage of their competitiveness. It will be easier for competing countries to increase their production, and Norwegian suppliers loose market share and income.

## 3. Threats and voluntary export restraints

Experiences from international trade conflicts or disputes show that threats of using anti dumping means, or other forms of sanctions which regulate the import, have increased the extent of so called "voluntary export restraint", abbreviated to VER (Laird & Yeats 1990, Prusa 1992, Staiger & Valak 1994). It seems to be a connection between threats from EU in implementing sanctions against Norwegian salmon industry, and how the Norwegian government has intervened in the market and governed the industry. The government has or had applied the following means; use of feed-quotas, periods with stop in feeding, density-rules on maximum biomass per cube and stop in the supply of new licenses or concessions. The instruments, which are mention above, function as self imposed export restraints. In most cases these instruments are involuntary, because they are activated as a reaction to threats from EU that they will implement severe import barriers. In this context it can be referred to situations where EU threaten to impose anti-dumping duty on salmon imported from Norwegian – presumably with reference to safeguards and anti-dumping in the WTO vocabulary. According to the agreement Norway's export volume to EU should not be increased by more than 10% a year during the

agreement period. The base year was 1997. Calculations show that this restriction was never a binding restriction during the period, probably because of VER and growth in alternative markets.

**3.1 Economic effects of “voluntary” export restraints**

The self-imposed regulations will first of all lead to lower export to EU compared to the free trade situation. The export restraints result in lower supply, and the price on the commodity is expected to increase. Increased market price and lower volume inflict a negative welfare effect on the consumers in EU in the form of a lower consumer surplus, and it also affects the allocation of resources. Even though there are differences, the effects from VER are similar to effects induced by export quotas and tariffs. To be more specific, the welfare effects can be split into the following two components: On the one hand we find a component, which represents a transfer of consumer surplus to the suppliers of salmon in EU and Norway. On the other hand we find a component, which represents an efficiency loss, which partly is due to the fact that protected, less effective producers get the opportunity to increase their production in expense of the more efficient suppliers in the exporting country. There is also an efficiency loss, which is due to fact that marginal consumers substitute from salmon to other products. If we assume that the aggregated supply of Norwegian salmon can influence the price level, we expect that the economic rents from “voluntary” export restraints can potentially, and partially be expropriated by the exporters. I use the notion ‘potentially’ because the market structure in the value chain will determine who realises the economic rents generated from the restraints. An interesting point is that EU could have expropriated the economic rent more certainly if they applied administrative import quota or anti-dumping duty.

During the last 15 years the concession policy in Norway has been very restrictive. It is to believe that the content in the regulation policy towards the salmon industry reflects the market and negotiation situation vis-à-vis EU. The problem for the Norwegian government is that they can only regulate the market via total production in Norway. Because of that, the policy represents only as limited or partial, local control and not global control of the market. Chile, the Faroe Island, Canada and USA have during the agreement period established oneself in business. The competition is expected to increase, and the more actors establish themselves in the EU market, the more powerlessness will the Norwegian industry and government experience when they try to apply means to control the price formation.

**4. Assessment of the welfare effects**

But if we want to assess the economic welfare effects of the agreement and export restraints in monetary terms, how big are they? In the following we will try to measure in monetary terms the answers to the questions we asked in the beginning of the paper: What welfare effects does the agreement have on the salmon industry in EU and Norway, and what is the effect of the agreement on the consumers in EU? Who will win and who will loose on the agreement?

The welfare economic effects, which can be induced from different trade restrictions, are, as mentioned before, divided respectively into a distributional and efficiency effects. The first effect have to do with the fact that regulations and trade restrictions lead to a redistribution of income between one group to another, while the other mentioned effect has to do with how the regulations affect the allocation of resources in the economy. And to assess or measure the efficiency and distributional effects we estimate the changes in consumer and producer surplus in monetary terms. The table below summarizes the welfare effects from the agreement during the period 1997 to 2001.

**Table 1: Welfare effects in million US-dollars**

	1997	1998	1999	2000	2001
$PS_{Ni}$ : Producers surplus for the Norwegian suppliers	41	93	97	228	64
$PS_{EU}$ : Producers surplus for other suppliers in EU	24-28	43-59	52-70	63-160	39-51
$CS_{EU}$ : Loss in consumers surplus	70-76	157-176	173-194	416-530	117-130

in EU					
$W_i$ : Efficiency loss in production and consumption	0.7-3	3-15	3-15	17-83	2-9

The assessment shows that the agreement has been positive for the Norwegian salmon industry in the period from 1997 to 2000. The agreement gave the farmers and exporters a surplus about 42 million US dollars in 1997, about 93 million US dollars in 1998, 97 million in 1999, while the producer surplus was about 228 million in 2000, and 64 million US dollars in 2001. Half of the profit can probably be ascribed to the fixed or minimum import price provision. The remaining half of the effects can be ascribed to many factors, e.g. self-imposed production and export restraints and positive shifts in demand for salmon (“windfall profits”). According to the estimation for 2000, the minimum import price amount to about 20% of the producer surplus. The estimated surplus in 2001 is based on actual export to EU. We should nevertheless be aware that during the last part of 2001 the price for Atlantic salmon in EU fell under the minimum import price, so the Norwegian suppliers temporarily was squeezed out of the market, and accumulated an ‘overproduction’ equal about 30 000 ton which they had to sell in alternative markets. Actually when the market price came under the minimum price, then the minimum price functioned as a barrier to entry, and the Norwegian suppliers were effectively kept out of the market.

Behind a façade of trade restrictions EU-producers and suppliers from other countries enjoy the benefits. The annual gain suppliers in EU realised, amount to about half of what the Norwegian actors have realised. This is due to the fact that the sum of the internal production in EU and the supply of Atlantic salmon from others are lower than the supply from Norway. The table shows that the average, yearly producer surplus realized by the suppliers in EU is 44 to 74 million US dollars depending on the value of the supply elasticity. It is first of all the consumers in EU who are the losers, partly because of the salmon agreement, and partly because of the rigid restrictions on the Norwegian production. Estimations show that the agreement inflicts a loss in consumer surplus in shape of increased expenses and lower consumption, which amounts to about 70 million US dollars in 1997, over 150 million in 1998, about 190 million in 1999, and about 450 million in 2000. It should be mentioned that the extremely high losses in 2000 are due to positive shifts in demand. The loss in consumer surplus was estimated to about 110 to 130 million US dollars 2001.

The table also shows the extent of efficiency loss induced by the agreement on the EU economy. The measures are small or marginal compared to the distributional effects. The measures are sensitive to values on the elasticities and on market value. Further, to control that the Norwegian actors follows the agreement, they have to prove or document export prices and volumes to the EU-Commission. This work is resource consuming, may be a non-productive activity and it is estimated to about 20 man-labour years for the whole industry. We estimate these costs to 0.6 to 0.7 million US dollar a year, but they are not incorporated in the table.

## 5. Conclusions

In this article we sketched some of the economic effects induced from the most important means in the agreement, and we got an insight in how the threats from EU have influenced the regulation of the industry. In this paper we argue that the agreement and the Norwegian internal regulations of the industry can be seen in coherence. From the discussions we can conclude that the agreement has: (1) inflicted a welfare loss to the consumers and (2) given a welfare gain to respectively the producers in EU and suppliers from other countries, e.g. Chile and the Faroe Islands. (3) We expect that the effects on the Norwegian salmon industry are ambiguous. Although, in the short run we expect that the agreement has generated positive gains, especially if the alternative was a collapse in the market. More generally it is also to expect that the effects have been positive for the suppliers if the market price is sensitive to changes in quantity, and given that competing countries did not expand too quickly. That indicates that the gain realized by the Norwegian industry is probably a short-lived one. The development path during the last one and a half-year indicates that.

The problem for the Norwegian industry is that the agreement has made the feasible set of actions for the industry much smaller or narrower, and that is after all the intention with the agreement. The Norwegian industry has fewer opportunities to react or respond when things happen in the market – especially with regard to a market in recession. The competitors can on the other hand expand freely, and determine prices according to how the market is functioning. This flexibility to adjust does not the Norwegian industry have because they are

tide-up to the agreement. The minimum price seems too paralyse the industry when competing countries expand and/or when the actual market price is below the minimum import price.

The agreement and the voluntary production restrains (VER) have resulted in a considerably redistribution of income from consumers in EU to the aquaculture industry in mainly EU and Norway. It is the consumers who first of all pay the prize for the regulations. An interesting conclusion we can draw from the analysis is that the net effect of the agreement is negative for EU. The positive gains realized by the EU-producers are too small to compensate for the loss in efficiency and consumer surplus.

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## Appendix: Specification of the assessment method

Change in economic welfare ( $\Delta W$ ) can be expressed as the sum of changes in producer and consumer surplus, i.e.

$$\Delta W = \Delta PS + \Delta CS$$

The producer surplus realized by the Norwegian salmon industry in year  $t=1997, \dots, 2001$  is calculated in the following way:

$$PS_{Nt} = (p_t - C_{Nt})Q_{Nt}$$

Where:

$p_t$ : Unit import price (CIF) on fresh and frozen Norwegian Atlantic salmon gutted with head on for year  $t = 1997, \dots, 2001$ . Fresh and frozen fillets are converted to gutted, fresh and frozen salmon. The values on the converted fillets are found by multiplying the converted volume with respectively fresh and frozen unit price on gutted, fresh and frozen salmon with head. The estimated volume is based on data published by the Norwegian Seafood Export Council.

$Q_{Nt}$ : Import volume of Norwegian gutted fresh and frozen Atlantic salmon to EU-market year  $t = 1997, \dots, 2001$ . Exported fresh and frozen fillets are converted. The estimated volume is based on data published by the Norwegian Seafood Export Council.

$C_{Nt}$ : The average cost in supplying Norwegian salmon to EU-market year  $t$ . The cost measure embraces respectively production/operational costs, capital costs, packing costs, transport and trading costs to the EU-border. The data is published by the Directorate Fisheries in Norway, except from the trading and transport costs, which are based on information from the transport industry. Note also that the export tax on 3% is incorporated in the cost-measure. At the risk of overestimated the producer surplus, we incorporated it in the cost measure, and it should not be interpreted as if the aggregated demand is infinite elastic.

I mentioned above that we focus on changes in producer surplus. I assume implicitly that the free trade solution is the alternative equilibrium. The relatively big unused production capacity of salmon in Norway, and the possibility to establish an unknown number of plants with identical production technology, implies that the aggregated supply function is horizontal in the price-quantity plane, and that price is equal average costs in the long run. So the difference or changes in producer surplus between the equilibrium generated from the agreement and the expected free trade equilibrium is  $\Delta PS = PS_{Nt}$ .

The methodology in Bowen, Hollander & Viaene 1998 was applied to estimate producer and consumer surplus for actors in the EU-market. The producer surplus ( $PS_t^O$ ) is estimated with use of the following equation:

$$PS_t^O = \frac{t_t^* V_t}{2(1+t_t^*)} \left[ 2 - \frac{t_t^* \varepsilon_s}{1+t_t^*} \right].$$

Where:

$V_t$ : Sales value for Atlantic salmon year  $t$  from respectively EU-producers, Chile, the Faroe Islands and some marginal suppliers. Unit of measure is 1000 ECU.

$\varepsilon_s$ : Supply elasticity for the above-mentioned suppliers.  $0 \leq \varepsilon_s \leq 5$ . While we assumed that the aggregated supply function for the Norwegian industry mapped a horizontal line in the price-quantity plane, we assume that the aggregated supply from the competing countries are bounded, and it implies a monotonic increasing function in the price-quantity plane.

$t_t^*$ : Implicit tariff rate year  $t$ . In a static competitive framework we presuppose that it is possible to find a tariff rate that reproduce any economic effect from a trade barrier. See for example Vousden 1990, p. 40 or Greenaway & Milner 1993. In this analysis we have tried to transform the elements of trade barriers which are inherent in the agreement to an implicit tariff rate  $t^*$  for each year. The implicit tariff  $t^*$  is estimated in the following way:

$$t_t^* = \frac{p_t - C_{Nt}}{C_{Nt}}.$$

When the minimum import price ( $p_M$ ) is a binding restriction, the implicit tariff is

$$t_t^M = \frac{p_M - C_{Nt}}{C_{Nt}}.$$

The efficiency loss in consumption and production ( $W_t$ ) can be estimated with use of the following expression (Bowen, Hollander & Viaene 1998):

$$W_t = \frac{1}{2} V_{Nt} \eta_N \left[ \frac{t_t^*}{1 + t_t^*} \right]^2.$$

Where:

$V_{Nt} = p_t Q_{Nt}$ : The value of the import to EU from Norway in year  $t=1997, \dots, 2001$ . The estimated values are based on data published by the Norwegian Seafood Export Council. Unit of measure is 1000 ECU.

$\eta_N$ : Demand elasticity (cf. e.g. Bjorndal, Gordon and Salvanes 1992) for salmon from Norway. We assume that  $0.6 \leq |\eta_N| \leq 3$ .

The total loss of consumer surplus ( $CS_t$ ) in EU in year  $t$  is estimated with the use of the following equation

$$CS_t = \frac{t_t^* V_{Dt}}{2(1 + t_t^*)} \left[ 2 + \frac{\eta_D t_t^*}{1 + t_t^*} \right].$$

Where:

$V_{Dt}$ : The total value of consumed Atlantic salmon in EU in year  $t=1997, \dots, 2001$ . The estimated volume is based on data published by the Norwegian Seafood Export Council. Unit of measure is 1000 ECU.

$\eta_D$ : Demand elasticity for Atlantic salmon in EU. We assume that  $\eta_D = \eta_N$ , because the salmon from different countries are very similar, i.e. the products are homogenous.  $0.6 \leq |\eta_D| \leq 3$ .

**Table 2: Values on variables used in the assessment**

Variables	1997	1998	1999	2000	2001
$p_t$	3.33	3.42	3.40	4.00	3.37
$C_{Nt}$	3.15	3.05	3.05	3.03	3.06
$p_M$	3.25	3.25	3.25	3.25	3.25
$Q_{Nt}$	208389	224328	259067	255695	230563
$V_{Nt}$	693935	767202	880828	1022780	776997
$V_t$	451378	491043	632223	713197	621152
$V_{Dt}$	1145050	1257126	1514209	1736519	1400418
$t_t^M$	3.1%	6.15%	6.15%	6.8%	6.2%
$t_t^*$	5.7%	12.1%	11.6%	32.1%	10%
$N.kr/ECU^1$	8.01	8.45	8.31	8.11	8.05
$N.kr/US\ dollar^2$	7.08	7.55	7.80	8.81	8.99

<sup>1</sup> Source: Central Bank of Norway. Average exchange rate based on monthly spot-data.

<sup>2</sup> Source: Central Bank of Norway. Average yearly exchange rate.