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AGRICULTURE VERSUS FISH - NORWAY IN WTO

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Agriculture versus fish – Norway in WTO

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Abstract

The Norwegian agriculture is highly protected and subsidised. The opposite is the case for fisheries and fish farming which suffer from foreign market restrictions. Using a computational general equilibrium model, the gain for Norway of a complete elimination of food subsidies and tariffs is estimated to be in the range of 1.2 - 2.7 per cent of GDP. Most of this gain stems from domestic farm sector liberalisation. The gain from free market access for seafood is estimated to 4.4 per cent of the seafood export value. Consequently, Norway has much to gain from offering other countries market access for agricultural products. In return, Norway should demand free access for their fish products.

Key words: general equilibrium model, cost of agricultural policy, trade liberalisation, food industry, fisheries

JEL classification: C68, Q18

Introduction

Although it is widely accepted that international trade promotes economic growth and development, the current Doha round of the World Trade Organisation (WTO) is on the brink of failure. One main obstacle is the industrial countries' reluctance to liberalise their farm sector. Major food exporting developing countries, which have appeared as a new powerful force in this round of trade negotiations, seem unwilling to compromise on other issues, including NAMA (Non-agricultural market access), TRIPS (Trade related aspects of intellectual property rights) and services, unless their interests are accommodated on agriculture. So, even if these issues are negotiated separately in the WTO, they are in practice interlinked through a system of trade offs. Furthermore, a future formal linkage between agriculture and NAMA is suggested in the Ministerial Text from the meeting in Hong Kong in December 2005 (paragraph 24, WTO 2005).

Norway is one of the countries that oppose such linkages. Fisheries and fish farming, whose export value amounts to 7 per cent of the Norwegian export (exclusive of oil and gas), are hampered by barriers to trade. For these industries, negotiated under NAMA, Norway promotes their offensive interest. At the same time, however, Norway strongly resists a liberalisation of agricultural trade, as a member of the G10[1]. Norwegian farm support is substantial. Total support amounts to 67 per cent of the value of production in agriculture, which places Norway, together with other G10 members like Switzerland, Korea and Iceland, among the biggest spenders in the OECD area (OECD 2004).

[1] The G10 includes Iceland, Israel, Japan, South Korea, Liechtenstein, Mauritius, Norway, Switzerland and Taiwan.

In this paper we explore the diverging trade interests between agriculture and fisheries. Common features of these industries are that they produce food and are major contributors to rural employment. However, while agriculture is uncompetitive in world markets, fisheries and fish farming are profitable industries with an export share of 90 per cent. What are the relative importance of agriculture and fisheries in the Norwegian economy, and what is at stake for the different food sectors in trade talks?

To assess the economy-wide costs for Norway of food trade restrictions, impacts on the different industries and sectors have to be aggregated. Using a computational general equilibrium model, the second aim of the paper is to investigate the scope for domestic overall welfare gains from a complete elimination of food trade restrictions.

Naturally, a rich literature on the costs of food programs already exists. Both partial equilibrium (PE) and general equilibrium (GE) models have been widely employed to study welfare effects of alternative agricultural policies in national economies (see e.g. Norton and Schiefer 1980; McCarl and Spreen 1980; Hertel 2002). Also, welfare effects for different regions, e.g. developing countries, as well as global economic impacts of farm liberalisation have been thoroughly analysed, using multi-region computational equilibrium models (see e.g. Tyers and Anderson 1992, Hertel 1997; Anderson and Martin 2005).

A distinguishing feature of the model used in this analysis is that the whole spectre of food industries (agriculture, fisheries, fish farming and food processing) are modelled in great detail within a general equilibrium setting. This allows us to explore food industry linkages through product and factor markets, and to assess the relative importance of the different parts of the food industry. Also, by incorporating the food sectors in a general equilibrium framework, potential repercussions on the rest of the economy of food policy programs can be identified. As argued by Alson and Hurd (1990) and Gylfason (1995), the deadweight losses connected to the financing of farm programs can be significant.

The Norwegian food industry

As in most industrial countries, Norwegian agriculture accounts for a low, and declining, share of GDP (below 1 per cent) and total employment (3 per cent). Nevertheless, self-sufficiency is maintained in main agricultural products like milk, meat and eggs. 12 per cent of the milk production is even exported at a loss. For climatic reasons some grain is imported, as well as tropical products.

The sector depends heavily on trade restrictions and support due to its climatic and topographic comparative disadvantage. High costs are also due to the structural policy, focusing on small farm units scattered all over the country. Import tariffs are in the range of 171 – 429 per cent. Subsidies account to about NOK 12 billion, or NOK 200,000 per man-year.[2] The total support (NOK 21 billion) is 1.2 per cent of GDP in Norway (2004).

Fisheries and fish farming depend on export. Almost 90 per cent of the production is exported, and the export value amounted in 2004 to 3.5 per cent of the total Norwegian export (7 per cent if oil and gas is excluded). Farmed salmon is the most important product, with over 30 per cent of the seafood export value. Whole pelagic fish, fillet of salmon and salted and dried cod then follow, each with shares below 15 per cent. The European Union is by far the most important market for Norwegian seafood with 60 per cent of the export value. Russia and Japan are next, each with less than 10 per cent of the export value.

Practically no subsidies are paid to the fish industries. On the contrary, these industries suffer from trade barriers. The trade barriers, which vary between products and markets, can be divided into two categories: First, there are ordinary tariffs, which span between 0 per cent and 86 per cent, dependent on product and market, and in some cases subject to tariff escalation. For example, the tariff on whole salmon in the EU is 2 per cent, while it is 13 per

[2] 1 NOK is approximately 0.125 €.

cent for smoked salmon. Tariffs on highly processed fish (prepared meals etc.) are also relatively high in most markets. In general, tariffs are especially high in emerging markets in Asia (generally 20 – 30 per cent). Tariffs are also high in Russia and Japan (generally 3.5 – 15 per cent). Due to a bilateral trade agreement[3], tariffs in the EU market are in general low (0 – 3.9 per cent), with shrimps, whole pelagic fish and smoked salmon as important exemptions (7.6 – 20 per cent).

Second, the fish farm sector is vulnerable to non-tariff barriers. In the EU, the largest market for Norwegian salmon, different export restrictions have over a long period been imposed on Norwegian salmon after allegations of dumping. These sanctions have recently been lifted after a WTO dispute settlement. In the US, an anti-dumping duty of 26 per cent introduced in 1991 has basically closed the market for Norwegian salmon. Recently, Russia, the fastest growing market for Norwegian farmed salmon, has on several occasions adopted import restrictions due to alleged health risk from eating Norwegian salmon.

The model

Highly disaggregated sectors for agriculture, fisheries, fish farming and food manufacturing are integrated in a comparative static GE model. Major food policy instruments, including barriers to trade and subsidies, are implemented. The rest of the economy is on an aggregated form. General taxes like value added tax, excise taxes, import levies, pay roll tax and wage tax are included. The model is framed in order to perform food policy analyses, taking into account linkages within the food industries and to the rest of the economy. It reports figures

[3] Having rejected EU membership twice in national referendums, trade in fish and fish products is mainly regulated through Protocol 9 to the Agreement of the European Economic Area (EEA), in addition to bilateral agreements.

like economic welfare, rents in fisheries and fish farming, resource allocation, production, trade and relative prices.

Agriculture is represented by 10 farm technologies, each with a region (central and rural areas) and scale (current size and large size) dimension. Altogether the model has 32 individual sectors in agriculture, producing 11 goods. For example, one sector is combined milk and beef production (technology), with 20 cows (current scale), situated in rural area (region). In each region the agricultural activity is limited by given endowments of agricultural land, owned by a private household and rented by farm sectors. The scale dimension is an approach to allow different farm sizes, in a model where each sector is characterized by constant returns to scale. Note that Norwegian farms are relatively small which means that there are potential gains from exploiting economics of scale. The agricultural produce are processed in 25 food manufacturing processes into 34 products for human consumption (12 dairy, 17 meat and 5 other products), as well as feed concentrates.

18 vessel groups represent the Norwegian fishing fleet. The vessel groups span from small coastal vessels to factory trawlers, and include different technologies like hand-line, long line, seine, purse seine and trawling. The catch is aggregated into 11 different species, like cod, saithe, haddock, herring etc. With regard to fish farming, the model includes sectors producing salmon and trout in 6 different regions, as well as a national hatchery sector producing smolt as input for fish farming.

The catch of fish is regulated by quotas for each species distributed on the different vessel groups. The quotas are modeled as vessel specific endowments owned by private households and rented by the different vessel groups. A potential quota rent is, thus, distributed to the private household sector. The same modeling strategy applies to potential rent in fish farming, where the rent is attached to licenses. The domestic supply of fish available for processing is therefore exogenously given in each simulation.

There are single-output processing sectors for each of the model's 28 fish products for human consumption. Cod can, e.g., be processed into chilled fillet, frozen fillet, round fish, salted fish, salted and dried fish and dried fish. In addition, there are processing sectors for fish meal and fish oil, as well as aqua feed concentrates.

Since the trade barriers for fish produce vary substantially between markets, 20 separate export markets are distinguished, in addition to the domestic market. A Constant Elasticity of Transformation (CET) function distributes each product between the different markets. This is an approach to handle the observed fact that product qualities, and also prices, vary between markets. It is further assumed that Norway confronts given prices in the export markets according to the small country assumption.

17 aggregated production sectors cover the rest of the economy. A public sector collects taxes, disburses transfers to firms and households, and purchases goods and services. Public consumption is exogenously given in the model, and the public budget is balanced by lump sum transfers or/and by scaling one or more tax or subsidy rates. As the model is static in nature, national savings and investments are exogenously given. Consequently, the net surplus on the trade balance is also fixed. The trade and capital account is balanced by an endogenous rate of exchange.

Capital and labor are, in general, assumed to be perfectly mobile between sectors, meaning that the model has a long run perspective. The farmers' labor is, however, assumed to be partly sector specific. A constant elasticity of transformation (CET) function allocates the endowment of farm labor between agriculture and other industries. The transformation elasticity decides how easy labor is transferable between the farm and the labor market as relative wages change. An observed phenomenon may in this way be handled, namely that farmers, even in the long run, seem to accept sub-market return on own effort.

A macro household represents private demand. The households maximize utility from input of goods, services and leisure. Revenues are received in the form of income from its own labor and capital, rents from fishing rights and fish farm licenses and transfers from public sector.

Norwegian and foreign goods are in general assumed to be imperfect substitutes (Armington assumption). This allows both export and import of the "same" good (cross-hauling). As will be demonstrated, the computed effects of farm liberalization are sensitive to the Armington elasticities.

The model is based on national account data and input-output matrices from 2004. The industries in question are disaggregated by means of micro data. The data for the agricultural sector are based on the model farms included in the sector model JORDMOD (Mittenzwei and Gaasland 2008). Sectors for fisheries and fish farming are constructed by data from the yearly profitability surveys of the Directorate of Fisheries in Bergen. Different sources are used to represent food manufacturing, as Manufacturing Statistics from Statistics Norway, profitability surveys in fish processing, and production coefficients in fish processing collected from the industry.

Technology and preferences are represented by (nested) constant elasticity of substitution (CES) functions whose distribution parameters are calibrated from the cost and budget shares following from the social accounting matrices. Inputs are nested and substitution parameters are added according to available empirical studies with regard to price and substitution elasticities, in combination with knowledge about technology and judgment. More details on the model is given in Gaasland (2008).

Liberalisation of the food industries – assumptions and results

Assumptions

In the model analysis, a complete elimination of farm subsidies and import tariffs is assumed. For fish products (that are not favoured with subsidies), trade barriers in the export markets are nullified. It is further assumed that Norway confronts given prices in the export markets according to the small country assumption. An elasticity of transformation, set to 4, distributes each fish product between the 20 different export markets, as well as the domestic market.

Free competition in the domestic market is implemented, which, i.e., implies that the Norwegian milk price equalisation scheme is abolished. By law this scheme involves price discrimination and cross-subsidization between different dairy products. Especially, export of cheese and butter are subsidized by revenues from domestically sold drinking milk (Brunstad et al. 2005a).

The analysis is performed under two different assumptions as to how close substitutes domestically produced and imported food are assumed to be (the so-called Armington elasticities). First, Norwegian and imported food of the same type are assumed to be perfect substitutes (homogeneous goods). Second, the assumption of differentiated goods is applied, so that Norwegian and imported food are valued differently by the consumers. In the absence of available empirical estimates, the Armington elasticity is set to 4 for all products.

The domestic supply of fish available for processing is exogenously given in the simulation. Therefore, further growth in fish farming, e.g. made possible by trade

liberalization, implies that the gain from trade liberalization will be underestimated in the analysis.[4]

Public consumption is fixed, so lower net budgetary outlays (e.g. as a consequence of saved subsidies) have to be paid back to the representative household. Two alternative assumptions are used to balance the budget: I) lump sum transfers, and II) a reduction of the relatively high and distorting pay roll tax.

Results

Not surprisingly, the farm sector and the food processing industry are heavily affected by the assumed liberalization (Table 1). Under the assumption of homogenous products, almost all activity is put to an end. The exception is large scale egg production (based on imported concentrated feed), and part of the downstream food processing industry less exposed to raw materials from Norwegian agriculture.

[Table 1]

When the origin of the products matters, some Norwegian products are demanded even at prices that exceed the world market level. The value to producers of the possibility to differentiate products appears in Table 1 as a market price support in the size of NOK 2.2 billion. Some food production is now activated, especially eggs and potatoes, but also some milk and meat. The grain production which suffers from climatically related low yield is

[4] While the fishing quotas varies from year to year according to fishery enforcement and the development of the fish stocks, the potential for growth in fish farming is more predictable. From being an infant industry in the early 70s, aquaculture now exceeds traditional fisheries in export value. The yearly growth in production over the last decade has been about 10 per cent.

almost wiped out. About 2/3 of the present acreage is in use, but only 15 per cent of the agricultural employment. Use of labour decreases more than use of land because the economics of scale, which is exploited in this simulation, is related to labour and capital, and not to use of land. Also, since land is a sector specific factor, the land price declines when support is eliminated, so that the farm sectors substitute towards this input factor. Most of the production is shifted to large farms in central areas, where the conditions for farming are best.

About 50 per cent of the employment in agricultural based food processing is sustained (the case of product differentiation). In milk and meat processing, the activity is scaled down in line with lower farm level production of milk and meat. The milk is mostly used for drinking milk and cheese, while export is eliminated. Also, the production of feed concentrates declines with lower farm production. At higher processing levels the negative effects are less. Sectors producing bakery products, prepared meals, preserved fruit and vegetables and oil and fat are mostly unaffected. Today import tariffs are relatively low for these products while the prices on raw materials from the Norwegian agriculture are high.

Based on present production and export patterns, a complete elimination of tariffs on seafood implies a NOK 1,070 million gain in export value, which is 3.9 per cent of the base year export value. Thus, 3.9 per cent can be interpreted as the weighted average tariff on seafood export from Norway, based on present production and export patterns. The actual gain will, however, be higher because the processing industry can change the disposition of the catch between products and markets. Mainly two factors affect this adjustment: First, due to different initial tariff levels export prices change asymmetrically between products and markets. Second, raw fish prices rise, which disfavours products that are intensive in the use of raw fish, e.g. whole fish. When adjustments in production and between markets are taken into account, the computed rent from fishing rights and fish farm licences rises to NOK 1,197 million (4.4 per cent of export value). As earlier mentioned, the potential gain from further

growth in fish farming, e.g. made possible by trade liberalization, is not included in this estimate.

Table 2 shows that more of the catches of cod and the saithe, which are the most important whitefish species, are processed to salted and dried fish. Of the whitefish exported to EU, the tariff is highest for this product (3.9 per cent). For pelagic species (herring and mackerel), EU tariffs are especially high for whole fish (15-20 per cent), and even more of the pelagic species are therefore exported in this form. Smoked farmed salmon, which today is exposed to high tariffs in most markets, expand substantially[5]. The processing of shrimps shifts from whole products (head and shell-on) to peeled products. Processed fish (prepared meals etc.) also expands since this product aggregate in general meets high tariffs. As a total for the fish processing industry, employment increases with 10 per cent. Since the amount of fish available for processing is assumed to be the same in both scenarios, a shift towards more labour intensive products takes place.

[Table 2]

With respect to markets, relatively more of the fish produce end up in markets with initial high tariffs (not shown in the tables). In general this applies for emerging markets in Asia and Russia. The EU market increases its importance for smoked salmon, whole pelagic species and processed prawns, but contracts for most other products.

Table 3 indicates that the rest of the economy is stimulated by the liberalisation.[6] Especially, this applies when the public budget is balanced by reducing the distorting pay roll

[5] To avoid an unrealistic specialisation, a somewhat arbitrarily ceiling is set on the expansion of smoked salmon (equal to 10).

[6] Since the rest of the economy is modelled in a simplistic way, the results for each individual sector should be interpreted with caution. The results should, however, give a broad picture. More net import of food is counterbalanced by more export of other goods and services (to sustain the fixed net surplus on the trade balance). Thus, export sectors are stimulated by a rise in the rate of exchange (see Table 4). On the other hand,

tax. Lower pay roll tax means higher net wage payment for the employees and since the elasticity of labour supply with respect to net wage is positive in the model, labour supply increases.

[Table 3]

Obviously, the redistribution of resources from agriculture and processing to other sectors in the economy, explains some of the impact on the rest of the economy. A more important stimulant to the economy is, however, that demand increases since: 1) the reform opens for higher transfers to private households, or lower taxation, (NOK 12 billion are saved in farm subsides), 2) private households receive higher rents on fishing rights and fish farm licences (NOK 1.2 billion), and 3) food prices fall (up to 22 per cent; see Table 4).

[Table 4]

The over-all welfare gain of the said liberalization, measured as change in Hicksian equivalent variation, is between 1.2 per cent and 2.7 per cent of GDP (Table 4).[7] Compared to the food sectors' low share of GDP (below 3 per cent), this result supports the view that deadweight losses connected to the financing of farm programs can be substantial.

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the increase in real income also stimulates production for the domestic market. In the case of lower pay roll tax, the rise in labour supply favours labour intensive sectors.

[7] The highest end of this interval is when domestic and foreign food products are considered to be perfect substitutes and when saved subsidies are paid back to households and production sectors in the form of lower taxes on labour.

Concluding remarks

The Norwegian agricultural policy is costly and seems to have adverse effects on other sectors in the economy. Using a computational general equilibrium model, the gain from a complete elimination of food subsidies and tariffs is for Norway estimated to be in the range of 1.2 - 2.7 per cent of GDP. Most of this gain stems from domestic farm sector liberalisation. The gain from free market access for seafood is estimated to 4.4 per cent of the seafood export value. Further growth in fish farming, e.g. made possible by trade liberalization, may elevate the gain to the seafood sector. The potential for market growth is especially high in emerging markets in Asia where the tariffs are substantial.

When evaluating farm programs, there is always the question whether there are social benefits to outweigh the substantial costs of the current policies. Economic arguments in favour of intervention are the existence of public goods related to agricultural activity, such as landscape and biodiversity preservation, and settlement in sensitive and scarcely populated areas. However, there is no evidence that the present high levels of support can be defended by the public goods argument (Brunstad et al. 2005b). Also, the present support, which is mainly price support, is badly targeted at the public goods in question. Since agricultural public goods are more linked to inputs and farming techniques (e.g. land-extensive farming) than production *per se*, an efficient policy involves instruments with less impact on production and trade than the present policy. A reform in that direction will turn the Norwegian agricultural policy more in compliance with major WTO principles. By offering substantial cuts in trade distortive measures, Norway may strengthen the case for fisheries and fish farming. Trade-offs between agriculture and fish may also be offered as a basis for renegotiating the bilateral trade agreement between Norway and it's largest trade partner, the EU.

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Tables

Table 1. Agriculture and processing (base solution = 1)

	Homogenous goods	Differentiated goods
Farm level		
Employment	0.01	0.15
Land use	0	0.64
Market price support	0	NOK 2.2 billion
Production		
Milk	0	0.24
Beef and veal	0	0.17
Pork	0	0.33
Sheep	0	0
Chicken	0	0.17
Eggs	0.99	0.80
Grain	0	0.05
Potatoes	0	0.53
Processing		
Employment	0.06	0.51
Production		
Dairy, drinking milk	0	0.37
Dairy, cheese domestic	0	0.24
Dairy, cheese export	0	0
Dairy, milk powder	0	0
Meat industry	0	0.22
Concentrated feed	0	0.17
Ice-cream	0	0.96
Flour and grain industry	0.72	1.10
Preserved fruit and vegetables	0	0.83
Oil and fat	1.49	0.88

Table 2. Adjustments in fish processing (base solution = 1)

	Fillet	Whole	Salted	Salted and dried fish	Dried fish	Smoked	Other
Cod	0.57	0.44	0.30	1.97	0.33		
Saithe	0.47	0.27	1.45				
Haddock	0.59	1.15					
Herring	0.94	1.02					
Mackerel		1.00					
Prawn		0.89					1.06
Farmed salmon	0.49	0.91				10.00	
Fish meals etc.							1.05

Table 3. Rest of the economy (base solution = 1) – differentiated goods

	Budget balancing	
	Lump sum	Pay roll tax
Forestry	1.001	1.000
Mine	1.020	1.043
Hydro energy	0.997	1.008
Oil and gas	1.017	1.013
Textile	1.054	1.082
Light industry	1.011	1.024
Heavy industry	1.018	1.040
Construction	0.999	1.003
Transport	1.015	1.030
Private services	1.004	1.010
Public services	1.003	1.011
Financial services	1.009	1.029
Telecom	1.004	1.023
Commodity trade	1.014	1.030
Other	0.999	1.004

Table 4. Price indices and economic welfare (base solution = 1)

	Homogenous goods		*Differentiated goods*	
	Lump sum	Pay roll tax	Lump sum	Pay roll tax
Consumer price index (numerairè)	1	1	1	1
Food and drink	0.835	0.823	0.917	0.906
Food	0.775	0.764	0.884	0.874
Meat	0.563	0.555	0.739	0.730
Fish	0.994	0.982	1.013	1.004
House and heating	1.016	1.001	1.008	0.996
Clothes and shoes	1.016	1.002	1.008	0.996
Transport	1.015	1.000	1.007	0.995
Other goods and services	1.015	0.997	1.008	0.993
Labour	1.014	1.046	1.007	1.033
Capital	1.019	1.007	1.010	1.000
Rate of exchange	1.020	1.005	1.010	0.998
Economic welfare	1.0289	1.0398	1.0183	1.0270
- as a share of GDP	0.0197	0.0274	0.0124	0.0184

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