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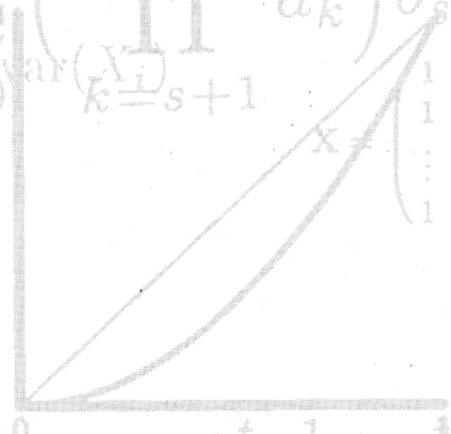

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Abstract:
We employ a large scale macroeconometric model to study transitory adjustment problems and long term welfare effects of a Norwegian EU-membership. Compared to the present European Economic Area (EEA) treaty, accession would primarily require economic reforms in the fields of agriculture, public finance and trade. When we ignore the yearly net contribution of approximately 1 billion ECU (1 per cent of GDP), integrating the Norwegian economy into EU generates a small welfare gain. The results seem to be strongly affected by a long transition period with under-utilisation of resources. With the costs of the net contribution included, we identify a welfare loss. This is especially so if fiscal policy is adjusted to maintain public and current account balances. To investigate the stability of the results when the estimated wage rate response and trade elasticities are altered, we present two sensitivity tests. None of them give us reason to cast doubt on the qualitative conclusions presented.

Keywords: European integration, EU participation, Macroeconometric modelling

JEL classification: C32, F15, F42

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1 Introduction

In a referendum held late fall 1994, the Norwegians decided not to join the European Union. During the preceding months, a controversial debate among economists on the potential welfare effects of a membership seemed to draw considerable attention from the general public. Transforming the present European Economic Area (EEA) Treaty into a full membership was believed to primarily affect three areas of economic activity. First, in order to adjust to the CAP system of the EU, a significant reform of the agricultural policy would be necessary. Second, an estimated net contribution to the common budget which represents about 1 per cent of the Norwegian GDP (close to 1 billion ECU) along with substantial changes in the structure of indirect taxes would adversely affect the balance of the government budget. Third, full participation in the tariff union as well as the single market would require a significant trade policy reform (including the policy towards third countries).

Although a completion of the single European market is regarded as an important milestone in the continuing integration of Europe and a tremendous amount of research has been devoted to explore the welfare effects of further integration[1], only a small number of studies have focused on the effects of the ongoing EFTA/EU integration. With respect to Norway, two model simulations performed by Haaland (1992, 1994) assess overall welfare effects of a full economic integration with the European Union. As in most other analyses of economic integration and trade liberalisation, both of these studies apply computable general equilibrium models based on a static (or ad-hoc dynamic) framework. The models are generally calibrated to a base year, using externally provided estimates of core elasticity parameters and other central variables. Yet, we claim that the most severe problem with the majority of the earlier studies, is that they ignore the effects of international lump-sum transfers due to membership contribution rules. The fact that all the EFTA countries (both the new members of the EU and those remaining outside) were potentially large net contributors to EU's common budget is a result of the way a contribution is calculated. In brief terms, the net contribution[2] is positively correlated with a country's GDP level and its value added tax (VAT) revenues, whereas it is negatively correlated with the size of it's agricultural sector (see section 3.2.2 for more on these calculations). Compared to the EU members (EU-12), none of the EFTA countries are large in agricultural production, but most of them have substantially higher VAT rates than the EU-12 average, see Tait (1988). Hence, the aspect of the nation's initial economic structure appears to be crucial when studying the overall effect a potential EU-membership. Although this question is somewhat outdated with respect to Sweden, Finland and Austria, the problem is still highly salient when it comes to the case of Switzerland, Iceland, Liechtenstein and Norway.

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[1] See e.g. Winters (1992) for a summary of these studies
[2] Calculations of the net contribution is formally presented in Table 2.

In this paper we employ a large scale macroeconometric model, MODAG[3], to analyse both transitory adjustment problems and long term welfare effects of adapting the Norwegian economy to the necessary structural and political changes as outlined in the Accession Treaty (1994). The model specifies a rather disaggregated production and consumption structure in addition to a detailed description of the tax structure and public sector finances. A data coherent specification of the dynamic structure of the Norwegian economy allows us to simulate both medium and long term effects from which conclusions on an intertemporal welfare measure can be drawn. When studying shifts in economic policy within a European context, it is highly important to explicitly model a labour market that allows for unemployment. The fact that MODAG captures this aspect gives reason to believe that the paper may contribute to the understanding of medium term structural effects of reforming trade and protection policies as well as the economic consequences of international lump sum transfers.

We design two alternative scenarios for the Norwegian economy; one membership scenario and one scenario that represents Norwegian prospects outside the Union. Both scenarios cover the period from 1995 to 2020. The future course of the European Union will of course be important for Norway, and the effects on the economy may depend upon the membership status. Yet, rather than to assess consequences for the Norwegian economy of different uncertain future European development scenarios, we compare full membership in the Union as it is today with the features of the present EEA-treaty. Since adaptation to new circumstances is both costly and time consuming, a dynamic approach is highly warranted. In section 4 below we draw conclusions on both transitory and long run effects of an EU-membership with emphasis on consumption possibilities measured in present value terms. For expository purposes we first analyse the «pure» integration effects, which means that we temporarily ignore the costs associated with Norway's net contribution to the common budget. According to our model, these costs depend on what kind of government measures are taken to offset the adverse effects on the current account and public sector balance due to the transfer payment. This point is illustrated separately.

Even if full integration of the Norwegian economy into the single European market is beneficial in the long run, according to our calculations, the present value of the reform seems to be negative when the cost of the Norwegian net contributions is included. This is especially so, if fiscal policy is changed to maintain the public sector budget balance. In addition to the financial charge, the cost of the reform would mainly be associated with under-utilisation of resources in a comparatively long transition period. The equilibrating forces of MODAG work slowly due to rigidities in the labour market and small absolute values of the price elasticities of foreign trade. Since these estimates may be criticised

[3] Cappelen (1992) presents a rigorous description of the model and its applications.

on theoretical grounds, we present a sensitivity analysis of the importance of these parameters for the simulation results. We find that not even large changes in the parameter values affect our qualitative conclusions.

Kokko (1994) emphasises the link between economic integration and increased investment. First, a membership is believed to increase investment through improved productivity promoted by increased competition. Second, compared to the EEA treaty, a membership is believed to stabilise the investment environment (i.e. reduced uncertainty) and attract foreign direct investments. The first effect is covered in this work but not the second. The EEA treaty ensures the existence of an equivalent competition policy as well as the free movement of goods, services and factors between Norway and the EU. The political and economic conditions can be regarded as highly stable in all Nordic countries. Hence, the important question seems to be whether foreign investors are aware of the EEA treaty and its legislative content. Recently, some alleged examples of discouraged investment effects may indicate that this knowledge is not complete. However, there is reason to believe that the problem will diminish over time. With these considerations in mind and the fact that such discouraged investment effects are hard to measure, we find it reasonable to not include these aspects in our study.

The model is presented and discussed in light of other studies of European integration in section 2. Assumptions behind the construction of the two alternative paths are presented in section 3. Here we focus on the four areas of economic activity that are subject to the most important changes. The simulations and sensitivity tests are found in section 4, whereas section 5 concludes.

2 The model and some comparisons to earlier contributions

Apparently, most studies of economic integration are based on partial or general equilibrium models. Although such models rest on a consistent and frequently sophisticated theoretical foundation, they are often unable to account for important empirical aspects of the economy. More specifically, previous model simulations assessing the welfare effects of a single country joining the European integration process apply static equilibrium theory, see e.g. Haaland (1992, 1994) on Norway, Antille et al. (1993) on Switzerland, Norton et al. (1986) on Portugal, Pantelis, Karadeloglou and Mentzas (1991) on Greece and Miller and Spencer (1977) on UK's entry. It is evident that studies based on static models can hardly provide conclusions that incorporate important transitional adjustment problems with respect to resource allocation and market rigidities[4]. Furthermore, when analysing the European economy, it is difficult (and dangerous) to ignore the existence of unemployment. Several CGE studies

[4] Some recent studies presented by Mercenier and Akitoby (1993) and Keuschnigg and Kohler (1995) apply dynamic general equilibrium models with imperfect competition to assess the intertemporal effects of integration and trade liberalisation on welfare and trade.

do consider the labour market but in a most perfunctory or implicit way. For instance, Mercenier (1995) employs a multi country CGE model to ask whether «1992» can reduce unemployment in Europe. However, the model is not specifically designed to study the labour market as it only allows for either fixed employment or fixed wages.

In the present analysis, we apply the relatively disaggregated (29 sectors-40 commodities) macroeconometric model MODAG developed by Statistics Norway. The model allows for increasing returns to scale in the production sectors (an aspect consistent with most of the studies mentioned above) and utilises estimated wage equations to determine labour market conditions. The model structure is not designed to evaluate the effect of a trade policy reform on the competitive structure among producers, nor does it explicitly allow for changes in labour supply due to economic integration. It is our impression, however, that since the difference between the EEA-treaty and an EU-membership does not suggest any significant changes in these conditions, this deficiency is really not important. Below we give a stylised description of the equation structure of MODAG. The disaggregated input-output framework and most of the dynamic structure are suppressed in this exposition.

Foreign and Norwegian goods and services are treated as imperfect substitutes, and foreign trade is modelled by Armington equations. Net export (NE) is a function of foreign demand (GDP_{for}), domestic demand (GDP_{dom}) and prices of Norwegian goods relative to foreign goods (P_{dom}/P_{for}).

(1) $$NE = f_1\left(GDP_{dom}, GDP_{for}, \frac{P_{dom}}{P_{for}}\right)$$

The price elasticities for exports and imports are on average 1.7, and both elasticities with respect to demand exceed one. There are three prices for each good in the model: the import price (exogenous), the domestic price and the export price. Costs are the dominant factor in determining domestic prices. For export prices foreign prices play a larger role. Domestic prices and export prices are determined as a mark-up over unit variable costs (UVC), where mark-ups depend on the price of foreign goods and the rate of capacity utilisation (CU):

(2) $$P_k = f_2^k(UVC, P_{for}, CU), \quad k \in domestic, export$$

Domestic final demand is modelled by a macro consumption function and extended accelerator investment equations. Private consumption (C) is determined by disposable income (Y) and net (real and financial) wealth (W).

(3) $$C = f_c(Y, W)$$

Revaluations of wealth is modelled only with respect to the value of the housing stock. The real price on dwellings depends positively on income and negatively on the real interest rate. Gross real investment (J) depends on production (X) and profitability (PROF). No interest rate effects are identified except for investment in dwellings.

(4) $$J = f_J(X, PROF)$$

Labour demand (L) is derived from a Cobb-Douglas production function in variable factors, for a given capital stock, and is determined by

(5) $$L = f_l\left(X, \frac{WC}{PM}, K_{-1}\right)$$

WC is wage costs per man hour, PM is the price of intermediate inputs and K is the capital stock. The equations express a significant element of short term labour hoarding when production falls. In the long run, however, labour increases pari passu with production and depends negatively on the capital stock. The average estimated elasticity of scale is 1.2. The modelling of the labour market is important for the overall model properties. Wages are considered to be determined by bargaining between unions and firms and the following real wage equation is estimated:

(6) $$W = f_w(PC, PQ, t, tq, U, Z)$$

where W is the wage rate received by the employee, PC is consumer price index, t is the average personal tax rate, PQ is the value added price, tq is the rate of payroll taxes, U is the unemployment rate and Z is labour productivity. Static and dynamic homogeneity of degree one in prices are imposed. Consumer prices and product prices each have an estimated long run weight of 0.5 in the wage equation. According to the model, direct and indirect (via consumer prices) as well as payroll tax changes are shifted onto wages. In the long run, increased labour productivity is also fully passed through into real wages. Increased unemployment reduces real wages. The estimations favoured a non-linear specification of the relationship between wages and unemployment. Thus, changes in unemployment exert little effect on real wages when unemployment exceeds 5 per cent (as in Norway today), yet much stronger effects when unemployment is below 2.5-3 per cent. The level of unemployment in our reference path is thus important for the simulation results. At 2.5 per cent unemployment, real wages increase by 5 per cent in the long run when unemployment is reduced by 1 percentage point, while the raise in real wages is below 1 per cent with an initial unemployment level of 5 per cent. Household labour supply is specified for different socio-demographic groups. Total labour supply depends on the number of households in each group. The elasticity with respect to wages is found to be rather small, but the estimates display a strong «discouraged worker» effect. Thus employment changes are not fully reflected in unemployment, which modifies the wage-restraining effect of reduced labour demand.

In the model, fixed exchange rates represents a basic assumption behind financial market behaviour. Estimations support a hypothesis of long run uncovered interest rate parity. Based on historical evidence, financial markets are assumed to react to changes in the current account with moderate interest rate adjustments, relative to foreign interest rates. The model contains no formal limitations on the development of government and/or national net holding of assets. Hence, simulations will only be meaningful if one reasonably can assume that the calculated government balance will be judged sustainable by the financial markets.

In the short run, a fiscal expansion works through traditional Keynesian multiplier and accelerator mechanisms, stimulating production and employment. But it also worsens government balances and the current account. As profitability increases and unemployment falls, wages gradually start to increase, partly offsetting the initial employment impulses. The offsetting effects work through different channels. Increasing wages reduces international competitiveness, thus eroding exports and increasing import shares. In addition, firms substitute intermediate inputs for labour. But, according to the model, the crowding out effects in the financial markets are not very strong. However, this has to be viewed in the light of the lacking sustainability conditions for financial stocks.

The degree of crowding out depends critically on the response of wages to unemployment and the response of market shares to increased domestic production costs. At present levels of unemployment (5 per cent), MODAG predicts that both effects are modest in magnitude. A partial multiplier analysis of fiscal policy expansion in MODAG implies some, but not full crowding out in the long run. This is due to modest wage and market share effects, but also to the lack of long run conditions regarding financial balances. A fiscal expansion reduces government net financial assets. If we (somewhat arbitrarily) impose a rule saying that net financial assets shall return to baseline levels at the end of the simulation period, the crowding out effect, via a necessary reversal of policy, will appear much stronger. We do not impose such requirements, but in reporting the simulation results, we take the developments in terminal wealth into account, cf. section 4.

3 Comparing an EU membership with the EEA treaty

We assess the economic effects of a potential EU-membership as the difference between two scenarios for the Norwegian economy. The reference scenario reflects the assumption that the present EEA treaty will stay in force during the entire simulation period of 1995 to 2020. The reference scenario is then compared to a scenario where Norway is assumed to be a member of the EU. Below, we summarise the most important assumptions behind the construction of the two scenarios.[5]

3.1 The reference scenario

The EEA treaty defines Norway - with some limitations - as a full member of the Single Market, ensuring free movement of services, capital, labour and most goods. Except for trade in agricultural and fishery products, tariffs and quantitative import restrictions are abandoned between Norway and the EU. Furthermore, the EEA treaty also includes several regulations prohibiting trade disturbing measures like production stimulating subsidies, technical trade barriers, trade restricting agreements, government import monopolies and discriminatory procurement policies. In addition, the treaty simplified the rules of origin and the border formalities between the EFTA and the EU countries, reducing the cost of intra EEA trade. Based on the projected strong current account figures, the Norwegian krone is assumed to be fixed to the ECU. Short run international real interest rates are believed to stay around 4 per cent. The average growth in import prices is set to 2 per cent a year and the average growth in GDP among the largest trading partners is set to 2.5-3 per cent up to the year 2000 and 2-2.5 per cent afterwards. As Norway is a large producer of oil and natural gas, the prices on these products are highly important for the projections. We find it reasonable to impose a 3.5 per cent growth rate in the real prices of both oil and natural gas up to year 2000 and somewhat below 2 per cent in the following years. The production of oil and natural gas is supposed to increase the first 5 years and to drop significantly after the turn of the century. Along with these projections, we also believe that investment in the petroleum sector will follow a decreasing trend[6]. The level of direct and indirect taxes are kept constant through the simulation period. Estimated effects of the newly established WTO treaty are included in the reference path which reduces the potential differences between the simulated regimes. However, according to Børve et al. (1994), the treaty may only have marginal impact on the agricultural policy in Norway. Hence, our projection of future agricultural production along the reference path is based on the historical trend. We assume that the amount of total agricultural subsidies will fall considerably during the simulation period.

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[5] For a full documentation of our estimates and assumptions, see Bowitz et al. (1994).

[6] Our figures regarding the oil producing activities are based on projections presented by the Ministry of Industry and Energy (1993-94).

3.2 Changes associated with the EU-membership scenario

The following presentation of changes from the reference path are based on the negotiated Accession Treaty (1994) for Norway. The treaty specifies how the changes should be implemented both with respect to magnitude and time. Along with these stated requirements, we have based our estimates on interpretations and intentions expressed by the Norwegian government. We assess the direct effects of an EU membership to be significant within the following economic areas: i) *agriculture*, ii) *government finances* and iii) *international trade.*

3.2.1 Agriculture and food processing

Although the effective support of the agricultural sector in the EU is significantly higher than the OECD average, it would still require comprehensive reductions in subsidies and import restrictions if the Norwegian agricultural sector was to adapt to The Common Agricultural Policy (CAP) of EU. Also, implementing the CAP would substantially reduce the market price support to the Norwegian food processing industry.

The CAP is primarily based on market price support, provided by institutional prices, variable import levies and market intervention. Only about 10 per cent of the support (channelled through the European Agriculture Guidance and Guarantee Fund (EAGGF)) is provided to assist farmers in less favoured areas or other kinds of direct support. Central parts of the existing policy mounted at assisting Norwegian farmers are in defiance with the CAP. Full participation in the common market would require that Norwegian agricultural assistance would have to be adjusted to the EU level, and several subsidies conditioned on production would have to be abolished. However, unaccepted forms of support could partly be substituted by budgetary transfers from EAGGF or different kinds of approved national measures. Furthermore, due to the potential entry of three Nordic countries, the EU expanded the CAP to allow for compensatory government subsidies directed towards low productivity farms located in the so-called northern areas. This was to sustain the level of production in these locations, covering approximately 50 per cent of the Norwegian cultivated area. Provided that production would not be excessively stimulated, the EU also opened for temporary national measures facilitating integration to the CAP in cases of severe restructuring problems. In addition, some transitory arrangements were agreed upon for the first 5 years.

In Norway, the food processing industries are mainly assisted by import levies or quantitative import barriers, partly meant to compensate for the high domestic agricultural prices. Nevertheless, estimates by Fæhn et al. (1995) indicate a significant effective (net) protection of the Norwegian food processing industry. Reducing industrial food prices to the EU level would only partly be compensated by the

simultaneous CAP-pricing of agricultural products. In order to facilitate a restructuring of the industry, the government announced a 4 year investment programme to start from the day of accession. These subsidies are estimated to approximately 125 million ECU each year (1995 values) and are assumed to imply a yearly increase in real investments of 95 million ECU.

Table 1 displays main figures for the agricultural and food processing sectors. After a complete de-escalation of the transitional support to agriculture and food processing, overall budgetary assistance would fall considerably. The estimated reductions in producer prices of food are based on the assumption that food import prices will fall to Danish levels, adjusted for transport costs. The stipulated long run effects on food production are based on results from a disaggregated linear programming model (Børve et al. (1994)) designed to study the effects of policy changes with respect to the agricultural and food processing sectors. The transitional development towards the new long run solution rests on the assumption that existing producers could choose to sustain production activities as long as the proceeds cover operating costs. In both sectors we have imposed a 10 per cent increase in average productivity, which result in a long run decline in employment of approximately 1,5-2 per cent of total employment in 1994.

Table 1. Direct income shifts in Agriculture and Food Processing.
Deviations from the reference path.

	Agriculture			Food processing		
	2000	2010	2020	2000	2010	2020
Budgetary support from Norway (*mill. ECU*)	-325	-363	-363	0	0	0
Budgetary support from EU (*mill. ECU*)	275	200	200	0	0	0
Producer price (per cent)	-30	-30	-30	-14	-21	-22
Production (per cent)	-9	-9	-13	-6	-9	-9

3.2.2 Public Finances

As a member of the EU, Norway would have to contribute to the common budget. According to government calculations, see Ministry of Foreign Affairs (1994), the gross contribution would have amounted to approximately one billion ECU in 1995, increasing to about 1.5 billion in year 2000. Although the gross membership contribution is subject to negotiations, there exist a number of indicators which broadly determine the level of transfers. These are: the level of GDP and the VAT and tariff revenues (including taxes on agricultural products imported from third countries). As in most other EFTA countries, the Norwegian VAT rate (22 per cent when the treaty was negotiated) is substantially higher than those observed in the EU (excluding Denmark). During the rest of the

simulation period, the contribution is assumed to grow proportionately with GDP. However, as the EFTA and EEA contributions would come to an end, the government would probably save approximately 100 million ECU per year. Accession would also prohibit the present tax on grain feed (125 million ECU per year) and the investment tax which amounts to 500 million ECU per year (we phase this out over five years starting in 1996). A compulsory introduction of value added taxes on services would have increased government revenue with 100 million ECU the first year and then grow in line with the tax base. Through the European Investment Bank, Norway would have been obliged to finance an estimated outlay of 25 million ECU for four years following accession. Adapting to the CAP would have reduced direct government subsidies from 1996 on with approximately 350 million ECU (1995 value). To compensate for lost animal and product values due to imposed price cuts, the government was allowed to transfer approximately 250 million ECU as a one time subsidy to the agricultural sector in 1995. As already mentioned, a transition subsidy of 125 million ECU offered each year from 1995 to 1997 was to be assigned to the food processing industry. In addition we assume some 160 million ECU in government expenses to co-finance outlays from the EU fund for reconstruction. Finally, we have removed the Norwegian sugar tax in the calculations and reduced the tax rates on alcohol and tobacco with 12 per cent to avoid a potentially unacceptable import leak.

Table 2: Direct effects of a membership on government revenue and expenses. Deviation from reference path in 100 mill. (1995) ECU.

	1995	2000	2010
Expenses:			
Membership contribution	**9.9**	**15.2**	**18.6**
Subsidies to the agricultural sector	**2.9**	**-3.3**	**-3.6**
Co-financing the EU fund for reconstruction	**1.6**	**1.2**	**1.2**
Transition subsidies	**1.2**	**0.0**	**0.0**
The European Investment Bank, EFTA, EEA	**-0.6**	**-0.9**	**-0.9**
Income:			
Grain feed taxes	**-1.2**	**-1.2**	**-1.2**
Net increase in government expenses:	**16.3**	**12.5**	**16.6**
Repayments from the EU to private sector	**6.6**	**6.2**	**5.6**
Membership contribution			
- Repayments from the EU to private sector			
= Net Economic Contribution	**3.3**	**9.1**	**13.0**

When calculating the net financial contribution to the EU budget, one must also account for transfers from the EU to the private sector in Norway. Such transfers include general subsidies from the CAP, financial support available through the fund for reconstruction and resources mediated through EU's

scientific programs. Our estimates of the size of the changes in taxes and other financial variables are presented in Table 2.

3.2.3 Barriers to trade, border controls and documentation of origin

Norway imports a large variety of industrial products, while exports are mainly concentrated on crude oil, fish and semi- processed industrial products. About 2/3 of the Norwegian imports and 4/5 of the exports are associated with the EU countries. Adapting to the EU trade policy would require changes in trade with *EU members* through full integration with the Single Market, and with *non-members* through participation in the Customs Union.

As the EEA Treaty is already in force, full integration with the Single Market would only generate marginal changes. With respect to *imports* we find that a full integration only has substantial effect on prices of foods and beverages. With respect to *exports* a complete opening of the European markets for fish and fish products is expected to reduce tariffs by approximately 2 per cent. Furthermore, we expect a general fall in export prices due to minimisation of border formalities between EU members, as well as elimination of procedural formalities regarding documentation of origin[7]. The European Commission (1988) estimated the total gains of removing all border formalities within EU to 1.8 per cent of the total trade value. There is reason to believe that this number is not representative for the integration of Norway, as only one border is involved. Furthermore, Norway's exports are to a large extent bulk sales with marginal exposure to costly border controls. Rules of origin may generate administration costs and efficiency losses. Herin (1986) estimated these costs between the EU and EFTA to between 3 and 5 per cent of the products' value. Since 1986, the EEA agreement has reduced these costs considerably. Summing up the effects, we estimate a 1.5 per cent reduction in the costs of exporting to the EU. However, due the new GATT/WTO treaty, the cost reduction is scaled down to 0.5 per cent from year 2005.

Customs Union participation would not have a significant impact on Norwegian *export* conditions. *Import prices*, on the other hand, would be somewhat affected. We found that the price changes were significant for 7 out of 20 aggregates of industrial products. These are reported in Table 3, where the differences are decomposed into changes in tariffs and tariff equivalents[8] of Non-Tariff-Barriers (NTBs). We report for the years 1995 and 2005 representing the time of full implementation of an EU membership and the GATT/WHO treaty respectively. Adjusted tariff policies would mainly affect *Vehicles*, *Machinery* and *Chemicals*, where MFN tariffs would increase by 5-10 percentage points. For *Textiles and Wearings*, there would be a *reduction* of similar magnitude. However, average changes

[7] We assume that import prices will not change, based on the idea that exporters will collect the gains when trading with a small country.

are rather small, *inter alia* reflecting the dominance of imports from the EEA. In general, required adjustments would be even smaller after the full implementation of the Uruguay Round agreement by 2005.

Table 3. Price changes on imported products as a result of an EU membership - 1995 and 2005.

	Value of imports c.i.f. 1991 (Millions of ECU)	Change in tariff-rate with an EU-membership (percentage points)		Change in equivalent tariff rate with an EU-membership (percentage points)		Change in import price with an EU-membership (percentage)	
		1995	2005	1995	2005	1995	2005
Competing products except food, beverages and tobacco							
Textiles and Clothes	**1664**	**-1.2**	**0.6**	**1.5**	**0.0**	**0.3**	**0.6**
Various Manufacturing products	**4605**	**0.1**	**0.1**	**0.0**	**0.1**	**0.1**	**0.1**
Wood products	**588**	**0.1**	**0.1**	**0.0**	**0.0**	**0.1**	**0.1**
Industrial Chemicals	**987**	**0.5**	**0.3**	**0.0**	**0.0**	**0.5**	**0.3**
Metal products, Machinery and Equipment	**6104**	**0.7**	**0.5**	**0.2**	**0.2**	**0.9**	**0.7**
Non-competing imports							
Food and Raw materials	**454**	**0.0**	**0.0**	**39.0**	**39.0**	**38.8**	**38.8**
Cars, Tractors etc.	**480**	**1.8**	**1.3**	**3.1**	**3.1**	**4.8**	**4.3**

Measured by their tariff equivalents, changes in the system of non-tariff barriers (NTBs) will also influence import prices. Norway still imposes some import restrictions on the non-EEA countries, like MFA export quotas on textiles and clothing[9], discriminating governmental procurement policies and various technical barriers to trade, see Fæhn et al. (1995). Although the EU operates with a far more extensive NTB system, adoption would only have small effects on the level of import prices, with some main exceptions: A Customs Union with EU would increase import prices on citrus fruits by 25 per cents, bananas by 30 percents and sugar by as much as 250 percents. Adopting the MFA arrangements of the EU on *Textiles and Clothing* is estimated to raise Norwegian import prices by 1,5 per cent (the differences would vanish after 2005). Norwegian import prices on *Vehicles* would also increase within the Customs Union. A heavy excise tax on these products has stimulated foreign producers to offer a generous discount system on Norwegian imports of cars (see Flam and Nordström (1995) for further evidence). Because the Commission recently announced measures against

[8] The equivalent tariff rate of the NTBs is here defined as the ad valorem tariff rate that would generate the same reduction in imports.

[9] Both Norway and EU participate in the Multi Fibre Arrangement (MFA) of GATT, which opens for agreements on voluntary export restraints with exporters of low-cost textiles and clothing products.

differentiated producer prices within the EU, there is reason to assume that an EU membership would cut down on these discounts.

4 Model simulations and sensitivity tests

The effects of a membership are measured as deviations from the EEA simulation. To illustrate some important aspects of the transition process, we report results for a broad set of macroeconomic indicators. As outlined in section 2, the short and long run impulses differ in response to the dynamic adjustments. Hence, a welfare evaluation of the simulation results must depend on how long run effects are valued relative to short run effects. Our welfare measure is simply based on estimates of the present value of total consumption (private and public) over the simulation period, adding the discounted value of last period national wealth .

$$W = \sum_{i=0}^{T} \frac{1}{(1+R)^i} \cdot C_i + \frac{1}{(1+R)^T} \cdot (K_T + F_T) \tag{7}$$

The discount rate (R) is set equal to the rate of return on financial assets (F). F, the stock of real capital (K), and total consumption (C) are all measured in constant prices. In a friction-loose world, the real rate of return on financial assets should equal the rate of return on real investment. Reducing consumption and increasing investment by one unit in year t would imply an increase in future consumption which, discounted back to period t, would equal the consumption foregone in period t. This is however not necessarily the case in MODAG.

Broadly speaking, an EU membership consists of two elements. The first element represents trade and policy harmonisation, exposing the sheltered agriculture and food-processing industry to free competition from the EU. We also classify tax harmonisation as belonging to this group. The other element is linked to the net contributions to the EU budget. We have chosen to simulate the potential welfare effects of an EU membership in three steps. First, to capture the traditional integration effects, we ignore the aspects of budgetary contributions (simulation M1). In the second simulation (M2) we consider both elements but do not impose any restrictions on government finances. Finally, we impose fiscal policy measures to illustrate the effects of the bugdetary sustainability problems in simulation M2 (simulation M3).

4.1 Membership without contribution - the M1 simulation

It is assumed that increased foreign competition will force down food prices to Danish levels within two years. Lower food prices imply ceteris paribus higher purchasing power in the household sector. In addition, the temporary farmer support will maintain real income for farmers in the very first years after accession.

Table 4. Partial effects of EU membership, excluding membership payments (M1). Difference from reference simulation in per cent, unless otherwise stated.

	2000	2010	2020
Private Consumption	**-0.3**	**0.5**	**1.6**
Private Investment	**-1.8**	**3.2**	**2.1**
GDP	**-0.4**	**0.8**	**1.7**
Employment	**-1.1**	**-0.2**	**0.2**
Government Surplus 1)	**-0.7**	**0.0**	**-0.2**
Current Account 1)	**0.0**	**0.3**	**0.3**
Average Hourly Wage Rate	**-3.5**	**-7.7**	**-6.1**
Consumer Prices	**-3.5**	**-6.2**	**-5.8**

1) In percentage points of GDP

Thus, real household disposable income and private consumption increase somewhat the first years. But when temporary farm subsidies are faded out by 2000, and the multiplier and accelerator effects work through, private consumption is lower than in the reference simulation. The same is the case with GDP and total employment. In Table 4, we present our results emphasising some important macroeconomic variables. Overall employment is reduced by more than 1 per cent by 2000, and 80-90 per cent of this reduction has taken place in agriculture and food-processing industries. However, due to the discouraged worker effect unemployment increases by only about one half of the decrease in employment. Wages are reduced due to increased unemployment and lower consumer prices, counteracting the positive impetus on real disposable household income from the initial reduction in food prices. After 2005, wages are about 7 per cent below reference levels, a difference that is kept approximately unchanged until year 2020. The fall in wages boosts exports and induces factor substitution into labour, gradually restoring equilibrium in the labour market. In the first 10 to 15 years after the policy change production does not change much because the positive impulses from improved competitiveness are counteracted by negative impulses from domestic demand. In 2010, GDP is larger than in the reference simulation, although employment is still slightly below. After 25 years, employment is also higher than in the reference scenario.

Average labour productivity increases during the first years mainly due to the imposed rationalisation in the agricultural sector and the food-processing industries. If these industries are excluded, value added per man-hour hardly changes until 2010. But while activity in many sectors increases and the economy recovers, productivity in other sectors also increases[10]. By 2020, labour productivity in the

[10] Productivity in the government sector is assumed to follow the National Accounts convention of an autonomous productivity growth, and we have not changed the rate of growth of productivity in this sector, due to EU membership. The same applies to the petroleum sector.

mainland private sector excluding the agriculture and food-processing industries is one per cent higher than in the reference simulation. The reason why productivity increases in other sectors in the long run is to be found in the increasing returns to scale properties of the implicit production functions of the model. During the first years, the government surplus is reduced due to the temporary increase in farm subsidies and lower tax revenues as a consequence of harmonisation to lower levels in EU. From 2000 on, changes are small both in the government balance and the current account.

4.2 Membership including contribution - the M2 simulation

This simulation is identical to the M1 simulation, except that the net contribution to EU's common budget is included. Since fiscal policy is not changed, the government budget balance deteriorates alongside the current account. In the M2 simulation a fall in government surplus of 1.7 percentage point of GDP in 2000 grows to 3.4 percentage points in 2020. The current account deteriorates with an amount corresponding to 1 percentage point of GDP in year 2000 and 2.8 percentage points in year 2020. Due to accumulated interest payments the difference in the surpluses tends to increase through time. Disposable income for Norway is reduced. Contrary to the M1 simulation, domestic interest rates increase slightly compared to the levels in the reference simulation due to a weakening current account. Since there are no strong links to interest rate effects in MODAG, the other macroeceonomic variables are found to change almost identically to what was observed in the M1 simulation.

4.3 Membership with fiscal restraint - the M3 simulation

Without offsetting policy actions, the net contribution to the EU's common budget worsens both the current account and the government balance. Modelling the link between government and national debt and exchange rate expectations and interest rates is complex, and MODAG is not very sophisticated in this respect. However, we believe that agents in the financial markets will assess the development of public finances and the current account when judging the likely future course of the exchange rate. In our analysis, we have measured the effects on these balances as differences from the reference simulations.

In order to assume unchanged exchange rates and a small interest rate increase (as in the M2 simulation), the current account and government balance must be sustainable. Whether they will be sustainable after imposing an EU-membership depends on the likely development in the case of Norway not being an EU-member, i.e. on the surpluses in the reference simulation. According to the Maastricht definitions, the 1994 current account surplus was 3.3 per cent of GDP and there was a government deficit of 0.7 per cent of GDP. In the reference simulation, the present cyclical upturn together with increased petroleum revenues in the first part of the simulation period makes both these

surpluses relatively comfortable. Even though the difference between the size of the two balances in the M2 and the reference simulations increase throughout the simulation period, the economy does, nevertheless, fulfil the budgetary requirements of the Maastricht treaty. However, if the reference simulation is too optimistic regarding fiscal solvency, the estimated weakening of the government budget may be seen as too large. Also, if the assumed policy of the M2 simulation was extended beyond 2020, the Maastricht criteria would have been violated further into the future.

In the M3 simulation we have constructed a policy package to reduce the adverse effects on government balances due to the EU-membership contribution. We note that the necessary size of the package will depend on the choice of fiscal instruments. To mention but one example - private consumption is a lot more import-intensive than government consumption. However, we do not want to focus on the effectiveness of different fiscal instruments in obtaining macroeconomic goals. Consequently we have constructed a broad fiscal policy package consisting of a reduction in government consumption and subsidies, an increase in personal and payroll taxes and in some excise taxes. In quantitative terms, the package reduces government consumption by 0.6 per cent, and increases the average household tax rate by 1 percentage point (averaging 0.5 per cent of GDP). Subsidies are reduced by 0.2 per cent.

The effects of the policy package are summarised in Table 5 below. Implementing the package appears to have significant negative effects on production, employment and revenues, according to our simulations. The fiscal policy contraction has long-lasting negative impacts on domestic production, consumption and employment, yet the end-of-simulation net financial and real wealth increases. The most important question is whether the working of the economy enables the authorities to reduce consumption in the beginning of the simulation period in order to obtain higher consumption later without real losses. Table 5 below suggests that this is not the case.

Table 5. Partial effects of a membership-induced fiscal contraction. Difference from the M2 simulation in per cent unless otherwise stated.

	2000	2010	2020
Private Consumption	-2.5	-3.6	-4.6
Private Investment	-4.2	-4.0	-4.3
GDP	-2.3	-3.0	-3.4
Employment	-2.6	-2.9	-2.9
Government Surplus 1)	1.9	2.2	3.4
Current Account 1)	1.3	2.9	3.4
Average Hourly Wage Rate	2.2	2.1	0.4
Consumer Prices	1.9	2.4	2.1

1) In percentage points of GDP

As the fiscal contraction reduces employment, nominal wages continue to increase. The main reason for this is to be found in the shifting of taxes onto wages. According to the econometrics of MODAG, increased direct and indirect personal taxes will increase nominal wages in order to maintain real disposable wages. Hence, the policy package counteracts the competitive gains in the M1 simulation .

4.4 EU-membership and the impact on welfare

In this section we present welfare evaluation of the different outcomes based on equation (7). In all simulations the discount factor was set equal to the real short run interest rate which averages 4 per cent. Sensitivity tests showed that discount factors of 3 and 5 per cent gave practically the same results. Net wealth increases by 0.1 per cent when the net membership contribution is ignored. In the M1 simulation average private and public consumption exceeds the level in the reference simulation by 0.4 per cent per year. However, in the first part of the simulation period, consumption on average was negatively affected by an EU-membership due to less than full capacity utilisation. The present value of total consumption increased by 0.3 per cent, while net national financial assets declined significantly.

Table 6. Welfare measured by the discounted value of wealth and consumption.
Percentage difference from reference simulation. Discount factor: 4 per cent.

Simulation	
M 1 (no contribution)	0.1
M 2 (incl. contribution)	-0.9
M 3 (also incl. fiscal restraint)	-3.2

When accounting for the membership contribution (the M2 simulation), national wealth is negatively affected. A policy designed to prevent the reduction in net financial assets implied by the M2 simulation, imposes an additional real loss on the economy. This is clear from Table 5 and illustrated in a compact form in Table 6. Total wealth is reduced by 3.2 per cent when membership is combined with a fiscal policy package (the M3 simulation) aimed at restoring the government sector surplus of the reference simulation. Because of the increasing returns to scale properties, a lower level of activity generates lower productivity. Value added in the private mainland sector (excluding the housing sector) declines by some 1.2 per cent in 2020 as GDP is reduced by more than 3 per cent. This is one of the reasons why consumption possibilities are reduced by a fiscal contraction.

4.5 Sensitivity tests

One may of course cast doubt on the reliability of these results by questioning the estimated parameters of the model. Often, the assumptions regarding the responsiveness of real wages to changes

in unemployment and the responsiveness of domestic firms' market shares to changes in domestic costs appear to be crucial in studies of this kind, as is the case with the scale elasticities. Clearly, by assuming constant returns to scale, the effect of a fiscal contraction on consumption would not have been that significant. Furthermore, more «optimistic» assumptions regarding price elasticities in foreign trade and wage responsiveness to unemployment might have altered the negative effects on the economy. As the model predicts relatively small wage responses to short run reductions in employment, it is of interest to try to assess alternative assumptions regarding the wage formation. A move in this direction can be interpreted as approaching the properties of a CGE model where a more smoothly clearing labour market and larger elasticities in foreign trade are common assumptions. This would unquestionably force our model to be less consistent with the results of most time series based empirical studies of the Norwegian economy. However, as our aim is to study the problems of transition in a field where other researchers have focused on static long run gains and losses of a trade policy reform, this may be of interest.

Table 7. Two tests of sensitivity. Per cent difference in welfare from reference simulation.

Simulations	All trade elasticities increased by a factor of 3	The level of unemployment set to 2.5 per cent from 2005 on
M 1 (no contribution)	**1.6**	**0,2**
M 2 (incl. contribution)	**-0.2**	**-0.8**
M 3 (also incl. fiscal restraint)	**-2.4**	**-3.4**

Hence, in Table 7 we present sensitivity tests with respect to the elasticities of trade and the responsiveness of real wages to changes in unemployment. This responsiveness depends considerably on the initial unemployment level. Hence we represent an increase in the responsiveness with a reduction in the level of unemployment in the reference simulation[11]. Larger trade elasticities produce more favourable results in all simulations. The pure «increased exposure» effect now amounts to an increase of 1.6 per cent in total wealth. Nevertheless, the effect of EU membership is still marginally negative even without a fiscal contraction. The change in wealth in the case of an EU membership combined with the policy package is reduced from -3.2 per cent to -2.4 per cent. Hence, it is reasonable to claim that the qualitative results provided by this model are not very sensitive with respect to these elasticities.

[11] Unemployment will probably not be altered much in any direction in the near future. It is a lot more difficult to assess whether unemployment after year 2000 will be 4-4.5 or 2.5 per cent. In order to assess the effects of different future unemployment levels, we have constructed an alternative reference simulation where the error terms in the econometric equations have been adjusted so that unemployment declines to 2.5 per cent in 2005 and stays constant until 2020. All other variables are identical to their original reference simulation values. We once again simulate the effects of an EU-membership applying the basic model version with the historically estimated trade price elasticities.

Perhaps a little surprisingly, the effects of increasing the responsiveness of real wages to changes in unemployment do not seem to change the effects reported in Table 6. One reason for this is that unemployment is assumed equal to the level in the original reference simulation the first years after accession (see footnote 10) where the largest shocks were to take place. But this is not the entire explanation. The wage reductions are in fact significantly larger under this alternative, and factor substitution contributes to moderate the negative employment effects of an EU-membership. However, in addition to reducing labour costs, lower real wages also generates a reduction in real household income and private consumption. Still, it raises profitability and encourages investment. The net effect on domestic demand is nevertheless negative. Neither seems the positive effects on net exports to be large enough to offset the negative effect on domestic demand. The magnitude of the fiscal contraction behind the estimates in Table 7 is the same as in the M3 simulation in Table 6. However, it generates a larger reduction in real wages and consequently in domestic demand. Together with the increasing returns to scale property, it generates a fall in productivity growth and consumption possibilities.

5 Concluding remarks

Our simulations give a somewhat pessimistic impression of the potential economic gains of Norwegian integration and membership in the European Union. Although the pure effects of integration presented in the M1-simulation are slightly positive in terms of our welfare measure, the under-utilisation of labour and capital in sectors most severely exposed to increased foreign competition, i.e. agriculture and food processing, implies reduced production and income during the first half of the simulation period. However, lower real wages generate a gradual increase in activity in more productive sectors, and reinforced by increasing returns to scale, production and income are found to be above the reference scenario levels during the latter half of the simulation period. The positive integration effects are, however, not strong enough to counteract the cost of the net contribution to the common budget, as displayed in the M2 simulation[12]. The M3 simulation shows that this is especially so if fiscal policy is modified to maintain the public sector budget balance.

The study illustrates that there are limits to how much a country can contribute to the union without loosing the gains from integration. In the case of Norway and the EU, the repayments through CAP and other membership funds are not sufficiently large to generate an over all gain from a membership. Since the remaining EFTA members are quite similar with respect to the importance of the agricultural sector, we claim that the outlined effects of a membership might be important for these countries too. In addition, the study illuminates important transitory mechanisms, first of all rooted in the functioning

[12] Recently, the Norwegian GDP figures have been revised upwards by more than 10 per cent due to new international standards. If the study was based on the these numbers, the results in the M2 and M3 simulations would probably have appeared to be even more negative as a result of increased net contributions.

of the labour market, which adjust slowly to this kind of policy changes. The parameters of the model are estimated on times series data, and the relationships broadly capture the historical dynamics of the Norwegian economy. Since it has been claimed that the reported results depend heavily on the actual values of a small set of key parameters, we have performed sensitivity calculations with respect to the real wage responsiveness to changes in labour market conditions and the absolute values of the trade elasticities. The first modification of the model did not significantly alter our predictions but the increased sensitivity of foreign trade to relative prices magnified the pure integration effects of an EU-membership. However, even a threefold increase in the trade elasticities was not sufficient to alter the qualitative conclusions of our calculations.

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