TTIP – Potential Effects on Norway

Gabriel Felbermayr
Rahel Aichele
Inga Heiland
Arne Melchior
Marina Steininger

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1. Introduction

Countries are negotiating and concluding large trade agreements all around the world. Different to many earlier pacts, the current deals have strong systemic relevance. The Transpacific Partnership (TPP) agreement negotiated by the US, Japan, and eleven other Pacific Rim countries has the explicit ambition to allow the partners to continue shaping global trade rules. The partnership is the corner stone of President Obama's pivot to Asia and one of its implicit objectives is to contain China. The People's Republic has its own trade policy agenda; together with other Asian countries, it is negotiating the Regional Comprehensive Economic Partnership agreement, which would, once concluded, encompass almost half of the global population.

More crucial for Norway, the European Union is negotiating the transatlantic trade and investment partnership (TTIP) agreement with the United States of America since summer 2013. It would cover about 45% of global GDP, thus even more than in TPP and with the ambition to set the standards for world trade for the XXIst century. However, the agreement also has classical components such as the elimination of tariffs, the streamlining of market access rules, the opening of procurement markets, services liberalization, and investment protection. Norway, with its close ties to the European Union through membership in the European Economic Area (EEA) will be affected by this systemically relevant agreement. When TTIP lowers tariffs and the costs of non-tariff barriers in Europe for US suppliers, the relative competitive position of Norwegian firms on the EU markets deteriorates. The same is true for Norwegian exporters to the US relative to their EU competitors. This problem is particularly relevant in sectors in which Norway has substantial sales to either the US or EU markets or both. In sectors, in which the EU or the US have little or relatively uncompetitive production themselves, the increase in economic activity in the TTIP partner countries generated by a successful agreement would also help Norwegian firms boost their sales.

In this respect, Norway is in a similar position as Iceland, which is also a member of EEA, and as Switzerland, which is tied to the EU through a large number of bilateral treaties. Structurally, Mexico and Canada who are linked to the US economy by the NAFTA free trade agreement face comparable concerns, too. However, since the mentioned countries differ very strongly with respect to their patterns of comparative advantage, a case-by-case analysis is needed to detect vulnerabilities and opportunities.

Whether these trade creation effects outweigh the trade diversion effects described above depends on the structures of comparative advantage and of initial protection. A simulation of a computable general equilibrium (CGE) model is required to determine the net effect. This is what the present note tries to undertake. For this purpose, a structurally estimated CGE model developed at the Ifo-Institute (Aichele et al., 2016) is applied. This framework

builds on a long tradition of CGE modeling, but integrates parameter estimation, scenario definition, and estimation into a unified setup.

In the following, we provide a detailed analysis of what the TTIP could imply for Norway. Since the negotiations are ongoing, it is still unclear in which areas the agreement will come to which conclusions. Therefore, the analysis necessarily will be scenario-driven. Nonetheless, this helps shedding light on the underlying mechanisms and identifies industries which warrant deeper analysis.

Moreover, Norway has several options to deal with the strategic challenge that the TTIP might entail. It could strive to conclude its own trade agreement with the US or team up with other EFTA (European Free Trade Association) members to do so. We provide some simulation insights describing the effects of such initiatives. Of theoretical interest, we also look a scenario where Norway becomes a full partner of the TTIP.

In the following (Section 2), we briefly describe the Ifo trade model. In Section 3, we describe how we deal with the quantification of non-tariff barriers and trade cost reductions related to them. Section 4 and 5 provide the main quantitative results of the paper. In Section 6 we draw the conclusions. The results of the bottom-up analysis are depicted in Apendix I.

2. The Ifo Trade Model

The Ifo Trade Model is a computable general equilibrium (CGE) model which falls into the class of New Quantitative Trade Theory (NQTT) models (Ottaviano, 2014). This means that the estimation of parameters (essentially trade elasticities and the trade cost effects of the agreement in question) is conducted on the same data that are used as the baseline for the simulation exercise. However, the theoretical basis of the model is very standard and comparable to other CGE models. It is a stochastic, multi-sector, multi-country Ricardian model of the type developed by Eaton and Kortum (2002), extended to incorporate rich value chain interactions by Caliendo and Parro (2015), broadened to include non-tariff barriers by Aichele et al. (2014, 2016) and described in general terms by Costinot and Rodriguez-Clare (2014).

The pioneering work by Eaton and Kortum (2002), in particular the characterization of technology as a random variable, allows us to obtain analytical results which make sure that the estimation of model parameters can be carried out in a consistent way based on a specific equilibrium relationship obtained from the model itself (the gravity equation). The estimation procedure is described in Aichele et al. (2016); note, however, that this paper provides more aggregate results than those shown in the present study.

As all other well-known CGE models that are used for trade policy analysis, the Ifo Trade Model assumes perfect competition and full employment; it requires detailed data on sectoral value added and production, trade flows of goods and services, input-output relations between domestic and foreign sectors, and technological input coefficients (treating cost shares as constant assuming Cobb-Douglas technologies) as inputs. These data come, similar to almost all other CGE models, from the Global Trade Analysis Project (GTAP). We use the newest available data set (GTAP 9.1), which refer to the year of 2011. We use the model to update the data such that it reflects the trade policy landscape as observed in 2016.[1]

The Ifo Trade Model is a general equilibrium model which simultaneously quantifies the effects of trade policy scenarios on sectoral trade flows, value added, employment, wages, tariff income, GDP, prices, and other variables of all countries involved. Thus, trade diversion effects are fully accounted for. For example, the TTIP could lead to a redirection of European car parts imports away from sources such as Norway towards the US. These diversion effects are the root cause for the fact that the welfare effects of free trade agreements (FTAs) are generally ambiguous for the parties engaged in negotiating them and also for the countries remaining outside of the agreement. The model allows for a very rich pattern of domestic and international sourcing patterns. This means that an expansion of economic activity in one country can lead to increased exports of third countries, which counteracts the trade diversion effects.

The model provides static level effects on real income and trade. Potential dynamic effects of trade liberalization, e.g. on the innovation activities of firms, are not taken into account. In other words, we provide a lower bound for the potential effects of a TTIP. However, this does not imply that the static effects would result instantaneously after the FTA has entered into force. This is particularly relevant for non-tariff measures (NTMs): the increased regulatory cooperation between the EU and the US will be slowly phased in and only gradually yield lower trade costs. Evidence from existing FTAs shows that this phasing-in process usually takes between 10 and 12 years (see e.g. Jung, 2012).

Another caveat worth mentioning is that the Ifo Trade Model, like almost all other CGE models, does not explicitly include rules of origin. This means that the model may generate too little trade diversion, since goods originating from third countries may enjoy preferential treatment when used as inputs in the parties' production systems. Note, however, that at the level of sectoral aggregation used in the model, the share of third party value added in exports is beyond the critical thresholds of 50% in almost all cases.

[1] More precisely, we predict an updated baseline data set (trade flows, sectoral employment, value added, etc.) such that it reflects the trade policy changes that have occurred since 2011 up to today. The effects of all free trade agreements as of 2016 are simulated, plus the most important pending agreements of the EFTA and EU countries as well as the US (i.e. EFTA with Georgia, the Philippines and Guatemala, respectively, CETA and TPP). We also work with an alternative benchmark: Starting in 2011, the effects of all FTAs as of 2016 are simulated, without consideration of pending agreements.

One important advantage of the Ifo Trade Model is that one can calculate the effects of trade policy changes without knowing the level of trade costs. This is an enormous advantage, because trade costs other than tariffs would be very difficult to quantify and any quantification would come with substantial uncertainties. However, one needs to have information about the expected changes in sectoral trade costs to model the effects of the TTIP. This is relatively easy when talking about tariffs, since they can be directly observed. The only complication here is to aggregate tariffs up to the level of detail in the model (57 industries) and how to deal with specific tariffs and tariff quotas. We use the data provided by GTAP which already solves these problems. How to deal with changes in non-tariff trade barriers is more involved; see Section 3 on our modelling strategy.

The model has a number of attractive properties for our purpose:

- It has a detailed subdivision of sectors, with a maximum 57 sectors. The sector list is attached as Appendix II. It has more than 20 agriculture and food processing subsectors.
- The model is estimated and specified at the country level, with 140 countries. Hence any pattern of free trade agreements can be analyzed, and Norway appears individually and not as part of some aggregate ("EFTA" etc.).
- The model captures international production networks so we can analyze "trade in value added". For aquaculture and the food industry in Norway, for instance, about 70-80 per cent of the gross value of production is represented by input goods and services (see e.g. Melchior & Sverdrup 2015). For services, such input-output effects are of huge importance and the model is constructed to take them into account.
- The model is data-based. Since all parameters are estimated on exactly the baseline data that describes the status quo, we have information about the variance-covariance structure of the estimated parameters. So, in principle, we can calculate exact confidence intervals for all of the endogenous model outcomes, computing time being the only restriction. Other approaches, which use parameter estimates from external data sources, cannot provide this type of analysis. Hence we can tell how likely the predictions are, based on real data.

In this report, we present simulation exercises based on two approaches: a top-down approach and a bottom-up approach relating to the quantification of non-tariff trade barriers. Regarding tariffs, the situation is simpler since tariffs can easily be observed. Note, however, that tariffs embedded in the GTAP dataset often deviate from tariffs published by official statistics. The reason is that the GTAP data harmonizes information across countries in calculating ad valorem tariff rates and aggregates to a very specific sector structure. In this study, we have carefully checked the GTAP tariffs data against official data and have made

amendments when needed. This is particularly important in the agricultural and fishery sectors, which are of course of particular importance for Norway.

3. Non-tariff Trade Barriers: Top-down versus Bottom-up

Different approaches differ with respect to the treatment of non-tariff barriers (NTBs). It is useful to broadly distinguish between *bottom-up* and *top-down* approaches:[2]

- Bottom-up approaches imply collecting information from firms and other sources in order to quantify trade costs at the sector level, then specifying some liberalization scenarios and plugging the parameters into an economic model suited for the purpose.

- Contrary to this, IFO (2013) uses a top-down approach where a modified "gravity model" is used to estimate the trade impact of existing free trade agreements, based on observed economic/trade data. With model parameters quantified by the regression analysis, the results are then used to simulate a scenario where TTIP is implemented.

The two approaches have their strengths and weaknesses:

- The bottom-up approach has the strength that trade costs are quantified with specific sector-specific data. A potential weakness is nevertheless that it measures business perceptions rather than observed outcomes. Furthermore, even if firms have said that barriers are high or low it requires an additional step to translate into tariff equivalents or specific figures. For example, Ecorys (2009) used gravity regressions (separately for goods and services) in order to quantify the non-tariff barriers, so here the top-down approach perhaps enters "through the back door". In the final analysis of CEPR (2013), it is also necessary to make ad hoc assumptions about how large the part of the non-tariff barriers are that are "actionable" in the context of trade agreements.
- The top-down approach has the strength that the whole analysis is based on observed outcomes. On the other hand, the gravity approach may capture any factor that affects trade so it may be even harder to determine to what extent trade frictions are "actionable", and whether they represent non-tariff barriers or e.g. marketing costs or other "natural" trade costs (beyond distance and other aspects that are accounted for in the estimation). Furthermore, the concept of an "average effect" of free trade agreements across time and space is debatable, and the early estimates of IFO (2013) also produced high economic growth (GDP) effects of the TTIP that have been criticized (see e.g. European Parliament, 2014). In later studies, however, IFO has refined the concept (Aichele et al. 2014). Note that the top-down approach is particularly useful in ex post evaluation

[2] For a review of some earlier studies on TTIP, see Medin and Melchior (2014). Also see Felbermayr (2016).

studies, or in analyses of third-party impacts, where it is not of primary interest *how* certain reductions of trade costs are achieved but what matters is the fact that they are achieved.

A limitation for both approaches is that gravity estimates for services are based on cross-border trade only; i.e. only one of the modes for services delivery.[3] Also note that the authors of the CEPR study have turned to top-down estimates in their own more recent work (Egger et al., 2015).

In the study, we try to capture the best of both worlds: we use a model with parameters determined by the top-down approach, but use different sets of numbers to quantify non-tariff barriers and the liberalization scenarios, including estimates obtained from bottom-up exercises. The core model (a computable general equilibrium model) builds on Caliendo and Parro (2015) and Aichele et al. (2014). In the latter, free trade agreements are classified into shallow and deep agreements based on Dür et. al. (2014). Using the GTAP data set, gravity regressions are used to estimate by sector the demand elasticities and the impact of trade agreements. With parameters determined this way, the model may be used to simulate the impact of various trade agreements.

The modeling philosophy in implementing the top-down approach consists in using the experience with existing FTAs to econometrically estimate their effect on sectoral trade flows using so called gravity models. Once causal effects of FTAs on sectoral trade flows are known, estimated trade elasticities and observed tariffs can be used to back out how large the reduction in other costs than tariffs must have been. Table 17 in the Appendix I shows the results obtained from the regression model in terms of ad valorem tariff equivalents. Generally, existing FTAs – both shallow and deep ones – have managed to reduce NTBs significantly in the manufacturing sectors; the evidence is more mixed in agri-food. In services, there is robust evidence for cost reductions, but the effects are rather small in size.

These cost reductions are then used as the basis of scenarios for a possible TTIP. Note that this strategy yields potentials, not forecasts. Whether negotiators are able to realize what has been possible in existing agreements depends on political circumstances.

While the method highlights feasible reforms (feasible, because they have been achieved in other trade relationships), it is absolutely possible that specific agreements go beyond what existing deals have done. In the TTIP case it is conceivable that both sides' major interest in services trade leads them to achieve more than what other agreements have been able to do. In that sense, we might underestimate the potentials for certain areas.

In the analysis, we use data from Dür et al. (2014) to distinguish FTAs according to their

[3] Perceptions of trade costs may reflect all services modes but also Ecorys (2009) uses gravity analysis of cross-border trade for the scaling of NTBs.

depth, i.e. how far-reaching the provisions on non-tariff aspects are. Because measuring the depth of FTAs is again complicated and fraught with measurement errors, we simply categorize the universe of FTAs into deep ones (such as EU-Korea, NAFTA, etc.) and shallow ones (such as EU-Morocco, or many older FTAs amongst developing countries). This allows us to assess the trade and welfare effects of different depths of trade liberalization. With this information at hand, we can simulate different levels of NTM reductions of a TTIP.

By contrast, the bottom-up approach uses direct evidence on non-tariff trade barriers and expert opinion on realistic cost reductions achievable in an agreement such as the TTIP. There exists a rich literature dedicated to estimating those barriers; see e.g. Kee et al. (2009). Francois et al. (2013) provides an excellent discussion of this approach in the context of the TTIP agreement. In this analysis, we also implement a bottom-up approach to check the robustness of our top-down analysis.

More precisely, in the bottom-up analysis, we use as a point of departure the results of Cadot & Gourdon (2016) on the quantitative impact of various types of arrangements related to regulatory cooperation. Assessing to what extent the various types of arrangements (mutual recognition and the like) are likely to be implemented across sectors in TTIP, we provide estimates on predicted NTM reduction in all the 42 goods sectors. For services, we use the predicted NTM reductions from CEPR (2013) as a point of departure. These are adjusted (mostly downward) in the light of more recent information on the TTIP negotiations and used to calculate a revised set of predicted NTM changes. [4] A detailed description is provided in chapter six.

The trade policy scenarios —described in more detail in the next subsection— are based on the following thought experiment: in the world as we observe it in 2011, if the EU and the US had a FTA, i.e. eliminated all bilateral tariffs and reduced NTMs, how would trade, sectoral production structures and real income look like in this alternative world? To create the scenarios, in the top-down approach, we assume that the extent of NTM reductions for the TTIP would be similar to the ones observed in past (shallow or deep) FTAs. In the bottom-up analysis, we draw on existing literature and our own judgement to provide credible estimates of how trade barriers may change due to the agreement.

4. Existing studies on the TTIP

By now, there are many different ex ante assessments of the effects of the TTIP, which mostly focus on the EU and the US. Table 1 shows the macroeconomic predictions for the most prominent ones. The CEPR (2013), broadened to member state detail by WTI (2016) and

[4] The input on services for the bottom-up scenarios was provided by Menon Business Economics, Norway.

CEPII (2013) take a bottom-up approach, Aichele et al. (2016), and Felbermayr et al. (2015) employ a top-down approach; Egger et al. (2015) mixes the two. All these studies employ CGE models in which trade leads to efficiency gains through an improved sectoral allocation of resources, higher competition (and thus lower prices) and resource savings (due to the elimination of wasteful bureaucracy). Ifo (2013) and Felbermayr et al. (2015) go for a single-sector setup; the others use a multi-sector framework. Capaldo (2014) uses a Keynesian macro model, in which gains from trade are ruled out by construction. Some studies assume spillovers, i.e., trade policy reform across the Atlantic also benefits third parties through the establishment of global rules and standards. The empirical evidence for such spillovers is weak, however (Felbermayr et al., 2015). Related to this project, a conceptual discussion of trade policy spillovers is provided by Melchior (2016), In addition to trade policy spillovers, there could also be "domino effects" whereby third countries initiate new trade agreements or revise existing ones as a response to TTIP (see e.g. Baldwin and Jaimovicz 2016). Beyond such agreements by Norway and EFTA, we also include scenarios where Turkey and Mexico update their agreements with the EU and the USA as a response to TTIP.

Table 1 Results of existing studies on TTIP: Effects on real per capita income

	[1]	[2]	[3]	[4]		[5]		[6]
	CEPR (2013)/WTI (2016)	CEPII (2013)	Aichele et al. (2016)	Egger et al. (2015)		Felbermayr et al. (2015)		Capaldo (2014)
NTBs	B-U	B-U	T-D	B-U&T-D		T-D		n.a.
Spillovers	YES	NO	NO	NO	YES	NO	YES	n.a.
USA	0.4	0.3	0.5	1.0	1.1	4.9	7.1	0.4
EU	0.5	0.3	0.4	2.3	3.0	3.9	n.a.	-0.4
Germany	0.6	0.4	0.5	1.4	2.3	3.5	7.1	-0.3
France	0.3	0.2	0.3	1.3	1.9	3.5	7.2	-0.5
UK	0.4	0.4	0.6	1.8	2.2	5.1	9.0	-0.1
Italy	0.5	n.a.	0.3	1.5	2.2	3.9	7.7	-0.0
Spain	0.4	n.a.	0.3	0.8	1.4	5.6	9.6	n.a.
Non-TTIP	0.1	n.a.	-0.0	n.a.	n.a.	-0.9	0.8	n.a.
World	0.3	n.a.	0.2	n.a.	n.a.	1.6	3.9	n.a.

Notes: Felbermayr et al. (2015) is an update of Ifo (2013) with more recent data, Aichele et al. (2016) is an update of Aichele et al. (2014) with more recent data substantially revised parameter estimates.

Table 1 shows that results on per capita income vary widely across the different models, mostly reflecting differences in scenario definitions. Only a few studies report effects for outsiders; in models with a multi-sector structure, which can account for differences in comparative advantage structures, these countries (of which Norway is one) benefit slightly from the agreement or are largely unaffected; in the presence of spillovers, there are measurable benefits also for these countries. However, in the single-sector model of Felbermayr et al. (2015), non-TTIP countries would lose.[5] In the following, we use the model of Aichele et al. (2016); see below for details. It is very close to CEPR (2013) and CEPII (2013).

5. Simulation results: Top-down Analysis

5.1 The simulated benchmark: All FTAs as of 2016 and all pending agreements of the EU, USA and EFTA

Before we move to simulations regarding the TTIP, we must prepare the ground by showing the effects that result from constructing a 2016 baseline based on the observed 2011 GTAP data. Tables 2 and 3 show Norway and its major trade partners.[6] Table 2 considers the default case, where, starting in 2011, the effects of all free trade agreements as of 2016 are simulated, plus the most important pending agreements of the EFTA and EU countries as well as the US (i.e., EFTA with Georgia, Philippines and Guatemala, respectively, CETA and TPP). Table 3 computes an alternative benchmark: Starting in 2011, the effects of all FTAs as of 2016 are simulated, without consideration of pending agreements.

[5] In single-sector models, there is no notion of comparative advantage. Trade happens because of product differentiation. These models represent a situation, where no country has a comparative advantage in any good, but countries differ with respect to absolute advantage (their average productivity levels) only.

[6] We focus on the top 10 trade partners. (i.e. on the import side: several EU countries, plus the USA on place 4 and Canada on place 10; on the export side: several EU countries, plus the US, China and Korea ranked 5th, 8th and 9th, respectively, according to our GTAP data in 2011).

Table 2: Effects of updating trade policies from 2011 to 2016, default case

	Real GDP		Real income change	Real wage change	Change in openness	Change in aggregate trade
	total, in bn USD	per capita, in USD	in %	in %	in %points	in %
South Korea	1393	27513	3.78	5.76	14.91	19.41
Canada	1573	43935	1.47	1.76	7.14	14.25
USA	17968	55904	0.48	0.52	2.55	9.01
EU28	16266	32064	0.27	n.a.	0.87	0.76
Norway	398	76266	0.16	0.18	0.59	1.01
China	11385	8280	-0.02	0.01	-0.15	-0.27
World	72318	10849	0.47	n.a.	n.a.	-0.34

Source: The real income change of regions is a GDP-weighted average of the country-specific real income changes in that region. Data source: GDP data for the year 2015 stem from the World Economic Outlook. Other results from own simulations.

The actual and pending trade policy changes observed from 2011 to 2016 have increased real income, real wages, openness (the sum of exports and imports, divided by GDP), and aggregate trade in all countries except China. For example, Korea has entered into a deep FTA with the US, which became active in 2012. This, and other agreements of the country, plus the side-effects of what has happened elsewhere, has increased real income by 3.78%. Real wage changes differ from changes of real income because of other income sources (such as, e.g., tariff income).

Looking at Norway, the agreements enacted since 2011 have cumulatively increased real income by 0.16%, and have boosted aggregate trade by about 1%.

Table 3 presents the macroeconomic effects from adopting an alternative updating strategy, where pending agreements are excluded. For example, Canada's agreement with the EU is not included. This leaves Canada only with the much more insignificant FTAs with Korea, Honduras and Panama. As a consequence, adjustments in aggregate trade or GDP are much smaller than in Table 2.

Table 3: Effects of updating trade policies from 2011 to 2016, alternative case

	Real GDP		Real income change	Real wage change	Change in openness	Change in aggregate trade
	total, in bn USD	per capita, in USD	in %	in %	in %points	in %
South Korea	1393	27513	3.95	5.92	15.97	20.55
EU28	16266	32064	0.20	n.a.	0.56	0.69
USA	17968	55904	0.18	0.19	1.06	3.71
Canada	1573	43935	0.15	0.14	0.31	0.68
Norway	398	76266	0.14	0.14	0.58	0.96
China	11385	8280	0.03	0.03	0.09	0.21
World	72318	10849	0.26	n.a.	n.a.	-0.32

Source: The real income change of regions is a GDP-weighted average of the country-specific real income changes in that region. Openness is defined as (exports+imports)/GDP. Aggregate trade is defined as exports plus imports. Data source: GDP data for the year 2015 stem from the World Economic Outlook. Other results: from own simulations.

In our simulation exercises, we build on the default baseline, but we carry out robustness analysis using the alternative construction of a baseline. The results presented below show changes between a "new" situation (with the TTIP in place) and the baseline (however defined). We are now ready to show the results from simulating various TTIP scenarios. We start with showing macroeconomic effects (GDP, aggregate openness), then we turn to sector-level effects and in a final step, we look at changes in bilateral trade.

5.2 Trade policy scenarios

We consider the following seven scenarios:

(i) Shallow TTIP (from top-down estimates)

(ii) Deep TTIP (from top-down estimates)

(iii) Deep TTIP with domino effects, i.e. additionally EU-Mexico and EU-Turkey turn deep

(iv) Deep TTIP, Norway also member of the TTIP

(v) Deep TTIP, EFTA countries also member of the TTIP

(vi) Deep TTIP and Norway negotiates shallow agreement with the US (all sectors treated)

(vii) Deep TTIP and EFTA negotiates shallow agreement with the US (all sectors treated)

In all scenarios, tariffs between the EU and the US are completely phased out. The initial tariffs are depicted in Appendix I. Not surprisingly, deep FTAs yield larger cost savings than shallow ones. The econometric top-down estimation predicts substantially stronger cost savings in many important services sectors, such as business services, construction, or finance, as well as in certain (but not in all) manufacturing sectors such as automotive or metal. Differences in the agricultural sectors are often less pronounced.

5.3 Macroeconomic effects of the TTIP

Table 4 provides the simulation results for real per capita income. This is the model counterpart of what economic theorists call welfare. It measures how much or less purchasing power the average person in the countries under scrutiny would have, in case a certain policy change occurs.

The two left-most columns show the level of real GDP and per capita real GDP in the initial situation (measured in constant 2011 USD). Note that changes in these variables coincide, because population is held constant. The following columns report the outcomes for the seven scenarios discussed above.

If TTIP turns out to be as effective in cutting trade costs between the US and the EU as the average shallow FTA observed in the data (Scenario (i)), the level of GDP per year in the US would go up by 0.28%, while it would increase by only slightly less (0.26%) in the EU. China and South Korea would register small losses, as firms from the EU and the US gain market shares in the US and EU markets, respectively. By contrast, Norway (and Canada) would not lose from the agreement. While these countries are also affected by possible trade diversion, they benefit from their tight integration in European (and North-American) production networks. We will see later that additional exports of EU firms to the US increase the demand for inputs sourced from Norway.

Table 4: Real income changes with TTIP

	Real GDP		Real income changes (in %), different TTIP scenarios						
	total, in bn USD	per capita, in USD	(i) Shallow TTIP	(ii) Deep TTIP	(iii) TTIP w. domino effect	(iv) Deep TTIP incl. NOR	(v) Deep TTIP incl. EFTA	(vi) Deep TTIP & shallow US-NOR FTA	(vii) Deep TTIP & shallow US-EFTA
USA	17968	55904	0.28	0.56	0.57	0.57	0.59	0.57	0.58
EU28	16266	32064	0.26	0.49	0.58	0.49	0.49	0.49	0.49
Norway	398	76266	0.03	0.04	0.05	0.39	0.39	0.23	0.23
Canada	1573	43935	0.01	0.00	0.00	0.00	0.00	0.00	0.00
China	11385	8280	-0.02	-0.04	-0.05	-0.04	-0.04	-0.04	-0.04
South Korea	1393	27513	-0.02	-0.07	-0.08	-0.07	-0.07	-0.07	-0.06
World	72318	10849	0.12	0.24	0.28	0.24	0.25	0.24	0.25

Note: In the scenario with domino effects, the negotiation of the TTIP leads to the deepening of the EU-Mexico and the EU-Turkey FTAs. Data source: GDP data for the year 2015 stem from the World Economic Outlook and own simulations.

If TTIP turns out to be as effective as the average existing deep trade agreement, its benefits for the average US or EU citizen roughly double and reach 0.56% and 0.49%, respectively. This is because certain key sectors, such as motor vehicles or business services can expect much larger cost cuts under the deep scenario than under the shallow one. The aggregate effects for scenario (ii) shown in the table are very much comparable in size to those calculated by CEPR (2013) for the EU Commission.

Scenario (iii) adds domino effects modelled as a deepening of existing trade agreements between the EU and Mexico and between the EU and Turkey. These countries have expressed concerns about possible preference erosion effects due to the TTIP and the EU Commission is looking into possibilities to upgrade the existing agreements. The results in Table 4 show that such a revamping of FTAs might be a good idea for the EU; it also leads to slightly better outcomes for Norway which benefits from the additional growth in Europe. However, the differences between Scenario (ii) and (iii) are very small.

Scenario (iv) assumes that Norway is able to join the TTIP and secures the cost savings shown in the Appendix III for its own trade with the US. The aggregate outcomes for Norway shown in Table 4 suggest that the country benefits from such a deal, but less than the EU countries would. Because of Norway's higher per capita income, however, absolute income gains would be comparable. For the EU and the US it makes no measurable difference whether Norway joins or not.

If the TTIP goes even farther and includes all EFTA countries (Scenario (v)), Norway's gains would remain almost the same as if it were to join the TTIP alone. However, Switzerland, Iceland, and Liechtenstein the joining TTIP would make the agreement slightly more attractive for the US. However, such a step would complicate negotiations significantly.

Scenarios (vi) and (vii) look at cases where Norway negotiates its own shallow FTA with the US, or EFTA does. The benefits from this configuration for Norway are smaller than if it were to join the TTIP, simply because the TTIP is assumed to be a deep agreement while the Norway-US deal is assumed being shallow. If it were also deep, the same effects than under joining the TTIP would obtain.

Table 5: Openness and its changes with the TTIP

	Initial openness	Changes in openness (in % points), different TTIP scenarios					
	in %	Shallow TTIP	Deep TTIP	Deep TTIP incl. NOR	Deep TTIP incl. EFTA	Deep TTIP & shallow USA-NOR FTA	Deep TTIP & shallow USA-EFTA FTA
Canada	65.3	-0.33	-0.75	-0.76	-0.77	-0.76	-0.76
China	54.3	-0.13	-0.19	-0.19	-0.20	-0.19	-0.20
EU28	86.9	1.59	3.05	3.05	3.01	3.04	3.02
South Korea	130.4	-0.36	-0.67	-0.68	-0.71	-0.68	-0.70
Norway	71.6	-0.81	-0.83	2.08	2.05	0.41	0.39
USA	32.8	2.28	3.97	4.04	4.23	4.01	4.12

Note: Openness is defined as (exports+imports)/GDP. In the scenario with domino effects, the negotiation of the TTIP leads to the deepening of the EU-Mexico and the EU-Turkey FTAs. Data source: GTAP 9 for the year 2011 and own simulations.

Table 5 looks at the effects on openness under our seven scenarios. Openness is defined as the ratio of total trade (exports plus imports) over GDP. The results suggest that the TTIP would reduce Norway's openness from 71.6% to 70.8%. This is a relatively modest reduction which results from the fact that Norway is affected both by a negative trade diversion effect and by a positive income effect. The fact that real GDP in Norway goes up despite the reduction in openness might seem puzzling. However, it arises because the share of Norwegian value added in Norwegian trade goes up despite the reduction in gross trade. Were Norway to join the TTIP (Scenarios (iv) and (v)) or were it to negotiate its own shallow FTA with the US (Scenarios (vi) and (vii)), openness would go up, even if defined on gross trade flows. Table also shows that other TTIP outsiders such as China, Canada, or South Korea are to experience much stronger trade diversion effects relative to income effects than Norway, which results in more substantial reductions in the openness measure.

5.4 Microeconomic effects

Next, we turn to sector level impacts. Table 6 and Table 7 provide the value added effects for all seven scenarios and all 57 sectors in Norway. The value added impact is important, because it determines, how opportunities or threats for workers and firm owners add up. Lower value added means that there is pressure on wages and employment, as well as need for restructuring. The tables list sectors in descending order of impact size. The left-most two columns show the value added in the initial situation as given in our data and also explain the relative size of the sector in aggregate value added.

Oil and gas are the two sectors that gain most from an EU-US trade deal when Norway remains outside. Value added would go up by 565 and 179 mn USD, respectively, in the deep scenario. This is because additional output in the EU boosts demand for Norwegian energy products; moreover, world energy prices go up as the TTIP boosts the level of world activity. Since these sectors rely only very marginally on imported inputs, additional demand translates almost fully into additional domestic value added. The deeper the TTIP, the larger the global boost to activity, and the stronger the positive effects on the Norwegian energy sector. Domino effects in the form of additional trade policy reform would strengthen these positive outcomes for the potential beneficiaries of the TTIP.

Certain service sectors such as public services, dwellings and construction and recreation services would also benefit, although by relatively small amounts. The same is true for forestry, where the simulations predict additional value added of 1 mn USD. For public services, there is no reduction in trade costs viz. the EU or the USA, so the positive impact must be due to a value chain effect.

Forestry and sugar could also benefit from a (deep) TTIP; moreover, there are 20 sectors, where the impact on value added is statistically not distinguishable from zero. In many of these sectors, Norway has virtually no own production, e.g., sugar and paddy rice. In other sectors, Norway has sizeable production, such as in service sectors as insurance or communication, or in agri-food sectors such as wheat or raw milk, but effects are likely to remain very small.

There are 11 sectors where the TTIP could generate small losses of around 1 mn USD in Norway. This is the case in certain agri-food industries such as dairy products or beverages. In relative terms, in all of these sectors, losses remain below 0.3%; the vegetables, fruits, and nuts industry would be strongest hit with a loss of 0.3%.

Minerals and textiles could be hit with losses of about 3 mn USD each; because these industries are relatively small in Norway, the relative sizes of these hits reach 0.4% and 0.6%, respectively.

Table 6: Sectoral value added and its changes in Norway with TTIP/Norway outside, diverse scenarios

	Sectoral value added		Change in sectoral value added with TTIP					
			Shallow TTIP		Deep TTIP		domino effects	
	in mn USD	as share of national value added, in	in mn USD	in %	in mn USD	in %	in mn USD	in %
Oil	49455	11.2	390	0.8	566	1.1	565	1.1
Gas	27867	6.3	34	0.1	123	0.4	179	0.6
Public services	94087	21.3	24	0.0	33	0.0	36	0.0
Dwellings	22631	5.1	7	0.0	10	0.0	11	0.0
Construction	26370	6.0	4	0.0	6	0.0	7	0.0
Recreation and other services	9493	2.1	2	0.0	3	0.0	6	0.1
Forestry	1226	0.3	1	0.1	1	0.1	2	0.1
Water	739	0.2	0	0.0	0	0.0	0	0.0
Sugar	6	0.0	0	0.2	0	0.4	0	0.4
Insurance	6059	1.4	2	0.0	0	0.0	-1	0.0
Coal	0	0.0	0	0.3	0	-0.9	0	-0.8
Petroleum, coal products	0	0.0	0	-1.5	0	-1.1	0	-1.0
Meat products nec	1	0.0	0	-0.1	0	-0.1	0	-0.1
Sugar cane, sugar beet	3	0.0	0	-0.1	0	-0.2	0	-0.2
Paddy rice	3	0.0	0	-0.3	0	-0.5	0	-0.5
Wool, silk-worm cocoons	5	0.0	0	-0.2	0	-0.4	0	-0.6
Processed rice	9	0.0	0	-0.2	0	-0.5	0	-0.5
Oil seeds	8	0.0	0	-1.0	0	-1.4	0	-1.4
Leather products	20	0.0	0	-0.3	0	-0.6	0	-0.7
Wheat	104	0.0	0	-0.2	0	-0.1	0	-0.1
Plant-based fibers	47	0.0	0	-0.2	0	-0.3	0	-0.3
Meat: cattle, sheep, goats, ho	246	0.1	0	-0.1	0	-0.1	0	-0.1
Vegetable oils and fats	9	0.0	0	-1.4	0	-2.0	0	-1.9
Raw milk	723	0.2	0	0.0	0	0.0	0	0.0
Communication	6852	1.5	-2	0.0	0	0.0	0	0.0
Cereal grains nec	195	0.0	0	-0.2	0	-0.2	0	-0.2
Gas manufacture, distribution	81	0.0	0	-0.3	0	-0.5	0	-0.4
Cattle, sheep, goats, horses	650	0.1	-1	-0.1	-1	-0.1	0	-0.1
Wood products	1671	0.4	0	0.0	-1	0.0	-1	-0.1
Dairy products	2022	0.5	0	0.0	-1	0.0	0	0.0
Animal products nec	601	0.1	0	-0.1	-1	-0.1	0	-0.1
Wearing apparel	384	0.1	0	-0.1	-1	-0.2	-3	-0.7
Ferrous metals	380	0.1	0	0.0	-1	-0.2	-2	-0.5
Paper products, publishing	5399	1.2	2	0.0	-1	0.0	0	0.0

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	Sectoral value added		Change in sectoral value added with TTIP					
			Shallow		Deep		Domino Effects	
	in mn USD	national value added, in %	in mn USD	in %	in mn USD	in %	in mn USD	in %
Beverages and tobacco produc	841	0.2	-1	-0.1	-1	-0.1	-1	-0.1
Crops nec	473	0.1	-1	-0.2	-1	-0.2	-1	-0.2
Mineral products nec	1806	0.4	-1	-0.1	-1	-0.1	-1	-0.1
Vegetables, fruit, nuts	547	0.1	-1	-0.2	-1	-0.3	-1	-0.2
Minerals nec	742	0.2	-2	-0.3	-3	-0.4	-3	-0.3
Textiles	526	0.1	-2	-0.3	-3	-0.6	-6	-1.1
Manufactures nec	1526	0.3	-3	-0.2	-7	-0.4	-7	-0.5
Business services nec	55610	12.6	22	0.0	-7	0.0	-8	0.0
Air transport	2617	0.6	-7	-0.3	-7	-0.3	-6	-0.2
Fishing	3579	0.8	-11	-0.3	-9	-0.2	-2	0.0
Financial services nec	14960	3.4	8	0.1	-14	-0.1	-14	-0.1
Food products nec	3664	0.8	-11	-0.3	-14	-0.4	-12	-0.3
Electronic equipment	1879	0.4	-19	-1.0	-16	-0.9	-16	-0.9
Metal products	3688	0.8	-11	-0.3	-19	-0.5	-21	-0.6
Motor vehicles and parts	1468	0.3	-9	-0.6	-24	-1.6	-37	-2.6
Electricity	7973	1.8	-26	-0.3	-29	-0.4	-31	-0.4
Metals nec	876	0.2	-24	-2.7	-29	-3.4	-32	-3.6
Trade	42726	9.7	-29	-0.1	-46	-0.1	-50	-0.1
Transport nec	17692	4.0	-38	-0.2	-49	-0.3	-48	-0.3
Sea transport	3888	0.9	-52	-1.3	-56	-1.4	-58	-1.5
Machinery and equipment nec	7420	1.7	-40	-0.5	-58	-0.8	-65	-0.9
Chemical, rubber, plastic prod	4015	0.9	-37	-0.9	-63	-1.6	-64	-1.6
Transport equipment nec	6274	1.4	-28	-0.5	-73	-1.2	-76	-1.2

Note: All prices are in constant 2011 USD. In the scenario with domino effects, the negotiation of the TTIP leads to the deepening of the EU-Mexico and the EU-Turkey FTAs. Data source: GTAP 9 for the year 2011 and own simulations.

The critical fishery sector would also slightly lose (9 mn USD), but relative losses would be just 0.2%. Thus, the top-down approach suggests that fishery is the second most affected agri-food industry, losses are only larger in the foods products industry, which is roughly of equal size (measured by value added) and which would face losses amounting to 14 mn USD.

The sectors where losses reach amounts that could be felt by businesses are mostly manufacturing industries where both the US and Europe have strong comparative advantages. This is most pronounced in transport equipment; a sector which accounted for more than 6 bn USD in our baseline. Here, losses would amount to about 73 mn USD according to the simulations. The chemicals and machinery sectors would register similar negative effects reaching 63 and 58 mn USD, respectively. The former would be hit relatively more, with a

reduction of value added amounting to 1.6%. This is the largest negative effect amongst industries with a significant contribution to overall Norwegian value added. Even in a shallow agreement, chemicals would lose almost one percent; domino effects due to the deepening of the EU FTAs with Mexico and Turkey would, however, not modify the impact.

Another sector which could be severely hit is sea transportation. The simulation suggests losses of about 52 to 56 mn USD in a shallow and a deep agreement, respectively. This corresponds to about 1.3 and 1.4% of total Norwegian value added.

The sector with the single largest negative impact could be the metals sector. Its value added could decline by about 2.7 to 3.4% in a shallow and a deep TTIP scenario, respectively. Note, however, that the size of this sector is relatively small: it contributes only about 0.2% to total Norwegian value added.

Overall, the picture can be summarized as follows: A shallow and a deep TTIP would slightly increase total value added generation in Norway by between 139 and 205 mn USD. However, the aggregate effect is almost entirely driven by the energy sector. Without the positive contribution of oil and gas, summing up to about three quarters of a billion USD per year, the net impact of the TTIP would be minus 0.5 bn USD. The TTIP would yield negative effects for 41 out of 59 sectors. However, in many of these sectors, the adverse effects would be very minor. Only in eight sectors losses would exceed 1%, of which the largest would be 3.4%. Therefore, the top-down approach suggests that in no sector losses associated to TTIP would be existential.

When interpreting the sector-level results, it is important to bear in mind that they are in no means forecasts, but provide some information on potential impacts. When the order of magnitude of effects is as small as in all except a few sectors, the most likely result is that there will not be any discernable effect.

Table 7 turns to the effects of Norway joining the TTIP, either on its own or together with the other EFTA countries. In these cases, the ordering of sectors with respect to the size of potential impacts would change dramatically compared to the effects of Norway remaining outside of the TTIP. Now, total value added could go up between 1.1 and 1.7 bn USD, depending on the scenario, or between 0.3 and 0.4% of total value added. 41 out of 59 industries would benefit from Norway joining the transatlantic agreement. The business services sector would be the largest beneficiary. Its value added could go up by about 872 mn USD or 1.6%. If Norway participates only partially, those gains would fall to 334 mn USD, mostly because the overall expansion of Norwegian economic activity would be smaller and the increase in demand for business services would remain lower.

Table 7: Sectoral value added and its changes in Norway with TTIP/Norway inside, various scenarios

	Sectoral value added		Change in sectoral value added with TTIP			
			Deep TTIP incl. NOR		Deep TTIP incl. EFTA	
	in mn USD	as share of national value added, in %	in mn USD	in %	in mn USD	in %
Public Services	94087	21.3	298.0	0.3	301.0	0.3
Business services nec	55610	12.6	872.0	1.6	885.9	1.6
Oil	49455	11.2	72.2	0.1	71.2	0.1
Trade	42726	9.7	163.6	0.4	161.7	0.4
Gas	27867	6.3	92.7	0.3	85.8	0.3
Construction	26370	6.0	107.3	0.4	106.6	0.4
Dwellings	22631	5.1	89.1	0.4	88.2	0.4
Transport nec	17692	4.0	189.7	1.1	189.4	1.1
Financial services nec	14960	3.4	-207.9	-1.4	-200.2	-1.3
Recreation and other service	9493	2.1	3.0	0.0	4.2	0.0
Electricity	7973	1.8	123.3	1.5	116.2	1.5
Machinery and equipment ne	7420	1.7	-7.9	-0.1	-9.1	-0.1
Communication	6852	1.5	52.3	0.8	52.7	0.8
Transport equipment nec	6274	1.4	-206.4	-3.3	-207.0	-3.3
Insurance	6059	1.4	14.6	0.2	15.2	0.3
Paper products, publishing	5399	1.2	83.2	1.5	84.6	1.6
Chemical, rubber, plastic pro	4015	0.9	45.3	1.1	43.7	1.1
Sea transport	3888	0.9	-10.1	-0.3	-10.3	-0.3
Metal products	3688	0.8	-4.5	-0.1	-4.9	-0.1
Food products nec	3664	0.8	-21.4	-0.6	-21.0	-0.6
Fishing	3579	0.8	14.9	0.4	15.2	0.4
Air transport	2617	0.6	18.4	0.7	18.5	0.7
Dairy products	2022	0.5	18.1	0.9	18.0	0.9
Electronic equipment	1879	0.4	46.4	2.5	46.4	2.5
Mineral products nec	1806	0.4	9.6	0.5	9.7	0.5
Wood products	1671	0.4	23.7	1.4	24.0	1.4
Manufactures nec	1526	0.3	34.3	2.2	33.6	2.2
Motor vehicles and parts	1468	0.3	-22.8	-1.6	-23.0	-1.6
Forestry	1226	0.3	14.1	1.1	14.4	1.2

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	Sectoral value added		Change in sectoral value added with TTIP			
			Deep TTIP incl. NOR		Deep TTIP incl. EFTA	
	in mn USD	as share of national value added, in %	in mn USD	in %	in mn USD	in %
Metals nec	876	0.2	63.8	7.3	57.8	6.6
Beverages and tobacco products	841	0.2	4.9	0.6	4.9	0.6
Minerals nec	742	0.2	8.0	1.1	7.8	1.1
Water	739	0.2	2.4	0.3	2.4	0.3
Raw milk	723	0.2	6.4	0.9	6.4	0.9
Cattle, sheep, goats, horses	650	0.1	-35.2	-5.4	-35.3	-5.4
Animal products nec	601	0.1	-21.7	-3.6	-21.8	-3.6
Vegetables, fruit, nuts	547	0.1	-44.0	-8.1	-44.0	-8.1
Textiles	526	0.1	-2.0	-0.4	-2.0	-0.4
Crops nec	473	0.1	-1.4	-0.3	-1.3	-0.3
Wearing apparel	384	0.1	-2.2	-0.6	-2.2	-0.6
Ferrous metals	380	0.1	15.6	4.1	15.6	4.1
Meat: cattle, sheep, goats, horses	246	0.1	-16.4	-6.7	-16.4	-6.7
Cereal grains nec	195	0.0	-2.7	-1.4	-2.7	-1.4
Wheat	104	0.0	-8.4	-8.1	-8.4	-8.1
Gas manufacture, distribution	81	0.0	0.5	0.6	0.5	0.6
Plant-based fibers	47	0.0	-0.1	-0.1	-0.1	-0.2
Leather products	20	0.0	1.0	4.8	1.0	4.8
Vegetable oils and fats	9	0.0	0.7	7.7	0.7	7.4
Processed rice	9	0.0	0.1	1.7	0.1	1.6
Oil seeds	8	0.0	-0.1	-1.5	-0.1	-1.6
Sugar	6	0.0	0.2	2.8	0.2	2.9
Wool, silk-worm cocoons	5	0.0	0.0	0.1	0.0	0.1
Paddy rice	3	0.0	-0.2	-7.1	-0.2	-7.1
Sugar cane, sugar beet	3	0.0	0.0	0.0	0.0	0.0
Meat products nec	1	0.0	0.0	-4.5	0.0	-4.5
Coal	0	0.0	0.0	1.2	0.0	1.3
Petroleum, coal products	0	0.0	0.0	4.6	0.0	4.1

Table 8: Sectoral value added and its changes in Norway with TTIP and Norway-USA agreement, various scenarios

	Sectoral value added		Change in sectoral value added with TTIP			
			Deep TTIP + Shallow US-NOR FTA		Deep TTIP + Shallow US-EFTA FTA	
	in mn USD	as share of national value added, in %	in mn USD	in %	in mn USD	in %
Business services nec	55610	12.6	334.4	0.6	345.7	0.6
Oil	49455	11.2	267.9	0.5	266.6	0.5
Public Services	94087	21.3	181.1	0.2	180.7	0.2
Gas	27867	6.3	96.2	0.3	88.3	0.3
Trade	42726	9.7	89.0	0.2	87.6	0.2
Transport nec	17692	4.0	83.7	0.5	83.2	0.5
Electricity	7973	1.8	65.3	0.8	60.3	0.8
Construction	26370	6.0	58.8	0.2	59.1	0.2
Electronic equipment	1879	0.4	57.7	3.1	57.6	3.1
Dwellings	22631	5.1	52.0	0.2	51.7	0.2
Metals nec	876	0.2	35.1	4.0	30.6	3.5
Communication	6852	1.5	29.1	0.4	29.8	0.4
Paper products, publishing	5399	1.2	27.3	0.5	28.5	0.5
Food products nec	3664	0.8	13.6	0.4	13.9	0.4
Air transport	2617	0.6	13.7	0.5	13.8	0.5
Fishing	3579	0.8	11.7	0.3	11.8	0.3
Manufactures nec	1526	0.3	11.7	0.8	11.5	0.8
Insurance	6059	1.4	8.0	0.1	8.4	0.1
Dairy products	2022	0.5	4.7	0.2	4.8	0.2
Mineral products nec	1806	0.4	4.6	0.3	4.7	0.3
Ferrous metals	380	0.1	3.7	1.0	3.7	1.0
Minerals nec	742	0.2	3.7	0.5	3.6	0.5
Wood products	1671	0.4	3.3	0.2	3.5	0.2
Forestry	1226	0.3	3.2	0.3	3.5	0.3
Beverages and tobacco products	841	0.2	1.9	0.2	1.9	0.2
Raw milk	723	0.2	1.7	0.2	1.7	0.2
Water	739	0.2	1.2	0.2	1.2	0.2
Leather products	20	0.0	0.2	1.2	0.3	1.2
Vegetable oils and fats	9	0.0	0.3	2.8	0.2	2.6

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	Sectoral value added		Change in sectoral value added with TTIP			
			Deep TTP + Shallow US-NOR FTA		Deep TTIP + Shallow US-EFTA FTA	
	in mn USD	as share of national value added, in %	in mn USD	in %	in mn USD	in %
Sugar	6	0,0	0,1	1,3	0,1	1,3
Crops nec	473	0,1	0,0	0,0	0,1	0,0
Gas manufacture, distribution	81	0,0	0,0	0,0	0,0	0,0
Sugar cane, sugar beet	3	0,0	0,0	0,1	0,0	0,1
Coal	0	0,0	0,0	0,9	0,0	1,0
Petroleum, coal products	0	0,0	0,0	5,5	0,0	4,9
Meat products nec	1	0,0	0,0	-0,9	0,0	-0,9
Wool, silk-worm cocoons	5	0,0	0,0	-0,2	0,0	-0,2
Processed rice	9	0,0	0,0	-0,2	0,0	-0,2
Paddy rice	3	0,0	-0,1	-3,0	-0,1	-3,0
Plant-based fibers	47	0,0	-0,1	-0,3	-0,1	-0,3
Oil seeds	8	0,0	-0,1	-1,8	-0,1	-1,9
Cereal grains nec	195	0,0	-0,3	-0,1	-0,3	-0,1
Wearing apparel	384	0,1	-0,6	-0,2	-0,6	-0,2
Textiles	526	0,1	-2,9	-0,6	-2,8	-0,5
Recreation and other services	9493	2,1	-3,9	0,0	-3,0	0,0
Animal products nec	601	0,1	-4,3	-0,7	-4,3	-0,7
Chemical, rubber, plastic prods	4015	0,9	-4,3	-0,1	-4,6	-0,1
Wheat	104	0,0	-7,0	-6,8	-7,0	-6,8
Metal products	3688	0,8	-10,3	-0,3	-10,5	-0,3
Meat: cattle, sheep, goats, horses	246	0,1	-11,2	-4,6	-11,2	-4,6
Sea transport	3888	0,9	-16,1	-0,4	-15,8	-0,4
Motor vehicles and parts	1468	0,3	-22,0	-1,5	-21,9	-1,5
Vegetables, fruit, nuts	547	0,1	-23,3	-4,3	-23,3	-4,3
Cattle, sheep, goats, horses	650	0,1	-24,2	-3,7	-24,3	-3,7
Machinery and equipment nec	7420	1,7	-32,3	-0,4	-33,0	-0,4
Financial services nec	14960	3,4	-64,7	-0,4	-59,7	-0,4
Transport equipment nec	6274	1,4	-107,4	-1,7	-107,2	-1,7

Note: The TTIP is assumed to be deep. The US-Norway and US-EFTA FTAs are assumed to be shallow agreements, respectively. All prices are in constant 2011 USD. Data source: GTAP 9 for the year 2011 and own simulations.

The energy sectors, major beneficiaries in a situation where Norway remains outside of the TTIP, fall back. This is particularly true for oil. US competition on the Norwegian or EFTA markets would likely become stronger, yielding a small negative value added effect.

Another sector which would be very differently affected if Norway joins the TTIP is the metals sector. Its value added could go up by 4 to 7%. Not only does the metals sector benefit from trade cost reductions across the Atlantic, it is also an important supplier of intermediate inputs to other sectors. If these expand their activity, the metals industry expands as well. A similar picture emerges regarding the chemicals industry, which could benefit from a deep involvement of Norway in the TTIP, and remain largely unaffected in case of a shallow association.

Membership to the TTIP would probably be profitable for some high-tech areas, such as electronic equipment, where value added could increase by 2.4 to 3.1%. Moreover, dairy products and fishing could also benefit as trade with the US increases from relatively low starting values.

If Norway joins the TTIP in one or another way, some sectors would lose out. The largest losses would be located in the financial sector where value added could decrease by 0.4 to 1.4%. This amounts to 60 to 213 mn USD. Relative losses would be even larger in the transportation equipment industry, regardless of whether Norway's inclusion to TTIP is a deep or a shallow one.

Moreover, some areas in the agri-food sector would probably suffer from membership to the TTIP. The largest effects would be found in the vegetables sector, where losses could add up to at most 33 mn USD or as much as 0.6% of total sectoral value added. Cattle and meat could also lose out, as well as other animal products. However, negative effects would remain rather modest and manageable, even if the association to the TTIP is an ambitious one.

5.5 Effects on the trade structure

Table 9 and Table 10 provide details on the expected effects on Norway's bilateral trade structure. The first two tables highlight the effects of a situation where Norway remains outside of the TTIP and differentiates between a shallow and a deep transatlantic agreement. It also shows the effects in the presence of spillovers (i.e., the EU upgrades the Mexican and Turkish agreements in the context of the TTIP). The tables focus on the most important trade links, but aggregate certain countries into groups (such as Africa and the rest of the world).

Exports to the EU make up for about 71% of Norwegian exports of goods and services. The value of trade is about ten times as big as with the US, the second biggest export destination after the EU. A deep TTIP would slightly increase Norwegian exports to the EU and to the USA. This might seem paradoxical at the first glance, because only EU and US producers are to benefit from trade cost reductions across the Atlantic. However, as explained above, trade diversion effects due to changes in relative competitiveness positions and trade creation effects due to higher levels of activity and, thus, higher demand for Norwegian prod-

ucts, need to be added up. And, as it turns out, the trade creation effects dominate, in particular with respect to the USA. The reason for this is the strong pre-existing linkages between Norway and other parts of the transatlantic economy. Because income effects in the EU and the US are weaker in the shallow agreement, Norway would actually see the share of exports to the EU go down (but the value of exports would nevertheless increase minimally).

Table 9: Effects of TTIP/Norway outside on Norwegian export structure

	Exports		Export changes with TTIP			
			Shallow		Deep	
	in mn USD	as share of total, in %	in %	in %points	in %	in %points
ASEAN	4961	2.8	-0.63	-0.02	-1.25	-0.04
Alianza del Pacifico	614	0.3	-0.85	0.00	-1.48	-0.01
Australia & New Zealand	676	0.4	-0.58	0.00	-1.28	-0.01
Canada	2506	1.4	-0.70	-0.01	-2.88	-0.04
Central Asia	4	0.0	-0.87	0.00	-1.58	0.00
China	6273	3.5	-0.76	-0.03	-1.54	-0.06
EFTA	1941	1.1	-0.75	-0.01	-0.97	-0.01
EU28	128057	71.0	0.01	-0.04	0.32	0.18
East Asia	2976	1.7	-0.82	-0.01	-2.16	-0.04
East Asia & Pacific	149	0.1	-0.38	0.00	-0.75	0.00
Eurasian Customs Union	3057	1.7	-0.56	-0.01	-0.79	-0.01
Latin America & Caribbean	694	0.4	0.12	0.00	-0.65	0.00
MERCOSUR	1363	0.8	-0.48	0.00	-0.85	-0.01
Middle East & North Africa	1699	0.9	-0.36	0.00	-1.06	-0.01
Rest of Former Soviet Union	741	0.4	-0.66	-0.01	-0.67	0.00
Rest of World	731	0.4	-0.25	0.00	-1.69	-0.01
South Asia	1673	0.9	-0.47	0.00	-0.96	-0.01
South Korea	3700	2.1	-0.77	0.00	-1.90	-0.04
Southern African Customs Union	208	0.1	-0.42	0.00	-1.27	0.00
Sub-Saharan Africa	1355	0.8	-0.85	-0.02	-0.44	0.00
Turkey	1053	0.6	-0.63	0.00	-1.71	-0.01
USA	12755	7.1	-0.13	0.00	0.63	0.04
West Balkan	920	0.5	-1.31	-0.01	-2.44	-0.01

Note: Export values are f.o.b. values and prices are given in constant 2011 USD. In the scenario with domino effects, the negotiation of the TTIP leads to the deepening of the EU-Mexico and the EU-Turkey FTAs. Data source: GTAP 9 data for the year 2011 and own calculations.

Exports to other destinations tend to fall, both in terms of their absolute size and in terms of their shares in overall Norwegian exports. The reason for this pattern lies in the dominance of trade creation over trade diversion effects with respect to the transatlantic partners. As Norwegian exports to these destinations go up, they have to decline elsewhere. This is be-

cause the Norwegian economy faces capacity constraints which are not relaxed due to the TTIP since resource-wasting trade costs with its trade partners remain unchanged (in contrast to the EU-US pairs). So, the transatlantic trade agreement leads to trade diversion towards the transatlantic partners and away from other economies.

China and the rest of Asia are most strongly negatively affected; their shares in Norwegian exports are predicted to fall by 0.05 and 0.07%, respectively. In terms of absolute trade changes, Canada and the rest of Europe (Russia and Turkey) see the largest declines.

On the import side, the dominance of the EU as a trade partner of Norway is somewhat smaller than on the export side and the role of China is larger. Overall, the simulations reveal a picture which conforms more strongly with naive expectations than the export side. As the EU and the US grant themselves mutually improved market access conditions, and their exports to each other go up, third parties see their terms of trade weakened and find it optimal to import less from them. In the deep scenario, Norway imports 0.09% less from the EU and 0.45% less from the US.

Interestingly, the model predicts a decline in imports from Canada by 1.56%. This is due to the fact that the TTIP induces Canada to export more to the transatlantic partners, but less to other countries by the same mechanism that boosts Norwegian exports to the US and EU.

Table 10: Effects of TTIP/Norway outside on Norwegian import structure

	Imports		Import changes with TTIP			
			Shallow		Deep	
	in mn USD	as share of total, in %	in %	in %points	in %	in %points
ASEAN	2928	2.2	0.00	0.00	0.50	0.01
Alianza del Pacifico	874	0.6	-0.08	0.00	0.41	0.00
Australia & New Zealand	485	0.4	0.28	0.00	0.87	0.00
Canada	4017	3.0	-1.47	-0.04	-1.56	-0.05
Central Asia	7	0.0	0.60	0.00	1.21	0.00
China	6526	4.8	0.11	0.00	0.51	0.02
EFTA	1536	1.1	0.10	0.00	0.15	0.00
EU28	90227	66.6	0.09	0.04	-0.09	-0.08
East Asia	2289	1.7	-0.15	0.00	0.44	0.01
East Asia & Pacific	309	0.2	0.15	0.00	0.43	0.00
Eurasian Customs Union	2307	1.7	-0.04	0.00	0.09	0.00
Latin America & Caribbean	1456	1.1	-1.36	-0.01	-1.08	-0.01
MERCOSUR	1871	1.4	-0.04	0.00	-0.87	-0.01
Middle East & North Africa	1559	1.2	-0.90	-0.01	0.55	0.01
Rest of Former Soviet Union	652	0.5	0.21	0.00	-0.41	0.00
Rest of World	823	0.6	-0.15	0.00	0.69	0.00
South Asia	1978	1.5	-0.48	0.00	0.41	0.01
South Korea	2860	2.1	0.23	0.00	0.50	0.01
Southern African Customs Un	807	0.6	-0.02	0.00	-1.37	-0.01
Sub-Saharan Africa	710	0.5	0.06	0.00	-0.13	0.00
Turkey	613	0.5	-0.99	-0.01	0.45	0.00
USA	8944	6.6	-0.40	0.00	-0.45	-0.03
West Balkan	329	0.2	0.37	0.00	0.09	0.00

Note: Import values are c.i.f. values and prices are given in constant 2011 USD. In the scenario with domino effects, the negotiation of TTIP leads to the deepening of the EU-Mexico and the EU-Turkey FTAs. Data source: GTAP 9 data for the year 2011 and own calculations.

However, imports from China and the rest of Asia go up by 0.59 and 0.45%, respectively. Trade with EFTA partners or other European countries outside of the EU and EFTA is only very marginally affected.

The upcoming table turns to scenarios in which Norway joins the TTIP. As a general pattern, under this assumption, Norway increases its exports and imports to the US by significant amounts. Were the country to join the TTIP, its exports to the US could go up by 50% and its imports by 64%. If Norway joins the TTIP together with the other EFTA countries, this picture remains almost unchanged. Further, the tables show the trade effects when Norway negotiates an FTA with the USA. When Norway concludes a shallow agreement with the US, either

alone or with the other EFTA countries, exports to the US would still increase by almost 35% and imports by 41%.

Trade with the EU would decline. Norway has excellent access to the EU's markets in most sectors, and the TTIP does not affect this much; with the TTIP, it would enjoy an improved access to the US as well. This redirects trade away from traditional markets. Exports to the EU would go down at most by 0.8%, imports by 1.0%.

Similarly, trade with third countries would fall. Exports to Canada could be affected particularly strongly as Norwegian inputs would be more likely to be delivered directly to the US rather than through Canada.

Overall Norwegian exports could grow by 2.8% and imports by 3.5%. This increase in openness is the root cause for the positive welfare effects found in Table 5.

Table 11: Effects of the TTIP on Norwegian export structure when Norway also negotiations an FTA with the US

		Export changes with TTIP, various scenarios							
		Deep TTIP incl. NOR		Deep TTIP incl. EFTA		Deep TTIP incl. & Shallow US-NOR		Deep TTIP incl. & Shallow US-EFTA	
	as share of total, in %	in %	in %points	in %	in %points	in %	in %points	in %	in %points
ASEAN	2.75	-0.99	-0.11	-0.96	-0.11	-2.28	-0.07	-2.25	-0.07
Alianza del Pacifico	0.34	-0.91	-0.01	-0.99	-0.01	-2.16	-0.01	-2.21	-0.01
Australia & New Zealand	0.38	-0.87	-0.01	-0.94	-0.02	-2.49	-0.01	-2.52	-0.01
Canada	1.39	-4.24	-0.10	-4.17	-0.10	-5.34	-0.08	-5.22	-0.08
Central Asia	0.00	-1.57	0.00	-1.59	0.00	-2.43	0.00	-2.42	0.00
China	3.48	-1.07	-0.14	-1.11	-0.15	-2.75	-0.11	-2.77	-0.11
EFTA	1.08	-0.33	-0.04	-6.37	-0.10	-1.85	-0.02	-8.36	-0.09
EU28	71.05	-0.54	-2.59	-0.52	-2.56	-1.63	-1.41	-1.60	-1.38
East Asia	1.65	-1.51	-0.08	-1.54	-0.08	-3.46	-0.06	-3.46	-0.06
East Asia & Pacific	0.08	-0.99	0.00	-0.96	0.00	-1.89	0.00	-1.86	0.00
Eurasian Customs Union	1.70	0.02	-0.05	0.02	-0.05	-3.13	-0.06	-3.12	-0.06
Latin America & Caribbean	0.38	6.52	0.01	6.61	0.01	2.95	0.01	3.04	0.01
MERCOSUR	0.76	-0.25	-0.03	-0.27	-0.03	-2.59	-0.02	-2.60	-0.02
Middle East & North Africa	0.94	-0.69	-0.04	-0.68	-0.04	-2.21	-0.02	-2.19	-0.02
Oil exporters	1.04	0.17	-0.01	0.19	-0.01	-1.63	-0.02	-1.61	-0.02
Rest of Former Soviet Union	0.41	-1.08	-0.02	-1.08	-0.02	-3.90	-0.02	-3.88	-0.02
Rest of World	0.41	-0.77	-0.04	-0.87	-0.04	-2.66	-0.01	-2.65	-0.01
South Asia	0.93	-1.64	-0.10	-1.64	-0.10	-1.74	-0.02	-1.81	-0.02
South Korea	2.05	-0.82	0.00	-1.02	0.00	-2.60	-0.06	-2.59	-0.06
Southern African Customs Union	0.12	-0.01	-0.02	-0.03	-0.02	-2.49	0.00	-2.63	0.00
Sub-Saharan Africa	0.75	-0.96	-0.02	-1.02	-0.02	-2.02	-0.02	-2.02	-0.02
Turkey	0.58	50.69	3.25	50.91	3.27	-2.55	-0.02	-2.57	-0.02
USA	7.08	-3.73	-0.03	-3.63	-0.03	33.01	2.30	33.23	2.32
West Balkan	0.51	-5.22	-0.03	-5.11	-0.03	-4.85	-0.03	-4.76	-0.03

Note: Export values are f.o.b. values and prices are given in constant 2011 USD. The TTIP is assumed to be deep. The US-Norway and US-EFTA FTAs are assumed to be shallow agreements, respectively. Data source: GTAP 9 data for the year 2011 and own calculations.

Table 12: Effects of the TTIP on Norwegian import structure when Norway also negotiations an FTA with the US

	Imports	Import changes with TTIP, various scenarios							
		Deep TTIP incl. NOR		Deep TTIP incl. EFTA		Deep TTIP & shallow US-NOR		Deep TTIP and shallow US-EFTA	
	as share of	in %	in %point	in %	in %point	in %	in %point	in %	in %point
ASEAN	2.16	0.03	-0.08	0.03	-0.08	-0.74	-0.02	-0.74	-0.02
Alianza del Pacifico	0.65	-1.25	-0.03	-1.19	-0.03	-3.98	-0.03	-3.94	-0.03
Australia & New Zealand	0.36	0.38	-0.01	0.42	-0.01	-5.19	-0.02	-5.17	-0.02
Canada	2.97	0.93	-0.09	0.64	-0.10	-0.56	-0.02	-0.79	-0.03
Central Asia	0.00	1.26	0.00	1.28	0.00	0.52	0.00	0.53	0.00
China	4.82	-0.31	-0.20	-0.31	-0.20	-0.53	-0.03	-0.52	-0.03
EFTA	1.13	-1.79	-0.06	-2.64	-0.07	-8.25	-0.09	-8.59	-0.10
EU28	66.65	-1.15	-3.31	-1.18	-3.31	-2.30	-1.59	-2.33	-1.59
East Asia	1.69	-0.66	-0.08	-0.65	-0.08	-0.36	-0.01	-0.36	-0.01
East Asia & Pacific	0.23	0.53	-0.01	0.48	-0.01	-0.04	0.00	-0.08	0.00
Eurasian Customs Union	1.70	-1.13	-0.08	-1.20	-0.09	-4.07	-0.07	-4.15	-0.07
Latin America & Caribbean	1.08	2.94	-0.01	2.86	-0.01	0.84	0.01	0.77	0.01
MERCOSUR	1.38	-0.37	-0.06	-0.48	-0.06	-4.37	-0.06	-4.45	-0.06
Middle East & North Africa	1.15	0.60	-0.04	0.59	-0.04	-0.22	0.00	-0.24	0.00
Rest of Former Soviet Union	0.48	-0.85	-0.02	-0.90	-0.02	-0.47	0.00	-0.49	0.00
Rest of World	0.61	-1.05	-0.03	-1.06	-0.03	-4.20	-0.02	-4.24	-0.02
South Asia	1.46	0.02	-0.06	0.01	-0.06	-1.99	-0.01	-2.01	-0.01
South Korea	2.11	-2.81	-0.14	-2.82	-0.14	0.14	0.00	0.13	0.00
Southern African Customs Uni	0.60	-1.28	-0.03	-1.33	-0.03	-2.27	-0.05	-2.28	-0.05
Sub-Saharan Africa	0.52	0.20	-0.02	0.23	-0.02	-11.41	-0.07	-11.45	-0.07
Turkey	0.45	-1.04	-0.02	-1.03	-0.02	2.93	0.01	2.94	0.02
USA	6.61	70.23	4.21	70.12	4.20	-1.80	-0.01	-1.79	-0.01
West Balkan	0.24	-1.83	-0.01	-1.94	-0.01	35.71	2.35	35.60	2.35

Note: Import values are c.i.f. values and prices are given in constant 2011 USD. The TTIP is assumed to be deep. The US-Norway and US-EFTA FTAs are assumed to be shallow agreements, respectively. Data source: GTAP 9 data for the year 2011 and own calculations.

6. Bottom-Up Approach

As a second set of estimates, we will use alternative figures for the level of NTBs between Norway and the EU-USA that are more tuned to take into account particular aspects of Norway's trade relationship with the USA and the EU, and that are based on bottom-up estimates of trade costs. The bottom-up approach serves as a sensitivity check on the top-down predictions. Estimating reductions in NTM levels triggered by TTIP is a considerable challenge since TTIP addresses thousands of different regulations; listed in Ecorys (2009). The bottom up scenario is based on a realistic assessment of the negotiations outcome. Quantifying the estimated NTM reductions for all the 57 sectors covered by the GTAP data set is the task involved. We have to provide predicted changes in percentage points for tariffs and NTMs across all 57 sectors.

6.1. Scenarios for tariff reduction

For tariffs, the exercise is comparatively easy, even if we do not yet know the outcome of TTIP negotiations. Some information is available on what has been suggested in the TTIP negotiations, and this was supplemented by interviews undertaken in the project. Furthermore, we use information on tariff outcomes in TPP from Freund et al. (2016) and in CETA from European Commission (2016), combined with information on these agreements from the websites of governments involved. In the TTIP negotiations, it is already on the table that 97% of the tariff lines will eventually be liberalized, however with transition periods for some. Based on available information we assume, for the purpose of the bottom-up simulations, that 1 per cent of the tariff lines will be permanently exempted from liberalization in TTIP, and another 3% will have partial exemptions or transition periods.

The second issue is how exemptions are to be allocated across GTAP sectors. Table 13 shows the sensitive sectors according to TTIP negotiations and current agreements.

Table 13: Sensitive Sectors for the USA and the EU

Category	Agreement	EU	USA
Non-liberalized	TTIP offers	Only agriculture; 128 of 281 meat, the rest spread out	285 lines agriculture (144 dairy) and 36 lines non-agr. (17 textiles, 19 motor vehicles)
	TPP		Mostly agriculture, especially dairy, sugar and processed food
	CETA	Agriculture only; meat and eggs	
Long transition periods	TTIP	Half/half agriculture (various products) and non-agr. (energy-intensive chemicals, cars and other)	122 lines non-agr. (glass, footwear, fisheries and others); 78 lines agriculture (meat, dairy, chocolate)
	TPP		Manufactured goods (textiles, clothing, vehicles) and various agricultural goods
	CETA	Agriculture; meat and grains	

Sources: European Commission (2015, 2016), Freund et al. (2016) and own calculations.

For the EU, agriculture is the sensitive area whereas for the USA, it is agriculture and selected manufacturing sectors. Priorities may shift across trade partners so the final outcome in TTIP may differ from e.g. TPP.

We allocate the tariff exemptions across sectors as follows: Using detailed tariff data at the 6-digit level from the UNCTAD TRAINS data base we calculate the share of tariff peaks (i.e. more than three times higher than the national tariff average) for each GTAP sector. We thereafter rank the sectors according to this "peak ratio" and assume that the GTAP sectors with the highest peak ratios will be subject to permanent exemptions, and the other sectors will have transition periods according to the peak ratios. We scale it so that we obtain permanent exemptions equivalent to one percent of the tariff lines, and transition periods equivalent to three percent of the tariff lines. Using the GTAP sectors, this is represented as partial tariff cuts for each sector.

6.2. Scenarios for NTM reduction

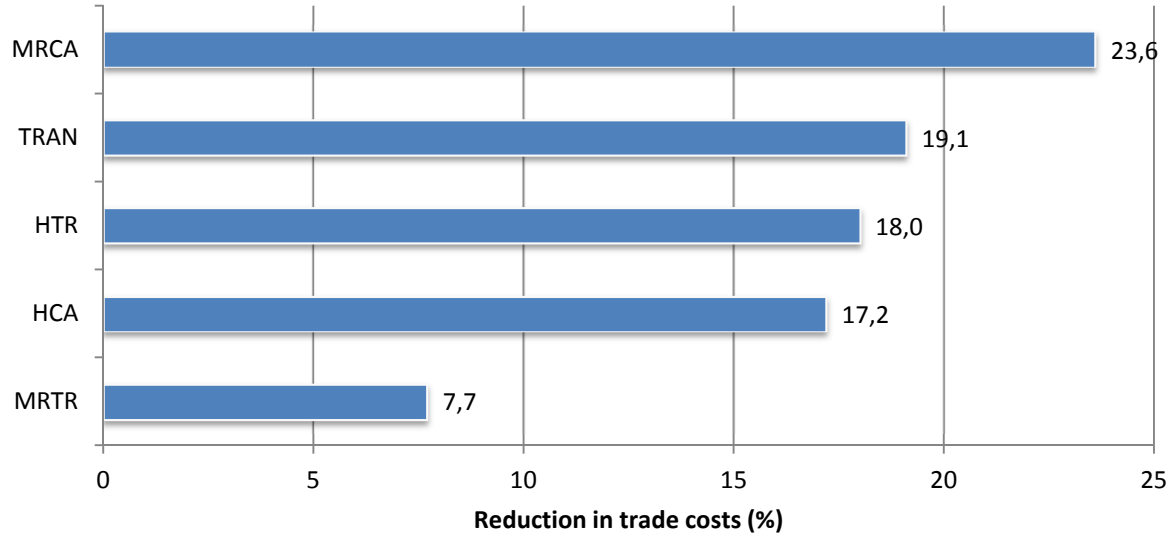
For NTMs, it is more challenging to predict reductions in TTIP since less is known about the negotiations, and changes are much harder to quantify. Luckily, we can draw on recent research based on data set newly constructed data set (undertaken by UNCTAD, the World Bank, ITC and the African Development Bank), allowing better quantification of regulatory cooperation agreements.

Using this data set, Cadot and Gourdon (2016) present results by sector for five types of NTM reduction, based on data for existing trade agreements (with our abbreviations in brackets):

- Mutual recognition of technical regulation (MRTR).
- Harmonization of technical regulation (HTR).
- Mutual recognition of conformity assessment (MRCA).
- Harmonization of conformity assessment (HCA).
- Transparency requirement (TRAN).

For each of these types, the authors present results on the percentage reduction from the baseline for each sectors in the trade agreements. For the four first types, results for SPS and TBT are reported separately, but we use only the total including both. Diagram 1 shows the average effect across all sectors for each:

Figure 1: The impact of regulatory cooperation in trade agreements



Source: Cadot & Gourdon (2016)

Somewhat surprisingly, the mutual recognition of conformity assessments has the strongest impact. Transparency requirements also have a significant impact. The results of Cadot and Gourdon (2016) are provided for 21 goods sectors; i.e. less that the 42 goods sectors in GTAP-57.

Essentially we use the results above and assess, based on available information, to what extent the various types of agreements will apply at the sector level in TTIP. This is bound to be uncertain since the TTIP result is unknown and the ”leaks” of texts on regulatory cooperation contain little on the sectorwise implementation. In general, our guesstimate is as follows:

- We assume that transparency will be a general cross-cutting feature of TTIP. This is a key issue for the USA (also in former agreements, see Piermartini and Budetta 2009), and signals from negotiations indicate that it will be part of the agreement.
- We assume that due to regulatory differences between the EU and the USA, there will be limited harmonization of regulations or conformity assessment procedures, but agreements on mutual recognition of conformity assessment in several sectors. Over time, other forms may develop.

We assume that regulatory cooperation will be more advanced in the nine TTIP priority sectors, mainly related to machinery and transport equipment, the chemicals sectors (including pharmaceuticals, cosmetics), and to some extent textiles. There has also been MRCA for food products already, and we assume this will be further developed in TTIP.

With these general assumptions, we put figures from zero to one for each sector/type of regulatory reform; with one if the whole sector is covered and zero if none. For example, we assume that in the short run 50% of chemicals will be subject to MRCA but 25% for other priority sectors. Combining these guesstimates with initial levels, we obtain predicted NTM levels.[7]

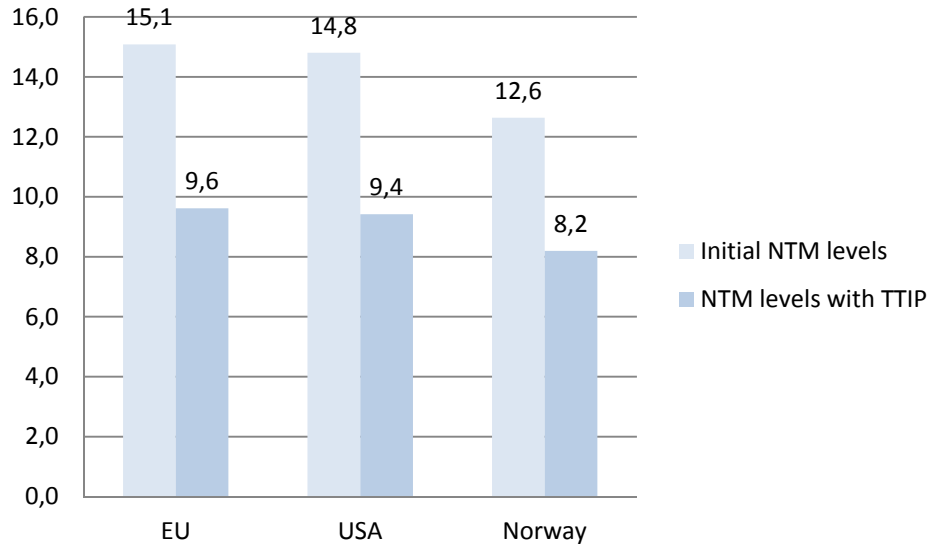
As the next step, we add public procurement based on Ecorys (2009). This study provides predicted NTM reductions due to public procurement, for a less ambitious and an ambitious scenario. Results are provided for seven goods sectors only and are applied to 17 of the 42 GTAP-57 goods sectors. Adding this to the former results, we obtain an estimate on the percentage reduction of NTMs due to TTIP, for the EU and the USA.

[7] In order to calculate percentage point changes, we also need data on initial NTM levels, which we do not have from Cadot and Gourdon (2016) for the GTAP sectors. For sectors that can be clearly mapped to the GTAP-57 sectors, we use the NTM level estimates from Ecorys (2009). This is possible for 9 out of 42 GTAP sectors. For other sectors, we use the results from Kee et. al (2008, 2009) on NTMs by HS6 positions and countries, and aggregate to the GTAP-57 level, using total imports (by product for each importing country) as weights. From this estimated NTM levels for the EU, USA and Norway by sector according to GTAP-57 are derived The Kee et al. (2008, 2009) results cover 21 EU countries and the EU level is constructed from this.

Finally we assume that if Norway accedes TTIP, she obtains the same NTM percentage reductions as the EU, due to participation in the EU internal market including technical regulations and the veterinary regime. This is surely an approximation but we have no data to provide a separate prediction for Norway that takes into account national aspects. The initial levels are however country-specific and taken into account.

Summing NTM reductions and public procurement, and calculating trade-weighted averages, the results are shown in Figure 2. In all three cases, there is an NTM reduction of 35-36 percent of the initial level.

Figure 2: NTM levels before and after TTIP (in %)



Source: Author's own illustration

Figure 2 shows the weighted averages for NTM levels initially and in TTIP. These are perhaps modest compared to e.g. Ecorys (2009) and CEPR (2013) but on the other hand they are larger than the average levels reported by Cadot and Gourdon (2016). It is our best guesstimate based on available information and using recent scientific evidence based on extended NTM data that have not been available earlier.

The calculations above were undertaken for the 42 goods sectors in GTAP. Finally, we also need estimates on predicted NTM reductions for the 15 services sectors. This input on services NTM reduction was provided by Menon Business Economics, Norway as part of their contribution to the project. As a point of departure, the predicted NTM reductions for ser-

vices in TTIP from CEPR (2013) were used. In the light of more recent information about TTIP negotiations, these predictions were adjusted downward (i.e. less NTM reduction) for important sectors: Maritime transport; air transport; finance and insurance; postal services; radio, TV and media. Using OECD's index of trade restrictiveness in services (STRI), the predicted NTM reductions were decomposed into NTM reductions for services trade vs. services investment (giving different numbers for each EU country). Finally, the services NTM levels of Ecorys (2009) were used to calculate the percentage point NTM reductions for barriers to services trade, to be used in the bottom-up-calculations. As a sensitivity check, an alternative set of predicted NTM reductions were derived using the results of Fontagné et al. (2011) as the point of departure instead of CEPR (2013). Since the results of the alternative simulations based on Fontagné et al. (2011) were very close to those obtained on the basis of CEPR (2013), the alternative simulations are not reported.[8]

Appendix III shows the predicted NTM reductions for all the 57 sectors. The following tables show the results, using these as well as the most ambitious tariff reductions. In general, the long-run effects are most appropriately captured by the top-down approach. An ambitious TTIP would leave Norwegian per capita income unchanged in the aggregate. In the companion paper (Felbermayr et al., 2016) we also report effects for other countries. Generally, the bottom-up approach delivers somewhat larger results for Norway in terms of the aggregate welfare effects as the top-down approach. The qualitative insights, however, remain largely unchanged. Similar to the top-down analysis, the energy sectors would be the main drivers of increased sectoral value added. There are 13 sectors where the TTIP could generate losses larger than 1 mn USD in Norway. This is the case in certain agri-food industries such as dairy products or beverages, but in relative terms, in all of these sectors, losses remain below 1%. If Norway were to join the TTIP, it would be able to generate positive welfare gains. While high-tech or the metal industry would gain from Norway joining the TTIP, others, such as agri-food sectors would suffer from membership to the TTIP. The largest effects would be found in the vegetables sector, where losses could add up to 17%. The losses would be even higher for agricultural sectors, such as wheat (20%), cereal (21%) and crops (22%). Cattle and meat could also lose out, as well as other animal products.

[8] Details are available upon request.

6.3 Macroeconomic effects of TTIP

Table 14 provides the simulation results for real per capita income for the bottom-up estimations. As already indicated in the top-down analysis, real per capita income depicts the welfare changes and thus measures how much or less purchasing power the average person in the countries under scrutiny would have, in case a Norway enters the TTIP or stays out.

The two left-most columns show the level of real GDP and per capita real GDP in the initial situation (measured in constant 2011 USD). Note that changes in these variables coincide, because population is held constant. Columns three and four report the outcomes for the following scenarios: either Norway participates in the TTIP, or stays outside.

If the TTIP turns out to be as effective in cutting trade costs between the US and the EU as the average deep FTA the level of GDP per year in the USA would go up by 0.13%, while it would go up by 0.27% in the EU. Just as in the top-down scenario analysis, China and South Korea would register small losses, as firms from the EU and the US gain market shares in the US and EU markets, respectively. Norway would not lose from the agreement. Whereas Norway might also be affected by possible trade diversion effects, it benefits from the tight integration in European production net-works. The welfare changes of the remaining countries under scrutiny have similar magnitudes. As previously depicted in the top-down analysis, this might be because certain key sectors, such as motor vehicles or business services can expect much larger cost cuts under the deep scenario than under the shallow one. These effects are smaller than the top down approach suggested.

Table 14: Changes of Real Income and Openness with TTIP

	Real GDP		Real income changes (in %), different TTIP scenarios		**Inital Openness**	Changes in Openness (in % points)	
	total, in bn USD	per capita, in USD	(i) Deep TTIP	(ii) Deep TTIP, incl. Norway	in %	(i) Deep TTIP	(ii) Deep TTIP, incl. Norway
Canada	1573	43935	0.00	-0.01	65.3	-0.28	-0.19
China	11385	8280	-0.02	-0.02	54.3	-0.07	-0.05
South Korea	1393	27513	-0.01	-0.02	130.4	-0.24	-0.18
Norway	398	76266	0.01	0.96	71.6	-0.05	3.50
USA	17968	55904	0.13	0.14	32.8	1.09	0.82
EU28	16266	32064	0.27	0.13	86.9	0.78	0.63

Note: Openness is defined as (exports+imports)/GDPData source: GTAP 9 for the year 2011,; Ecorys (2013) and own simulations.

Scenario (ii) assumes that Norway is able to join the TTIP and secures the cost savings shown in the Appendix III for its own trade with the US. The aggregate outcomes for Norway suggest that the country benefits from TTIP. Both of the bottom-up approaches suggest that there are no significant welfare gains for EU and US when Norway joins TTIP. If the TTIP goes even farther and includes all EFTA countries, Norway's gains would remain almost the same as if it were to join the TTIP alone. Overall, the bottom-up scenario indicates that Norway's gains from joining TTIP could be even larger than suggested by the top-down scenarios. This is interesting, given that simulations have been run using the same model and the bottom-up scenarios are based on more specific assessments of what can be achieved in TTIP.

The last three columns of table 14 look at the effects on openness under the scenarios when Norway joins TTIP or stays out. The results suggest that the TTIP would reduce Norway's openness slightly. This is a relatively modest reduction which results from the fact that Norway is affected both by a negative trade diversion effect and by a positive income effect. The fact that real GDP in Norway goes up despite the reduction in openness might seem puzzling. However, it arises because the share of Norwegian value added in Norwegian trade goes up despite the reduction in gross trade. Were Norway to join TTIP openness would go up, even if defined on gross trade flows. This is similar to the top-down approach. Other TTIP outsiders such as China, Canada, or South Korea are to experience much stronger trade diversion effects relative to income effects than Norway, which results in more substantial reductions in the openness measure.

6.4 Microeconomic effects

Next, we turn to sector level impacts for the bottom-up scenarios. Lower value added means that there is pressure on wages and employment, as well as need for restructuring. Similar to the top-down analysis of TTIP with Norway outside (see Figure three), the oil and gas sectors, which are part of the aggregated sector Energy and mining, gain the most from an EU-US trade deal. Value added would go up by 98 and 46 mn USD, respectively. This is because additional output in the EU boosts demand for Norwegian energy products. Moreover, world energy prices go up as the TTIP boosts the level of world activity. Since these sectors rely only very marginally on imported inputs, additional demand translates almost fully into additional domestic value added. The deeper the TTIP, the larger the global boost to activity, and the stronger the positive effects on the Norwegian energy sector.

In sectors, which have a sizeable production, such as in the insurance or communication sector, or in agri-food sectors such as wheat or raw milk, the bottom-up analysis suggests losses. The sectoral value added patterns for the manufacturing industries are similar to the ones of the top-down approach, because in those industries the US and Europe have strong

comparative advantages. The transport equipment sector which accounted for more than six bn USD in the baseline loses about 25 million USD. The chemicals and machinery sectors would register similar negative effects by reducing its value added by 0.5% and 1%. Also the sea transportation, which is part of the aggregated Trade and transport sector, could be hit by TTIP, mainly because of trade diversion effects.

Although, a deep TTIP with Norway outside would slightly increase total value added generation in Norway, the aggregate effect is almost entirely driven by the energy sector. The critical fishery sector would have relative losses amounting to 0.19%, respectively about 7 mn USD. When interpreting the sector-level results, it is important to bear in mind that they are in no means forecasts, but provide some information on potential impacts. When the order of magnitude of effects is as small as in all except a few sectors, the most likely result is that there will not be any discernable effect.

In this case of Norway joining the TTIP (see Figure four), the ordering of sectors with respect to the size of potential impacts would change dramatically compared to the effects of Norway remaining outside of the TTIP. This is similar to the top-down approach as well. Since the scenarios also included NTM reductions for Norway-EU, the effects of the bottom up analysis become quite large. This is plausible, because the European Union is a very large trading parting, thus translating into large gains.

The energy sectors, major beneficiaries in a situation where Norway remains outside of the TTIP, fall back. This is particularly true for oil. US competition on the Norwegian or EFTA markets would likely become stronger, yielding a small negative value added effect. Another sector which would be very differently affected if Norway joins the TTIP is the metals sector. Its value added could go up by 0.26%. Not only does the metals sector benefit from trade cost reductions across the Atlantic, it is also an important supplier of intermediate inputs to other sectors. If these expand their activity, the metals industry expands as well. A similar picture emerges regarding the chemicals industry, which could benefit from a deep and even a shallow involvement of Norway in the TTIP. This differs compared to the top-down analysis which indicated that the chemical sector would remain largely unaffected in case of a shallow association.

Membership to the TTIP would probably be profitable for some high-tech areas, such as electronic equipment, where value added could increase by 2.6%. This result is similar to the one of the top-down approach. Moreover, dairy products and fishing could also benefit as trade with the US increases from relatively low starting values. Moreover, some areas in the agri-food sector would suffer from membership to the TTIP. The largest effects would be found in the vegetables sector, where losses could add up to 17%. The losses would be even higher for agricultural sectors, such as wheat (20%), cereal (21%) and crops (22%). Cattle and meat could also lose out, as well as other animal products.

The service sectors are one of the winners in the case of Norway joining TTIP. This result is similar in the top down as well as in the bottom up approach. TTIP boosts aggregate income in the EU and US, some of this will be spent on Norwegian final goods and services, e.g., on tourism. Thus, services sectors, especially financial and business services, and trade and transports would generally gain from TTIP accession. More importantly, the business services and transport services sectors would have changes of about USD 900 and 200 mn, respectively. Losses would be concentrated in financial services, but also in the area of agriculture.

Figure 3: Average Change in Sectoral Value added of depicted sectors, in mn USD under Deep TTIP, Norway outside

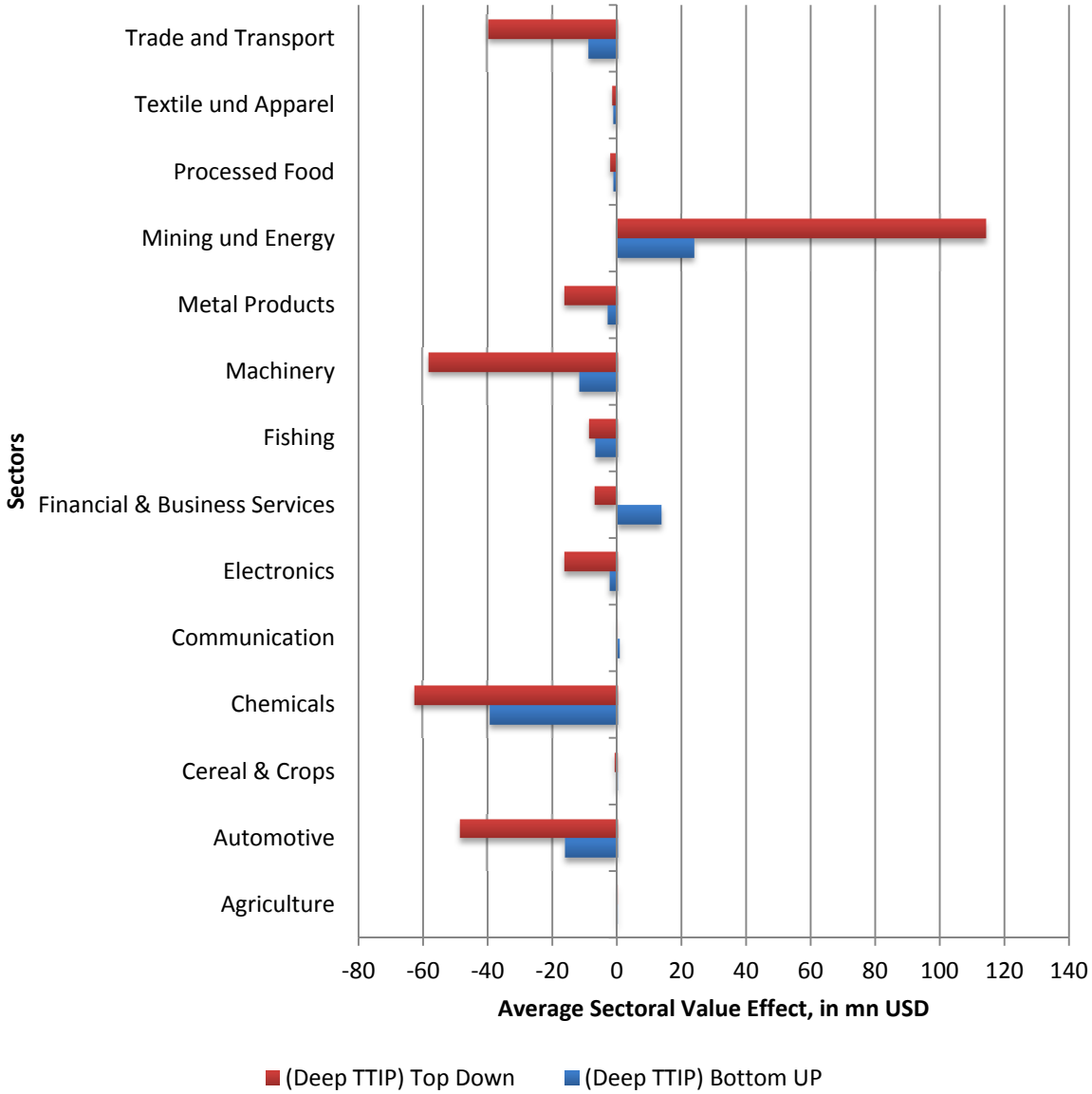
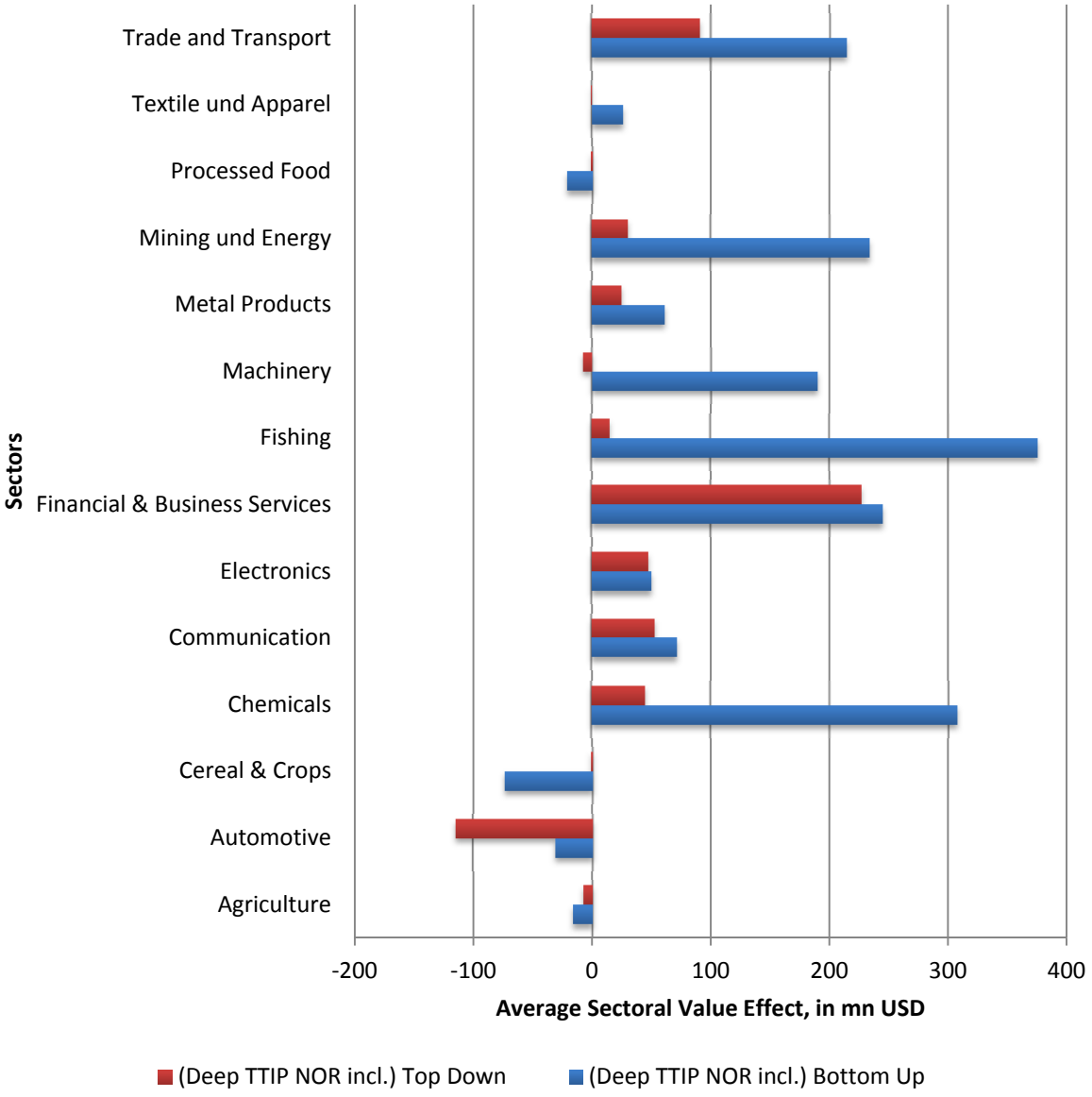


Figure 4: Average Change in Sectoral Value added of depicted sectors, in mn USD under Deep TTIP & Norway included



6.5 Effects on the trade structure

Table 15 and 16 provide details on the expected effects on Norway's bilateral trade structure. The last two columns indicate the effects of a situation where Norway joins the TTIP. Exports to the EU make up for about 71% of Norwegian exports of goods and services. The value of trade is about ten times as big as with the US, the second biggest export destination after the EU. A deep TTIP would slightly increase Norwegian exports to the EU and decrease it towards the USA. This might seem paradoxical at the first glance, because only EU and US producers are to benefit from trade cost reductions across the Atlantic. However, as ex-

plained above, trade diversion effects due to changes in relative competitiveness positions and trade creation effects due to higher levels of activity and, thus, higher demand for Norwegian products, need to be added up. And, as it turns out, the trade creation effects dominate, in particular with respect to the EU. Similar to the top-down analysis, exports to other destinations tend to fall, both in terms of their absolute size and in terms of their shares in overall Norwegian exports. China and the rest of Asia are most strongly negatively affected. In terms of absolute trade changes, Canada and the rest of Europe (Russia and Turkey) see the largest declines. Were the country to join the TTIP, its exports to the US could go up by 20%. If Norway joins the TTIP together with the other EFTA countries, this picture remains almost unchanged. Trade with the EU would decline in both analyses. Trade with third countries would fall as well.

As the EU and the US grant themselves mutually improved market access conditions, and their exports to each other go up, third parties see their terms of trade weakened and find it optimal to import less from them. In the deep scenario, Norway imports less from the EU and still slightly more from the US.

Table 15: Effects of TTIP on Norwegian export structure

	Exports		Export changes with TTIP, various scenarios			
			Deep TTIP (NOR out)		Deep TTIP (NOR incl)	
	in mn USD	as share of total, in %	in %	%points	in %	%point
ASEAN	4961	2.8	-0.47	-0.01	1.85	-0.15
Alianza del Pacifico	614	0.3	-0.52	0.00	2.11	-0.02
Australia & New Zealand	676	0.4	-0.45	0.00	2.60	-0.02
Canada	2506	1.4	-1.32	-0.02	-2.47	-0.13
Central Asia	4	0.0	-0.52	0.00	0.55	0.00
China	6273	3.5	-0.56	-0.02	2.75	-0.17
EFTA	1941	1.1	-0.28	0.00	2.04	-0.06
EU28	128057	71.0	0.12	0.11	7.06	-0.55
East Asia	2976	1.7	-0.80	-0.01	3.03	-0.07
East Asia & Pacific	149	0.1	-0.19	0.00	0.79	-0.01
Eurasian Customs Union	3057	1.7	-0.23	0.00	6.40	-0.02
Latin America & Caribbean	694	0.4	-0.44	0.00	3.64	-0.02
MERCOSUR	1363	0.8	-0.32	0.00	4.14	-0.03
Middle East & North Africa	1699	0.9	-0.38	0.00	2.23	-0.05
Rest of Former Soviet Union	741	0.4	-0.16	0.00	7.71	0.00
Rest of World	731	0.4	-0.60	0.00	2.40	-0.02
South Asia	1673	0.9	-0.36	0.00	1.06	-0.06
South Korea	3700	2.1	-0.69	-0.01	0.80	-0.13
Southern African Customs Un	208	0.1	-0.39	0.00	3.11	-0.01
Sub-Saharan Africa	1355	0.8	-0.18	0.00	3.36	-0.03
Turkey	1053	0.6	-0.35	0.00	2.81	-0.03
USA	12755	7.1	-0.34	-0.02	20.91	0.85
West Balkan	920	0.5	-0.59	0.00	-1.63	-0.05

Source: Ecorys (2009), GTAP 9 data for the year 2011 and own calculations.

Table 16: Effects of TTIP on Norwegian import structure

	Imports		Import changes with TTIP			
			Deep TTIP (NOR out)		Deep TTIP (NOR incl)	
	in mn USD	as share of total, in %	in %	%points	in %	%points
ASEAN	2928	2.2	0.29	0.01	-3.18	-0.24
Alianza del Pacifico	874	0.6	0.20	0.00	-5.42	-0.09
Australia & New Zealand	485	0.4	0.33	0.00	-1.46	-0.03
Canada	4017	3.0	-0.18	0.00	2.90	-0.16
Central Asia	7	0.0	0.42	0.00	0.44	0.00
China	6526	4.8	0.22	0.01	-2.95	-0.53
EFTA	1536	1.1	0.06	0.00	-10.08	-0.20
EU28	90227	66.6	-0.16	-0.07	12.41	2.12
East Asia	2289	1.7	0.28	0.01	-6.46	-0.24
East Asia & Pacific	309	0.2	0.11	0.00	0.28	-0.02
Eurasian Customs Union	2307	1.7	0.05	0.00	-1.58	-0.16
Latin America & Caribbean	1456	1.1	-0.01	0.00	-0.57	-0.09
MERCOSUR	1871	1.4	-0.06	0.00	-2.69	-0.15
Middle East & North Africa	1559	1.2	0.24	0.00	-0.40	-0.10
Oil exporters	1077	0.8	0.13	0.00	-0.67	-0.07
Rest of Former Soviet Union	652	0.5	-0.06	0.00	-7.13	-0.07
Rest of World	823	0.6	0.29	0.00	-1.30	-0.06
South Asia	1978	1.5	0.24	0.00	-0.73	-0.13
South Korea	2860	2.1	0.24	0.01	-5.95	-0.29
Southern African Customs Un	807	0.6	-0.37	0.00	-1.72	-0.06
Sub-Saharan Africa	710	0.5	0.07	0.00	-4.08	-0.06
Turkey	613	0.5	0.09	0.00	-6.52	-0.06
USA	8944	6.6	0.08	0.01	7.67	-0.08
West Balkan	329	0.2	0.00	0.00	-10.90	-0.04

Note: Import values are c.i.f. values and prices are given in constant 2011 USD Data source: Ecorys (2009), GTAP 9 data for the year 2011 and own calculations.

7. Conclusions

Norway is a small open economy which is strongly integrated into the European value added networks. The transatlantic trade and investment partnership (TTIP) between the EU and the US – the world's largest and second largest economies measured in terms of their GDPs in current USD – would most likely have effects on Norway, even if the country stays out of the trade pact.

On the one hand, if the reduction of tariffs and non-tariff trade barriers allows US and EU firms to become more competitive in the EU and US markets, Norwegians firms may come under pressure and lose market share. On the other hand, if the agreement allows certain industries in the EU to expand, Norwegian input producers – e.g. energy suppliers – will face an increase in demand. Similarly, if the TTIP boosts aggregate income in the EU and US, some of this will be spent on Norwegian final goods and services, e.g., on tourism.

The net effect on Norway will therefore depend on how the size of the trade diversion effects compares with the size of trade creation effects. The result is strongly driven by the relative patterns of comparative advantage: in sectors, in which Norwegian firms are direct competitors to transatlantic ones, will likely see trade diversion effects dominate; in areas, where Norway has a unique offer, trade creation will prevail.

To sort out these ambiguities, one needs a quantitative trade model. To capture the reality of global value chains, a multi-country multi-sector approach with rich intra- and international input-output linkages is required. The Ifo-trade model with its coverage of 140 countries and 57 industries has these features. Moreover, falling into the class of so called New Quantitative Trade Theory (NQTT) models, it offers the advantages of a tight integration of model estimation, scenario definition and simulation.

The TTIP is still in the process of negotiation and final texts are unavailable. Nonetheless, one can develop an accurate understanding of threats and opportunities by asking the following question: if the TTIP is as successful in bringing down trade costs as other trade agreements that can be observed in the data were, how would it affect Norwegian trade patterns, sectoral value added, and aggregate income? In the study, we use two approaches: The first and major track is a top-down approach in dealing with non-tariff barriers (NTBs): rather than applying expert opinion on the size and possible reduction of trade costs, we let the data speak – assuming that TTIP will have a similar impact as existing trade agreements. As a second track, for comparison and as a robustness check, we also run bottom-up estimations where the inputs are specific estimates on how TTIP will affect trade barriers.

Our analysis shows that, for TTIP with Norway outside, trade diversion and trade creation effects offset each other. A comprehensive agreement – similar to what the EU has concluded with South-Korea – would lead to an increase in GDP per capita for Norway by 0.05%. This

is equivalent to 36 USD per capita. However, that gain is entirely driven by value added gains in the energy sector amounting to almost 700 mn USD. Without these gains, the aggregate effects would turn into a loss of -0.11% of current GDP (about 75 USD). The sectors most strongly negatively affected would be transportation and chemicals, which would lose 1.2% and 1.6% of value added due to a loss of relative competitiveness mostly on the European market. Several manufacturing sectors would be negatively affected by tougher competition in their main export markets.

If Norway joins TTIP, there would be a substantial economic gain, ranging from 0.39 (top-down) to 0.96 (bottom-up) per cent of GDP in the different scenarios. The negative impact of TTIP on the manufacturing sector would in this case be eliminated (top-down) or turned into a substantial gain (bottom-up). Staying outside TTIP would have only modest repercussions for the fisheries sector, while joining TTIP would have modest (top-down) or even considerable (bottom-up) positive impact. Services sectors, especially financial and business services, and trade and transports would generally gain from TTIP accession. According to the results, the automotive and agricultural sectors would lose from TTIP accession and face problems of adjustment.

Should Norway, alternative to joining TTIP, conclude a free trade agreement with the US, the negative competitiveness effects from staying outside TTIP would also in this case largely be overturned, as Norwegian firms would face better conditions on the US market. For example, the chemicals sector could gain 1.1% value added. More importantly, the business services and transport services sectors would have changes of about USD 900 and 200 mn, respectively. Losses would be concentrated in financial services, but also in the area of agriculture. Cattle, meat, other animal products, vegetables and wheat would together lose more than USD 125 mn in value added. Interestingly, the net effects on fishing would be quasi nil. Raw milk production would be positively affected as would the dairy industry, albeit at small absolute gains (USD 6 and 18 mn, respectively).

This pattern does not depend much on whether Norway concludes a FTA on its own with the US or does so together with the other EFTA members.

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Appendix I: Initial Tariffs

Table 17: Initial Tariffs

	Trade Elasticity	Tariff (in %) USA (IMP) - NOR (EXP)	Tariff (in %) NOR (IMP) - USA (EXP)	Tariff (in %) EU (IMP) - USA (EXP)	Tariff (in %) USA (IMP) - EU (EXP)
Paddy rice	5.82	0.00	22.20	6.82	0.49
Wheat	1.32	1.83	115.69	5.49	0.36
Cereal grains nec	1.29	0.16	71.38	3.06	0.12
Vegetables, fruit, nuts	1.50	3.43	24.50	2.76	3.32
Oil seeds	1.32	0.96	36.69	0.00	0.07
Sugar cane, sugar beet	1.32	0.00	135.39	1.39	0.00
Plant-based fibers	14.50	0.00	0.00	0.00	0.05
Crops nec	1.84	0.65	47.22	5.89	2.49
Cattle, sheep, goats, horses	2.50	2.32	12.92	1.44	1.24
Animal products nec	3.52	0.48	35.80	2.43	0.72
Raw milk	2.55	0.00	0.00	0.00	0.00
Wool, silk-worm cocoons	2.55	0.00	0.00	0.00	0.23
Forestry	3.78	0.37	2.45	0.66	0.77
Fishing	3.67	0.01	0.18	5.88	0.15
Coal	10.39	0.00	0.00	0.00	0.00
Oil	26.68	0.10	0.00	0.00	0.02
Gas	26.68	0.00	0.00	0.00	0.00
Minerals nec	4.15	0.05	0.00	0.08	0.26
Meat: cattle, sheep, goats, horses	2.55	2.70	296.41	53.69	0.65
Meat products nec	2.55	1.59	72.55	15.00	0.67
Vegetable oils and fats	3.78	2.04	36.89	3.49	2.52
Dairy products	2.89	18.04	112.62	44.00	10.74
Processed rice	9.90	0.00	12.41	16.59	1.43
Sugar	2.51	10.80	13.10	30.82	10.81

continue…

	Trade Elasticity	Tariffs in % USA (IMP) - NOR (EXP)	NOR (IMP) - USA (EXP)	EU (IMP) - USA (EXP)	USA (IMP) - EU (EXP)
Food products nec	3.28	0.40	47.92	12.62	5.26
Beverages and tobacco products	1.32	0.36	7.19	5.69	1.13
Textiles	5.26	6.88	5.19	6.14	5.72
Wearing apparel	2.10	10.45	8.69	10.44	10.76
Leather products	3.71	5.26	0.00	6.27	6.82
Wood products	3.38	0.19	0.00	1.23	0.53
Paper products, publishing	4.64	0.25	0.00	0.02	0.00
Petroleum, coal products	8.65	1.64	0.00	1.79	1.35
Chemical, rubber, plastic prods	4.48	1.01	0.06	2.67	1.34
Mineral products nec	3.35	3.49	0.00	3.18	3.95
Ferrous metals	1.57	2.62	0.00	0.64	0.47
Metals nec	4.85	0.15	0.00	3.10	1.84
Metal products	2.56	1.79	0.00	2.58	1.75
Motor vehicles and parts	4.07	0.91	0.00	6.63	0.94
Transport equipment nec	4.01	0.01	0.00	1.37	0.47
Electronic equipment	2.00	0.37	0.00	0.71	0.27
Machinery and equipment nec	3.39	0.51	0.00	1.36	0.98
Manufactures nec	2.51	0.21	0.00	1.68	1.26

Note: Since there are no tariffs levied on service trade flows, we cannot identify those in service industries. We instead take an average value from Egger et al. (2012), who estimate a trade cost elasticity for services of 5.959. (See Aichele et al., 2016)

Appendix II: Sector description

Table 18: GTAP sector description

Sector	GTAP Sector Description
1	Paddy rice
2	Wheat
3	Cereal grains nec
4	Vegetables, fruit, nuts
5	Oil seeds
6	Sugar cane, sugar beet
7	Plant-based fibers
8	Crops nec
9	Cattle, sheep, goats, horses
10	Animal products nec
11	Raw milk
12	Wool, silk-worm cocoons
13	Forestry
14	Fishing
15	Coal
16	Oil
17	Gas
18	Minerals nec
19	Meat: cattle, sheep, goats, horses
20	Meat products nec
21	Vegetable oils and fats
22	Dairy products
23	Processed rice
24	Sugar
25	Food products nec
26	Beverages and tobacco products
27	Textiles
28	Wearing apparel
29	Leather products
30	Wood products
31	Paper products, publishing
32	Petroleum, coal products
33	Chemical, rubber, plastic prods
34	Mineral products nec
35	Ferrous metals

continued…

Sector	GTAP Sector Description
36	Metals nec
37	Metal products
38	Motor vehicles and parts
39	Transport equipment nec
40	Electronic equipment
41	Machinery and equipment nec
42	Manufactures nec
43	Electricity
44	Gas manufacture, distribution
45	Water
46	Construction
47	Trade
48	Transport nec
49	Sea transport
50	Air transport
51	Communication
52	Financial services nec
53	Insurance
54	Business services nec
55	Recreation and other services
56	PubAdmin/Defence/Health/Educa
57	Dwellings

Appendix III: NTB Reductions

Table 19: NTB Reductions for Bottom Up Analyses

Sector	GTAP Sector Description	Bottom Up Deep Scenarios
1	Paddy rice	-1.0
2	Wheat	-7.1
3	Cereal grains nec	-12.0
4	Vegetables, fruit, nuts	-12.1
5	Oil seeds	-5.7
6	Sugar cane, sugar beet	0.0
7	Plant-based fibers	-0.1
8	Crops nec	-5.9
9	Cattle, sheep, goats, horses	-13.2
10	Animal products nec	-3.6
11	Raw milk	0.0
12	Wool, silk-worm cocoons	-15.9
13	Forestry	-3.5
14	Fishing	-5.0
15	Coal	0.0
16	Oil	0.0
17	Gas	-10.8
18	Minerals nec	-0.5
19	Meat: cattle, sheep, goats, horses	-11.8
20	Meat products nec	-8.2
21	Vegetable oils and fats	-4.9
22	Dairy products	-28.4
23	Processed rice	-28.9
24	Sugar	-19.6
25	Food products nec	-17.9
26	Beverages and tobacco products	-2.8
27	Textiles	-21.16

Sector		Bottom Up Deep Scenarios
28	Wearing apparel	-26.3
29	Leather products	-14.3
30	Wood products	-2.5
31	Paper products, publishing	-1.8
32	Petroleum, coal products	-2.7
33	Chemical, rubber, plastic prods	-9.9
34	Mineral products nec	-7.8
35	Ferrous metals	-6.0
36	Metals nec	-8.6
37	Metal products	-8.5
38	Motor vehicles and parts	-10.1
39	Transport equipment nec	-5.0
40	Electronic equipment	-5.3
41	Machinery and equipment nec	-4.4
42	Manufactures nec	-3.0
43	Electricity	0.0
44	Gas manufacture, distribution	-0.4
45	Water	-0.4
46	Construction	-10.00
47	Trade	-10.00
48	Transport nec	-10.00
49	Sea transport	-2.39
50	Air transport	-5.91
51	Communication	-6.53
52	Financial services nec	-1.60
53	Insurance	-2.55
54	Business services nec	-10.00
55	Recreation and other services	-10.00
56	PubAdmin/Defence/Health/Education	-5.00
57	Dwellings	0.00

Source: GTAP 9 for the year 2011 and own estimations. See Aichele et al. (2014) and Aichele et al. (2016) for methodological details.

Note: The table shows the estimated NTB reduction, a deep trade agreement entails. NTB effects are econometrically estimated; they come with standard errors (not shown). In cases where the deep FTA implies a stronger trade cost reduction than the shallow one, the difference is never statistically significant. Note that these NTB reductions are symmetric in a country pair.

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