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The potential economic
impact of Brexit
on the Netherlands

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By Donal Smith, Christine Arriola, Caitlyn Carrico and Frank van Tongeren

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ABSTRACT/RÉSUMÉ

The potential economic impact of Brexit on the Netherlands

This paper provides estimates of the potential trade effects of an exit of the United Kingdom (UK) from the European Union (EU) on exports and production at the sectoral level as well as GDP in the Netherlands. Owing to the high uncertainty regarding the final trade agreement between the negotiating parties, the choice has been made to assume a worst case outcome where trade relations between the United Kingdom and EU are governed by World Trade Organization (WTO) most favoured nation (MFN) rules. In doing so, it provides an upper bound estimate of the potential negative economic impact stemming from disruptions in trade. Any final trade agreement that would result in closer relationships between the United Kingdom and the EU could reduce this negative impact.

Simulations using the METRO model suggest that from an increase in tariff and non-tariff measures (NTM's) Dutch exports to the UK would fall by 17% and GDP declines by 0.7% in the medium term compared to baseline. This effect is from the trade channel absent any change in foreign direct investment (FDI) or productivity. The Dutch agri-food sector would experience a 22% fall in its UK exports. There are some sectors that gain from the export opportunities provided by Brexit, notably financial services and transport.

JEL classification: C68, C10, B17, F13, F14

Keywords: Netherlands, Brexit, international trade, European Union, sectoral economic effects, computable general equilibrium model, METRO model.

L'impact économique potentiel du Brexit sur les Pays-Bas

Ce document présente des estimations des effets que pourrait avoir la sortie du Royaume-Uni de l'Union européenne (UE) sur les exportations et la production par secteur ainsi que sur le PIB aux Pays-Bas. Compte tenu de la grande incertitude entourant l'accord commercial qui résultera des négociations entre les parties, il choisit de se fonder sur l'hypothèse la moins favorable, celle de l'application aux relations commerciales entre le Royaume-Uni et l'UE des règles de l'Organisation mondiale du commerce (OMC) sur la nation la plus favorisée (NPF). Il aboutit ainsi à une estimation haute des conséquences préjudiciables possibles de la perturbation des échanges sur l'économie. Tout accord commercial final qui se traduirait par des relations plus étroites entre le Royaume Uni et l'UE atténuerait ces effets négatifs.

D'après les simulations réalisées avec le modèle METRO, la hausse des mesures tarifaires et non tarifaires ferait chuter les exportations des Pays-Bas vers le Royaume-Uni de 17 % et le PIB reculerait de 0.7 % à moyen terme par rapport au scénario de référence. Ces effets sont observés dans le canal des échanges en l'absence de toute évolution de l'investissement direct étranger (IDE) ou de la productivité. Le secteur agroalimentaire enregistrerait une diminution de 22 % de ses exportations vers le Royaume-Uni. Certains secteurs tireraient profit des possibilités d'exportation créées par le Brexit, comme les services financiers et les transports.

JEL classification codes: C68, C10, B17, F13, F14

Mots-clés: Pays-Bas, Brexit, commerce international, Union européenne, effets économiques sectoriels, modèle d'équilibre général calculable, modèle METRO

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The potential Economic Impact of Brexit on the Netherlands¹

By Donal Smith, Christine Arriola, Caitlyn Carrico and Frank van Tongeren

Introduction and Summary

The United Kingdom's planned departure from the European Union (Brexit) could have major economic consequences for the Netherlands, given strong bilateral trade and investment linkages between the two countries. The UK accounts for 14% of EU real GDP and 10% of EU export demand, a disruption in the UK can thus potentially have a strong impact on other member states. The economic impact will likely be transmitted primarily via the trade channel. The Netherlands is relatively more exposed to a trade shock than other member states as exports account for 50% of Dutch GDP compared to the EU average of 39%.² Different sectors of the Dutch economy will be effected to different degrees. The diversity of sectoral impacts will depend on the tariff rates and non-tariff measures the sectors would be subject to, different UK trade exposures of the sectors, different degrees of global value chain integration, and differences in sectors trade diversification opportunities.

In order to assess the potential impact on the Dutch economy, an illustrative scenario is simulated using the OECD METRO model (OECD, 2015). METRO is an extensive computable general equilibrium (CGE) model. The key advantage of METRO for this analysis is that it provides detailed estimates at the product and sectoral level, accounting for the diversity referred to above. This single framework takes account of the wide variety of factors that will determine the trade impact both at the aggregate and sectoral level.

The importance of this detail can be seen by examining the trade exposure to the UK of broad sectors in the Netherlands (Figure 1). The agri-food sector, which accounts for 7% of Dutch production, has a comparatively high UK exposure. This sector accounts for 23% of total exports of the Netherlands to the UK, while the UK market makes up 12% of total Dutch agri-food exports.³ At the country level three sectors – agri-food, energy and natural resources and chemicals – account for 60% of Dutch exports to the UK. At the sectoral level the UK is an important export market for Dutch sectors, over 10% in three sectors: agri-food, energy and natural resources and electronic equipment. These UK-exposed sectors would be expected to be particularly negatively impacted by the imposition of trade barriers.

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² Figures are taken from the METRO database.

³ GTAP database, 2011 data as used in the METRO model.

Figure 1. The diverse exporting relationship with the UK among Dutch sectors⁴

Source: GTAP database, 2011 data as used in the METRO model.

Since the rules governing the future economic relationship between the United Kingdom and the European Union are highly uncertain, a shock frequently applied in empirical work relating to Brexit (e.g. Kierzenkowski et al., 2016; Bergin et al., 2017; Dhingra et al., 2016; Bellora et al., 2017; Vandebussche et al., 2017), supposes that trade relations between the EU and UK default to the World Trade Organisation's (WTO) Most-Favoured Nation (MFN) rules. Relative to current arrangements, this corresponds to an increase in tariff and non-tariff barriers on Dutch trade with the United Kingdom. In this paper, this shock implies a scenario that could be the result of a disorderly conclusion to negotiations and can be considered something close to a worst case outcome. The shock is principally chosen because it can be quantified using existing information on tariffs and non-tariff measures and hence reduces the degree of judgment needed to formulate the shock. Consequently, the results give an upper bound estimate of the size of the negative sectoral economic effects on the Netherlands due to trade disruptions without representing a judgment about the most likely outcome of Brexit negotiations.⁵

This paper contributes new insights on the potential impact of Brexit on the Netherlands by providing trade, production and value chain estimates at a highly detailed level, allowing

⁴ This figure presents broad aggregate sectors. These broad aggregate sectors outlined in Table 17 and are used in this figure and throughout the paper for illustrative purposes. The main results of the METRO simulation are presented using much more disaggregated sectors.

⁵ In addition to trade disruption the results could also be influenced by longer term factors such as productivity, FDI and innovation not captured in the model.

for considerable variation within sectors to be illustrated. The majority of the existing literature on Brexit that contain estimates for the Netherlands only reports broad aggregates such as GDP. The estimation in METRO of the impact of the WTO scenario on factor demands allows changes in employment by skill category to be shown at the sector level. A further important aspect is that METRO takes into account potentially important trade diversion effects between countries.

This paper has the advantage that the tariff and NTM profile that is imposed in the WTO scenario is specific to the Netherlands. This is an improvement on some approaches in the existing literature on the impact of Brexit on Netherlands as country specific tariff and NTM profiles can differ substantially from an aggregate EU wide profile (Arriola et al., 2018).

A further contribution is that the METRO model, through use of the TiVA data, allows the impact on global value chains to be estimated. In TiVA imports are disaggregated by end use category so imports for intermediate use can be specifically modelled. This is of particular importance in the case of Brexit as in addition to the close trading relationship between the Netherlands and the United Kingdom the European single market is considered a very deep and broad free trade agreement, which allows for the highest degree of integration of any multi-country trade agreement in existence (Rojas-Romogosa 2016). This means that the impact from any potential disruption of the import of intermediate inputs could be substantial.

Utilising the METRO model has a particular advantage in the modelling of Brexit as it is a detailed general equilibrium model that allows the simulation of complex trade policy scenarios that may not have a historical precedent.

On the basis of the illustrative shock the main findings include that:

- Dutch exports to the UK would fall by 17% and the country's GDP would decline by 0.7% in the medium term. Sectors with a relatively high exposure to the UK as an export market and whose products would face a comparatively large increase in tariffs would be the most severely affected. The Dutch agri-food sector is estimated to experience a 22% fall in its UK exports. This is driven by a substantial 35% decline in exports in the meat products sector. Smaller manufacturing sectors such as wood and leather products and textiles would see a 20% fall in their UK exports.
- Electronic equipment would see the largest decline in total exports of all non-agri-food sectors at 3% and the largest decline in production at 2.4% in the scenario. The 2% fall in production in agri-food would contribute to a 7% decline in the value of agricultural land. Four of the five sectors that record the largest declines in employment would be in the agri-food sectors.
- Although exports are the key transmission channel there is also an impact from the disruption to global value chains (GVC's). Access to supply chains for intermediate imports from the UK for Dutch sectors would also be curtailed, contributing to an increase in intermediate input costs.
- A few sectors would gain from this Brexit scenario. These include motor vehicles and transport equipment, both of which show increases in exports to the rest of the EU as well as the United States. The gas and financial services sectors would see an increasing in gross exports.

The remainder of this paper is structured as follows. Section 2 discusses previous analyses of the impact of the UK exit from the EU on the Dutch economy. Section 3 specifies the

shocks used in the analysis. Section 4 provides a description of the METRO model. Section 5 presents the results, and section 6 concludes.

Existing literature on the impact of Brexit on the Netherlands

A number of studies compare the economic impact of Brexit across EU member states and have shown that the Netherlands is one of the most exposed countries. Dhingra et al., (2016) and IMF (2016) have shown that after the UK and Ireland, the Netherlands is the third next most economically affected member state. Using a gravity model at the sector level, Vandenbussche et al. (2017) find that the member states hit the hardest by a WTO Brexit scenario are those with historical ties to the UK, such as Ireland, and small open economies like the Netherlands. They estimate that value added in the Netherlands would be 2.6% lower than base in the scenario, the fourth highest loss in the EU.

Rojas-Ramagosa (2016) estimates a multi-country CGE model for a number of Brexit scenarios. Under a WTO Brexit scenario the Netherlands is the 4th most impacted country with a GDP decline of 1.2% relative to base and a fall in export volume of 3.2%. This study also estimates sectoral level impacts and finds that the most impacted sectors are electronic equipment, processed foods and motor vehicles. Using a similar methodology, Bellora et al. (2017) estimate the GDP contraction in the Netherlands at 0.5%.

A number of studies use CGE models to rank the impact of Brexit across individual member states. In IMF (2018) a CGE model with monopolistic competition and firm heterogeneity is used to quantify the long-term effects of Brexit. Under a WTO scenario, the Netherlands is the third most impacted country after the UK and Ireland with a GDP loss from base of about 1.0%. Cudrick et al., (2017) estimates a dynamic CGE model and finds that in a WTO scenario the Netherlands is the fourth most impacted country/region behind the UK, Ireland and a Bellux region (Belgium and Luxembourg). The GDP loss is estimated at 0.4% relative to baseline. Felbermayr et al., (2017) estimate a static CGE model and find that the Netherlands is the fifth most impacted economy in the EU with a 0.5% loss in GDP relative to the base.

The focus of the Bellora et al. (2017) study is the agri-food sector. They estimate a 66% fall in Dutch agri-food exports to the UK. Applying a partial equilibrium model Van Berkum et al. (2018) also look specifically at the Dutch agricultural sector. They find that the most negatively affected Dutch exports are beef, butter, milk powder and cheese. As in other studies the overall trade impact is not large, but the impact on individual sector can be sizeable. Under a WTO scenario they estimate the fall in production in the most affected sectors between 2% and 3.3%.

This paper is a contribution to this literature as it reports results across a much broader range of indicators and does this at the detailed sectoral level. It also analysis potentially important value global value chain impacts and applies the WTO tariff and NTM schedule specifically to the Netherlands.

Specification of the illustrative Brexit shock for the Netherlands

As in previous OECD analyses (Kierzenkowski et al., 2016), the effect of a UK exit from the EU is simulated before the United Kingdom reaches any new trade agreements. For illustrative purposes, trade relations between the United Kingdom and all of its partners, both EU and non-EU, are assumed to be governed by the World Trade Organisation's (WTO) Most-Favoured Nation rules (MFN). Tariffs on goods exported from the United Kingdom are assumed to increase to the importing country's WTO MFN bound

rates once the United Kingdom formally exits the European Union. Contemporaneously, the United Kingdom imposes tariffs, equivalent to EU bound rates, on goods imported into the country.

The post-Brexit tariff rates between the United Kingdom and EU member states in the model are set as the MFN bound tariff rates of the European Union in each sector. It is assumed that the United Kingdom will apply the EU MFN bound rates on imports from the rest of the world. This post-Brexit rate is operationalised in the model by applying a mark-up on the current bilateral applied rate. The mark-up is the percent increase between the applied and the bound rate of the European Union calculated using the WITS-IDB database. Table 13 shows the mark-up applied to the bilateral import rates faced by exporters of goods to the United Kingdom. In a similar fashion, a mark-up is applied on tariff rates faced by UK exports to the rest of the world. This mark-up is based on the percent increase between the applied rates on imports from the UK and the MFN bound rates of regions in the WITS-IDB database. Table 14 shows the mark-up rate applied to a region's current ad valorem tariff rate in the model to simulate the post-Brexit import tariff rates faced by the United Kingdom. In cases where UK imports currently enter duty free, the region's MFN Bound rates are applied.

Once the United Kingdom leaves the customs union, any introduction of administrative rules, like customs declarations, possible border checks, and health or technical compliance reviews, could increase the cost of trade with the remaining EU countries. Moreover, over time, regulatory divergence between the United Kingdom and the European Union could add additional costs to exporters from meeting differing requirements to trade and verifying that requirements are met. These assumed costs would occur on both sides of UK-EU trade and are illustrated by imposing new trade costs related to non-tariff measures (NTMs).

The increase in costs is assumed to be 50% of tariff equivalent estimates of NTMs on goods imported into the EU faced by non-member countries (for more details, see OECD 2018B) and is applied as an iceberg cost (trade costs modelled as an ad valorem tax equivalent but not resulting in any additional revenue) for the simulation.⁶ The NTM's between the UK and non-EU countries remain unchanged.

Services trade, while not subject to tariffs, is subject to rules, regulations, and other nontariff measures incurring some cost which could increase post-Brexit. The increased cost of services trade between the United Kingdom and the European Union is also simulated as NTM's. Services NTMs are also computed as 50% of the increase in tariff equivalents of NTMs. This is equal to the weighted average of the CEPII import restrictiveness index (Fontagné et al., 2016) across all of a country's trading partners.

The model estimates are conservative since it is not assumed that the UK faces changes to NTMs in non-EU countries. Additionally, in case of specific or mixed tariffs, we have no corresponding AVE bound rate, or it is unclear how they are treated in the WTO database. This is specifically the case in agriculture and food as well as steel and chemicals in some

⁶ The motivation for the 50% rate on the estimated tariffs is further outlined in Kierzenkowski et al., (2018). Kierzenkowski et al., (2018) state that in Berden et al., (2009) it is estimated that in an optimistic scenario looking at a transatlantic trade deal that a 50% reduction in NTM's could be achieved. This figure is across goods and services (Berden et al., 2009). This finding is guiding the assumption made for NTMs facing UK goods and costs on services exports outside the European Union. It is assumed that the tariff equivalents of NTMs on UK-EU trade would rise to 50% of the observed difference of intra- and extra-EU trade in the case when UK trade is governed by the WTO MFN status,

cases. Tariff rate quotas (TRQ) are another difficult issue. Where the EU has a TRQ access, it cannot automatically be assumed that the UK after Brexit would inherit a share of the quota. Similarly, where the EU grants preferential access under a TRQ, the UK may lose access to cheap imports. This is, for example, the case of EU sugar imports from African Caribbean and Pacific Countries, (currently UK sugar processing relies heavily on such imports). Overall, it is unclear if or how the EU and the UK would split the current volume of TRQ access. Nor do we know what type of TRQ administration the UK may put in place. The impact on an individual country would be different if the UK granted that country a pre-determined share of the quota so that its exports would not have to compete with exporters from the rest of the world.

Empirical Framework: The METRO model

The METRO model is a computable general equilibrium model (CGE), described in detail in OECD (2015). For this analysis, the model is aggregated to 10 regions, 40 sectors of the economy, and eight types of factors, with the United Kingdom and the Netherlands disaggregated from the rest of the European Union (EU 26). The simulations represent medium-term shocks where production factors are mobile, but there is no capital accumulation.

CGE models rely on a comprehensive specification of all economic activity within and between countries (and therefore the different inter-linkages that tie these together) and are suitable for examining the impact of a wide range of different trade shocks. The METRO model builds on the GLOBE model developed by McDonald and Thierfelder (2013). The novelty and strength of the METRO model lies in the detailed trade structure and the differentiation of commodities by end use. Specifically, commodities and thus trade flows are distinguished by whether they are destined for intermediate use, for use by households, for government consumption, or as investment commodities.

The underlying framework of METRO consists of a series of individually specified economies interlinked through trade relationships. As is common in CGE models, the price system in the model is linearly homogeneous, with a focus on relative, not absolute, price changes. Each region has its own numéraire, typically the consumer price index, and a nominal exchange rate (an exchange rate index of reference regions serves as model numéraire). Prices between regions change relative to the reference region.

The database of the model relies on the GTAP v9 database (Aguiar et al., 2016) in combination with the OECD Trade in Value Added data. Policy information combines tariff and tax information from GTAP with OECD estimates of non-tariff measures on goods, trade facilitation and export restricting measures. The dataset contains 61 countries and regional aggregates and 57 commodities.

The model is firmly rooted in microeconomic theory, with firms maximising profits and creating output from primary inputs (i.e. land, natural resources, labour and capital), which are combined using constant elasticity of substitution (CES) technology, and intermediate inputs in fixed shares (Leontief technology). Households are assumed to maximise utility subject to a Stone-Geary utility function, which allows for the inclusion of a subsistence level of consumption. All commodity and activity taxes are expressed as ad valorem tax rates, and taxes are the only income source to the government.

In this study, the government is assumed to maintain its pre-simulation fiscal position by adjusting expenditures as necessary. At the same time, the trade balance is fixed and the nominal exchange rate is flexible in the simulations. Wages are assumed downwardly rigid,

but remuneration rates of all other factors (land, capital, natural resources) are assumed to adjust.

Results

As METRO is a trade model the results at the detailed sectoral level for exports, production and value chains are presented first followed by macroeconomic estimates. The sectoral results are presented at two levels of aggregation. Firstly, broad aggregate sectors are presented for illustrative purposes to provide a broad overview of the most exposed and impacted sectors. This level of aggregation is that which is used in Figure 1 and detailed in Table 17. Secondly, the main results of the METRO simulation for trade, production and factors are presented using much more disaggregated sectors. These detailed sectors are also outlined in Table 17.

The United Kingdom is an important trading partner accounting for 8% of total Dutch exports and 7% of total imports into the Netherlands (Tables 3 and 4). From the aggregate perspective the METRO model estimates that the Brexit increase in tariff and non-tariff costs of exporting into the United Kingdom would result in a decline of almost 17% in total Dutch exports to the UK from base levels (Table 2). There is some trade diversion, with exports to all other markets increasing as importers switch from British to Dutch goods and services, but the increases are not enough to cover the loss in the UK market. As result, total Dutch exports decline by 0.8%.

The Dutch meat products, gas and petroleum sectors are the most reliant on UK exports

Certain sectors are potentially more exposed than others to the aggregate decline in trade. Among the broad sectors shown in Figure 1, agri-food, energy and natural resources, chemicals and electronic equipment are those that are likely the most exposed. The more detailed disaggregation reveals that within the agri-food, energy and natural resources sectors, it is the meat products and the gas sector in particular that are more vulnerable to a UK exit, since exports to the United Kingdom account for 34% and 42% respectively of their total exports (Table 5).⁷

In general, Dutch goods have a relatively higher share of exports going to the United Kingdom than services. On average 15% of goods exports are destined for the UK market compared to just 5% of services trade. On the import side however, services sectors are more exposed to the consequences of Brexit. On average 13% of imports of services comes from the United Kingdom. Dutch imports from the UK in the petroleum sector and business services are particularly high – 18% and 15% respectively (Tables 3 and 4).

Electronic equipment and agri-food sectors would experience the largest fall in exports

Different degrees of UK trade exposure, trade barriers under WTO rules and potential for market diversion, increasing trade to markets other than the UK, among the sectors of the Dutch economy lead to a diverse sectoral reaction to the scenario (Figure 2). In the METRO

⁷ Chemicals and electronic equipment are not disaggregated further.

Figure 2. Netherlands exports to the UK and total exports, per cent change from base total exports

Source: OECD METRO model estimates.

simulation of the WTO scenario, agri-food and motor vehicles would experience the largest fall in their UK exports with an estimated 22% decline. A further four sectors – transport equipment, chemicals, materials manufacturing and metals – would see a 19% - 21% reduction in UK exports. The electronic equipment sector has the largest estimated decline in total exports at 3%. This stems from a 16% fall in UK exports.

Changes in total exports in the sectors relative to the fall in their UK exports reveal the impact of UK trade exposure and market diversion on the overall outcome for a sector.⁸ The agri-food and motor vehicles sectors are estimated to experience the same fall in their UK exports, but while the overall exports of the motor vehicles sector increase by 1.3%, for agri-food exports fall by 2.5%. This outcome for the vehicles sector is different from that found by Rojas-Ramagosa (2016) who estimates a relatively large overall decline in this sector. This is possibly due to a difference in the modelling of the trade diversion to that in this paper; this is discussed in Box 1.

Box 1. Trade Elasticities and scenario outcomes: The Dutch motor vehicles sector

In the WTO scenario, exports of the Dutch motor vehicles sector increase by 1.3%. This sector's output expands in a scenario with increases in tariff and non-tariff barriers due

⁸ Market diversion is a function of product level elasticity parameters which enter the first order conditions for export and import volumes.

to trade diversion: the demand for the outputs of this sector by the UK's trading partners is diverted to other countries and the Netherlands benefits from this effect.

The size of this outcome can be influenced by trade elasticity assumptions. For illustrative purposes the scenario is run with the export supply elasticity increased by a factor of five. This flattens the export supply curve across all countries making them more responsive to price movements. With the lower elasticity countries did not change outputs as much and thus to satisfy demand in response to a trade disruption with the UK countries predominant response was to increase imports along existing patterns of trade. With a higher elasticity the demand can be satisfied from a broader range of countries as they respond more to the price movement. With a higher elasticity Dutch exports are reduced and more of the diverted demand formerly met by the UK is now met by China, India, the United States and Canada (Figure 3).

The export supply elasticity values used in this paper are seen as more reflective of real world dynamics in the response of country's exports and production to price changes.

Figure 3. Percentage point difference in change from base in exports between the low and high elasticity scenario

The results shown in Figure 2 are for broad sectors (as shown in Figure 1 and detailed in Table 17). It is of interest to compare further the differing reaction of the agri-food and energy and natural resources sectors. The position of the two sectors in Figure 1 suggests that both have a similar exposure to a UK exit. There is however a considerable difference in the impact of a WTO scenario on these sectors (Figure 2). In terms of both the decline in exports to the UK and total exports, the reduction experienced by the energy and natural resources sectors is less than half that seen in agri-food. As will be discussed subsequently this is due to an increase in exports to other markets that is not seen in agri-food.

The fall in agri-food exports is driven by the meat sector

The more detailed level of sectoral aggregation reveals that the agri-food result is driven by a sharp fall in exports of the meat products sector to the UK (Table 5). This sector's UK exports would fall by 35% and its total exports by 13% in this scenario. This reduction in total exports is over four times the fall recorded in any other sector. Other sectors that experience a large contraction are other processed foods, electronic equipment, vegetables and fruits, wearing apparel, leather products and wood products. These sectors would see

a 2-3% fall in total exports. The largest estimated fall in UK exports is 38% in the wearing apparel sector. This sector is a component of the broader materials manufacturing sector; in this sector there are also above 20% declines in exports of wood products, leather products and textiles to the UK. Two components of the metals sector (metal products and metals nec) see above 20% declines in their UK exports. In total 12 Dutch sectors experience a fall in UK exports exceeding 20%. The important gas and horticulture sectors would experience comparatively smaller 12% and 9% reductions in their UK exports, respectively.

Sectors which would experience an increase in exports under the WTO scenario are those that see a strong market diversion effect. The motor vehicles, transport equipment and financial services sectors see above 2% increases in their exports to the EU 26 countries. The gas sector is substantial in the Netherlands and in the scenario its exports increase by 0.6%. This is partially due to a strong market diversion effect, as the sector's exports to the EU and US increase by 6% and 10% respectively.

The Netherlands has a comparative specialisation in agri-food and horticulture

Turning from trade to production, services and the public sector are the largest sectors accounting for 17% and 16% respectively of Dutch output (Table 6). The agri-food sectors combined account for 7% of production, above the EU average for this sector. Horticulture accounts for a share of output that is five times larger in the Dutch economy than the EU average, reflecting specialisation in this sector. Overall, Dutch horticulture accounts for 15% of total EU production in this sector. There is also a specialisation in petroleum and gas with this sector accounting for a 14 times greater share of production in comparison to the EU average. The gas sector in the Netherlands accounts for 67% of the EU wide gas sector and 26% of all EU gas manufacture and distribution.

The agri-food and electronic equipment sector would see the largest falls in production

There is a large disparity in the estimated production declines. For illustrative purposes the decline in the broad sectors is shown in Figure 4 with electronic equipment and agri-food estimated to have the largest declines.⁹ At the more detailed level, four of the five sectors that experience the largest falls in production are agri-food sectors (Table 7). The largest impact is in the meat products sector where there would be a 9.1% fall in production relative to base, three times larger than the fall in the next most impacted sector. The agriculture, vegetables and fruits and processed foods sectors record production falls of 2% and above. The specialised horticulture sector would experience a 1.2% decline in production. These agri-food production falls are larger than the average fall in the other EU member states.¹⁰

In addition to agri-food, another particularly impacted sector is electronic equipment with an estimated 2.4% fall in production from the 3% decline in its total exports. The gas sector would experience no fall in production, while in gas manufacture and distribution output falls by just 0.4% in the scenario. As in the case of Ireland, some smaller manufacturing sectors – textiles, wearing apparel, wood and paper products – are among the most negatively affected sectors (Arriola et al., 2018). These sectors see their production contract

⁹ This figure presents the aggregated sectors as detailed in Figure 1 and Table 17.

¹⁰ This excludes the UK.

by at least 1% relative to base. Two sectors – motor vehicles and transport equipment – experience an increase in production in the scenario due to trade diversion.

Figure 4. Production, Per cent change from base

Brexit would lead to a substantial decline in the value of agricultural land in the Netherlands

The METRO model captures the impact of scenarios on the supply and demand for each production factor: land, labour and capital (Table 10).¹¹ The trade disruption caused by Brexit would lead to production declines across industries and thus declines in factors demanded. The production impact on the agri-food sector is reflected in the declines in factor income. There would be a 7.3% fall in the value of agricultural land; a factor of production that is demanded exclusively by the agri-food sectors (Table 8). The decline in the value of agricultural land is substantial; it is more than double the average land value decline in the rest of the EU. This further highlights the relatively high trade exposure of the agri-food sector in the Netherlands to Brexit.

Unemployment rises strongest among low-skilled workers in the agri-food sectors

Total factor demand for labour can be thought of as the overall wage bill (number of workers multiplied by average wage). In the model wages are assumed to be downwardly rigid, so that changes in labour factor incomes are reflective of changes in employment. Employment declines for each category of worker would range from 0.9 to 1.5%, with office managers and professionals seeing the largest reductions. This category makes up the majority of workers in the Netherlands at 43% of the labour force (Table 9 and 11). The overall reduction in labour factor demand is estimated at 1.3%.

¹¹ In the scenario the supply of land and physical capital are fixed.

At the sectoral level the declines in labour demand match the production declines with a 9.8% fall in demand for labour in the meat sector and 1 – 3% declines in the other agri-food sectors in the scenario (Table 10). Again matching production, four of the five sectors that record the largest declines in employment are in the agri-food sectors. Initial factor demands show the relative capital and labour intensities in each sector (Table 11). These figures show that the agri-food sectors are, along with public administration, the most labour intensive sectors in the Dutch economy.

Other sectors that record above 2% falls in employment are smaller manufacturing sectors and the electronic equipment sector. The gas and horticulture sectors would see falls of 0.7% and 1.7% in employment respectively. In the meat products sector the fall in employment is most concentrated among agricultural and other low skilled workers. These workers account for 31% of the fall in employment in this sector. Due to their size it is however the service sectors that experience the greatest absolute fall in labour demand across all sectors.

In terms of capital input, the meat products sector would see the largest decline in capital with an 8.7% fall. This sector does however only account for a small fraction of the total capital stock in the Dutch economy. Business services have the largest share at 22%. In the scenario this sector expands its capital stock as capital becomes cheaper.

Brexit impairs the participation of the Netherlands in Global value chains

In addition to gross trade flows, the participation of the Netherlands in global value chains is likely to be affected by Brexit. This is an important consideration as participation in GVCs allows higher levels of specialisation, productivity growth and thus job creation (OECD 2017).

There is a wide disparity in the use of imported intermediate inputs across sectors in the Netherlands (Figure 5). 16% of the total value of production in the Dutch business services sector is accounted for by imported intermediate inputs with the remainder being value added and domestic sourcing. This is the highest percentage of any sector; the lowest is in electricity and water at 1.4%. These figures suggest the disruption from this channel would not be of the same magnitude as that from the export channel.

In the WTO scenario, higher trade barriers on sourcing from the UK leads to a fall in UK intermediate input use. The largest fall in intermediate imports from the UK is estimated to be in the motor vehicles sector with a 57% reduction. The second largest fall in imports is in financial and insurance sector at 46%, this sector is however less reliant on intermediates in production compared to other sectors. Overall, all sectors except gas manufacture would see a reduction in their intermediate imports from the UK. This is an indication that in the scenario the connection of the sectors of the Dutch economy to supply chains is disrupted. The overall effect is an increase in intermediate input costs in the Netherlands.¹²

¹² The impact on the total exports of these sectors will depend on elasticity's, shares and changes in the overall trade pattern.

Figure 5. Imported intermediate inputs: Per cent of production and per cent change in UK imports

At the macroeconomic level the trade reliant Dutch economy is relatively more exposed to Brexit

Due to the strong trade and financial linkages between the Netherlands and the UK the scenario would have sizable macroeconomic consequences for the Netherlands (Table 1). The macroeconomic effects presented come from the trade channel. Other channels may influence the macroeconomic outcome such as the relocation of FDI or productivity effects, these are not captured in the model.¹³ Over the medium-term Dutch real exports fall by 0.8% relative to baseline, this fall in export activity reduces domestic demand within the Netherlands. The overall impact is a medium-term 0.7% reduction in real GDP relative to baseline.

These macroeconomic impacts of a WTO scenario are lower than those in the existing literature. Rojas-Romagosa (2016) uses a dynamic CGE model, as opposed to the static model used in this estimation, and assumes a much higher level of non-tariff barriers in a WTO scenario than are assumed in this paper. Erken et al., (2017) employ a different modelling approach, the NiGEM global macroeconometric model. In addition to a different modelling structure, it incorporates productivity and capital accumulation channels which may account for a stronger macroeconomic impact in that analysis.

¹³ See Paczos (2018) for a discussion of channels captured by different trade modelling approaches.

Among the four use categories, exports for private consumption take the largest hit (Table 2). Exports in this category decline by almost 2% from the base. Exports for private consumption to the United Kingdom account for 29% of UK trade. Exports for intermediate use account for the majority of Dutch exports, almost 70% of total exports at the base. Exports for intermediate use decline by almost 1%, as those destined to the UK market fall by 16% from base levels.

Despite the 14% decline in exports to the United Kingdom, capital goods exports increase by 0.4% in the Netherlands under the simulated UK Brexit. Exports increase to all other partners, notably the EU which account for more than half of capital goods exported at the base. Exports of machinery and equipment, which make up 42% of Dutch exports for capital use, increase towards all destinations by between 1 and 2%.

Conclusions

As an open economy with strong trade links to the United Kingdom, the Netherlands is very exposed to any increase in trade barriers between the United Kingdom and the EU. This paper considers an illustrative shock in which trade relations between the EU and the United Kingdom default to operating along WTO MFN rules. This paper employs the extensive and detailed METRO trade model to quantify the trade impact of a WTO scenario on the economy of the Netherlands both at the sectoral and macroeconomic level.

The paper adds considerably to the existing literature on the economic impact of Brexit on the Netherlands as it reports estimates for the effect of a WTO scenario on exports, imports, production, value chains and factor demand at the sectoral level. Estimates for the Netherlands in much of the existing Brexit literature are restricted to broad aggregates such as GDP. The paper applies the scenarios tariff and NTM increases at the country level. This captures important variation from an alternative application of EU wide tariffs. A further contribution is that the use of the TiVA data in the METRO model allows an examination of the impact on global value chains, specifically the impact on imported intermediate inputs. This is of importance due to the unique nature of the integration in the single market and so the potential for production chain disruption.

The METRO simulation suggests that there would be a sharp reduction of 17% in Dutch exports to the United Kingdom in the WTO scenario. There is considerable variation in the impact across the different sectors of the Dutch economy. The agri-food, smaller manufacturing, and electronic equipment sectors would be the most severely affected. Exports from the agri-food sector to the UK would fall by 22%. This is driven by a 35% decline in the exports of the meat products sector. Exports of the smaller manufacturing sectors to the UK are estimated to fall by over 20% and those of electronic equipment by 18%. These sectors are particularly negatively affected due to the concentration of their exports into the United Kingdom market and the comparatively high tariffs their products would face under a WTO schedule.

Not all sectors are negatively impacted, with a number of sectors experiencing a slight increase in total exports. Notably the important gas sector sees an increase in total exports, as do motor vehicles, transport equipment and a number of service sectors such as financial, insurance and business services. This is due to trade diversion effects and is mainly concentrated in the EU markets.

Brexit also disrupts the access of Dutch sectors to global supply chains. Access to intermediate inputs from the UK is curtailed and falls across most sectors. The motor

vehicles sector is estimated to be the most affected and sees a 57% reduction in intermediate imports from the UK. There is also a large fall for financial services.

The trade model used also shows how the fall in export demand could affect production in different sectors in the scenario. The highly UK-exposed electronic equipment sector would see a 3% fall in output. The 2% fall in output in the agri-food sector leads to a 7% decline in the value of agricultural land. The largest proportional employment reductions would also be concentrated in the agri-food sectors.

REFERENCES

- Aguiar, A., B. Narayanan and R. McDougall (2016), “An Overview of the GTAP 9 Data Base”, *Journal of Global Economic Analysis*, No. 1, pages 181-208, June.
- Arriola, C., C. Carrico., D. Haugh., N. Pain., E. Rusticelli., D. Smith., F. van Tongeren., and B. Westmore (2018), “The Potential Macroeconomic and Sectoral Consequences of Brexit on Ireland”, *OECD Economics Department Working Papers*, No. 1508, OECD Publishing, Paris, <https://doi.org/10.1787/8eddfa18-en>.
- Bellora, C., Emlinger, C., Fouré, J. and H. Guimbard (2017), “Research for AGRI Committee, EU – UK agricultural trade: state of play and possible impacts of Brexit”, *European Parliament, Policy Department for Structural and Cohesion Policies*, Brussels.
- Bergin, A., Rodriguez, A.G., Morgenroth, E., and D. Smith (2017), “Modelling the Medium- to Long-Term Potential Macroeconomic Impact of Brexit on Ireland”, *The Economic and Social Review*, Vol. 48 Sep, No. 3, pp. 305-316. DOI: <http://www.esr.ie/article/view/771>
- Berden, K. G., J. Francois, M. Thelle P. Wymenga, S. Tamminen (2009), “Non-Tariff Measures in EU-US Trade and Investment – An Economic Analysis”, Final Report, OJ 2007/S 180-219493, December.
- Ciuriak, D., Dadkhah, A. and J. Xiao (2017) “Brexit Trade Impacts: Alternative Scenarios”, *Ciuriak Consulting*.
- Dhingra, S., H. Huang, G. Ottaviano, J. Pessoa, T. Sampson and J. Van Reenen (2016) “The Costs and Benefits of Leaving the EU”, *Centre for Economic Performance Technical Report*.
- Erken, H., R. Hayat, M. Heijmerikx, C. Prins and De Vreede I. (2017), “Assessing the Economic Impact of Brexit: Background Report”, *RaboResearch – Economic Research*, Rabobank.
- Fontagné, L., C. Mitaritonna and J. Signoret (2016), “Estimated Tariff Equivalents of Services NTMs”, *CEPII Working Paper*, No. 2016-20, August.
- Felbermayr, G., F. Clemens, J. Gröschl and D. Stöhlker (2017), “Economic Effects of Brexit on the European Economy”, *EconPol Policy Report*, Vol. 1, November.
- International Monetary Fund (2016), “United Kingdom Selected Issues”, *IMF Country Report*, No.16/169.
- International Monetary Fund (2018), “Euro Area Policies Selected Issues”, *IMF Country Report*, No.18/224.
- Kierzenkowski, R., P. Gal, D. Flaig and F. van Tongeren (2018), “Sectoral and regional distribution of export shocks: What do two hundred thousand UK firm observations say? ”, *OECD Economics Department Working Papers*, No. 1501, OECD Publishing, Paris, <https://doi.org/10.1787/e5f21088-en>.
- Kierzenkowski, R., N. Pain, E. Rusticelli and S. Zwart (2016), “*The Economic Consequences of Brexit: A Taxing Decision*”, *OECD Economic Policy Paper*, No. 16, OECD Publishing, Paris.
- McDonald, S. and K.E. Thierfelder (2013), *Globe v2: A SAM Based Global CGE Model using GTAP Data, Model documentation*. Available at: <http://www.cgemod.org.uk/>

- OECD (2011): Dee, P. , J. Francois, M. Manchin, H. Norberg, H. Kyvik Nordås, F. van Tongeren , “The Impact of Trade Liberalisation on Jobs and Growth”, *Technical Note, OECD Trade Policy Working Papers*, no 107, Paris. <http://dx.doi.org/10.1787/5kgj4j1nq2-en>
- OECD (2015), “*METRO v1 Model Documentation*”, [TAD/TC/WP\(2014\)24/FINAL](http://dx.doi.org/10.1787/9789264275232-en).
- OECD (2017), “*Services Trade Policies and the Global Economy*”, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264275232-en>
- OECD (2018), OECD Economic Surveys: Ireland 2018, forthcoming.
- OECD (2018B): Cadot, O., J. Gourdon and F. van Tongeren (2018), “Estimating Ad Valorem Equivalents of Non-Tariff Measures: Combining Price-Based and Quantity-Based Approaches”, *OECD Trade Policy Papers*, No. 215, OECD Publishing, Paris. <http://dx.doi.org/10.1787/f3cd5bdc-en>
- Paczos, M. (2018), “Modelling the Economic Effects of Trade Policies: A Submission to the Treasury and International Trade Committees Inquiry into Implications of the UK's Approach to International Trade”, *NIESR Policy Papers*, No. 007.
- Rojas-Romagos, H. (2016), “Trade effects of Brexit for the Netherlands”, *CPB background document*, June.
- Timmer, M. P., E. Dietzenbacher., B. Los., R. Stehrer., and G. J. de Vries (2015), “An Illustrated User Guide to the World Input–Output Database: the Case of Global Automotive Production”, *Review of International Economics*, 23: 575–605.
- Van Berkum, S., Jongeneel, R.A., Van Leeuwen M.G.A. and Terluin I.J. (2018), “Exploring the Impacts of two Brexit Scenarios on Dutch Agricultural Trade Flows”, Wageningen, *Wageningen Economic Research*, Report 2018-026.
- Vandenbussche, Hylke and Connell Garcia, William and Simons, Wouter, Global Value Chains, Trade Shocks and Jobs: An Application to Brexit (September 2017). Available at SSRN: <https://ssrn.com/abstract=3052259> or <http://dx.doi.org/10.2139/ssrn.3052259>

Table 1. Table 1. Macroeconomic effects¹⁴

Value at base (USD millions)			
	Netherlands	European Union	
Real GDP	-0.71		-0.70
Consumption	-0.63		-0.43
Government consumption	-1.00		-1.34
Investment	-0.89		-0.74
Imports	-1.03		-0.76
Exports	-0.81		-0.80

Table 2. Trade decomposition (real exports)

<i>Netherlands</i>	% change				Value at base			
	Total	NLD → UK	NLD → EU26	NLD → USA	Total	NLD → UK	NLD → EU26	NLD → USA
Total	-0.8	-16.7	0.6	0.5	412,994	33,576	232,012	25,436
intermediates	-0.7	-15.6	0.6	0.5	285,759	21,485	156,980	18,206
private consumption	-1.8	-19.8	0.5	0.6	88,266	9,766	53,380	4,688
government consumption	-0.5	-14.4	0.0	0.3	7,660	354	4,356	378
capital goods	0.4	-13.7	1.4	1.0	31,310	1,972	17,296	2,165

¹⁴ Changing the model closures on government debt and the external balance adjust GDP outcomes in the range of 0.06-0.09pp.

Table 3. Share of Netherlands exports by sector and destination at base

Product	Share of total NLD exports by sector at base				Share of total NLD exports in each sector by destination at base				value at base			
	Destination				Destination				Destination			
	Total	UK	EU26	USA	Total	UK	EU26	USA	Total	UK	EU26	USA
Agriculture	0.9	0.3	1.2	0.4	100.0	2.8	77.8	3.1	3,606	100	2,805	112
Vegetables and Fruits	1.2	2.0	1.6	0.2	100.0	13.3	70.0	1.1	5,137	685	3,597	58
Horticulture	2.3	4.1	2.6	1.6	100.0	14.6	63.5	4.4	9,473	1,379	6,019	419
Other foods	4.9	3.5	6.0	6.9	100.0	5.8	68.0	8.7	20,323	1,187	13,818	1,760
Meat products	1.5	6.1	1.5	0.0	100.0	33.8	58.0	0.1	6,054	2,049	3,513	9
Other processed foods	4.6	6.7	5.5	1.3	100.0	11.8	66.6	1.8	19,077	2,259	12,701	335
Natural resources	0.2	0.1	0.3	0.0	100.0	4.5	86.3	0.8	686	31	592	6
Oil	0.0	0.0	0.0	0.0	100.0	0.0	99.6	0.0	42	0	41	-
Gas	2.1	10.6	1.7	0.2	100.0	41.4	46.9	0.5	8,634	3,571	4,052	40
Textiles	0.7	0.9	0.8	0.6	100.0	10.9	66.2	5.3	2,881	314	1,908	152
Wearing apparel	0.2	0.2	0.3	0.0	100.0	8.6	83.4	0.6	723	62	603	4
Leather products	0.1	0.1	0.1	0.0	100.0	12.8	75.9	0.8	325	42	247	2
Wood products	0.3	0.3	0.3	0.1	100.0	10.8	77.1	1.8	1,042	112	803	18
Paper products publishing	2.0	2.2	2.4	0.7	100.0	9.2	67.0	2.1	8,207	752	5,500	175
Petroleum, coal products	10.1	8.3	11.6	14.5	100.0	6.7	64.5	8.9	41,657	2,798	26,868	3,690
Chemical rubber plastic prods	16.9	17.3	19.9	20.6	100.0	8.3	66.4	7.5	69,622	5,797	46,253	5,251
Mineral products nec	0.5	0.5	0.7	0.2	100.0	7.8	73.7	2.6	2,138	166	1,576	55
Ferrous metals	3.9	2.0	4.9	1.6	100.0	4.2	70.4	2.5	16,097	681	11,327	401
Metals nec	1.3	0.6	1.8	0.4	100.0	3.6	79.5	1.8	5,167	187	4,109	91
Metal products	2.1	2.4	2.6	1.2	100.0	9.1	67.2	3.4	8,843	805	5,939	297
Motor vehicles and parts	3.1	3.8	3.7	0.9	100.0	9.7	67.0	1.7	12,985	1,264	8,698	218
Transport equipment nec	1.2	0.8	0.8	3.0	100.0	5.5	37.7	15.9	4,838	265	1,824	772
Electronic equipment	2.7	3.8	3.3	0.9	100.0	11.3	68.4	2.0	11,159	1,264	7,631	223
Machinery and equipment nec	8.6	8.5	8.2	11.1	100.0	8.0	53.5	8.0	35,593	2,843	19,052	2,834
Manufactures nec	1.9	1.6	2.3	1.8	100.0	6.8	70.5	6.1	7,720	524	5,441	470
Electricity	0.3	0.1	0.2	0.2	100.0	3.7	46.2	3.9	1,062	39	491	42
Gas manufacture distribution	0.4	0.1	0.3	0.2	100.0	2.2	55.5	3.0	1,462	32	811	44
Water	0.0	0.0	0.0	0.0	100.0	8.8	53.9	8.7	54	5	29	5
Construction	0.7	0.3	0.5	0.0	100.0	3.4	41.5	0.4	2,719	93	1,129	12
Trade	1.6	0.9	1.6	1.1	100.0	4.5	55.1	4.1	6,748	303	3,715	278
Transport nec	4.3	1.1	1.3	4.6	100.0	2.1	17.5	6.7	17,564	370	3,082	1,170
Sea transport	4.2	0.4	0.8	0.1	100.0	0.7	10.1	0.1	17,317	127	1,753	22
Air transport	2.7	1.3	0.9	5.6	100.0	3.8	19.2	12.7	11,159	423	2,144	1,412
Communication	1.2	1.0	1.2	1.4	100.0	7.0	57.2	7.4	4,762	335	2,726	351
Financial services nec	0.3	0.2	0.2	1.9	100.0	4.1	25.9	33.6	1,421	58	368	477
Insurance	0.4	0.2	0.4	0.5	100.0	3.4	62.8	8.8	1,572	54	987	138
Business services nec	9.2	6.2	7.3	12.6	100.0	5.5	44.7	8.5	37,873	2,072	16,917	3,211
Recreation and other services	0.6	0.7	0.6	0.6	100.0	8.9	51.5	5.8	2,493	223	1,284	144
PubAdmin Defence Health Educat	1.2	0.9	0.7	2.9	100.0	6.4	34.9	15.6	4,758	304	1,659	740
Dwellings	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	8.1	56.2	6.2	412,994	33,576	232,012	25,436

Table 4. Share of Netherlands imports by sector and origin at base

Product	Share of total NLD Imports by sector at base				Share of total NLD imports in each sector by origin at base				value at base			
	Total	Origin			Total	Origin			Total	Origin		
		UK	EU26	USA		UK	EU26	USA		UK	EU26	USA
Agriculture	2.2	1.6	2.8	2.2	100.0	5.2	61.9	7.3	7,195	371	4,453	525
Vegetables and Fruits	0.9	0.2	0.8	0.4	100.0	1.8	43.7	3.5	3,030	55	1,323	106
Horticulture	0.9	0.1	0.4	0.5	100.0	1.0	20.5	4.6	2,858	28	586	131
Other foods	2.3	1.6	3.9	0.5	100.0	4.7	79.5	1.4	7,737	366	6,149	111
Meat products	0.7	0.4	1.0	0.0	100.0	4.1	63.9	0.1	2,427	98	1,550	2
Other processed foods	3.1	1.9	4.3	1.6	100.0	4.2	65.0	3.7	10,333	435	6,719	386
Natural resources	1.1	0.2	0.6	1.8	100.0	1.5	24.3	11.9	3,686	54	897	437
Oil	10.3	10.5	0.1	0.0	100.0	7.1	0.3	0.0	34,500	2,454	105	3
Gas	0.1	0.0	0.0	0.0	100.0	0.5	6.4	0.0	459	3	30	0
Textiles	0.9	0.4	1.0	0.3	100.0	3.2	51.1	2.4	3,075	100	1,572	75
Wearing apparel	1.1	0.1	1.1	0.1	100.0	0.8	43.1	0.8	3,824	31	1,647	32
Leather products	0.6	0.2	0.6	0.1	100.0	2.9	45.8	0.7	1,943	57	890	13
Wood products	1.0	0.1	1.3	0.1	100.0	1.0	65.9	1.0	3,208	31	2,115	32
Paper products publishing	2.0	1.6	3.5	1.8	100.0	5.4	80.7	6.2	6,758	366	5,456	419
Petroleum, coal products	6.0	15.8	4.8	3.2	100.0	18.5	37.4	3.8	19,953	3,695	7,461	760
Chemical rubber plastic prods	11.0	13.9	13.4	22.1	100.0	8.8	57.3	14.4	36,751	3,250	21,055	5,288
Mineral products nec	0.9	0.3	1.6	0.2	100.0	2.5	77.8	1.8	3,124	78	2,430	57
Ferrous metals	3.9	2.0	5.6	0.7	100.0	3.6	68.1	1.3	12,917	464	8,791	165
Metals nec	1.7	1.0	1.6	0.3	100.0	4.0	42.4	1.1	5,772	229	2,446	63
Metal products	2.3	1.7	3.4	1.4	100.0	5.3	68.3	4.2	7,688	409	5,252	323
Motor vehicles and parts	6.3	3.4	11.8	1.9	100.0	3.8	88.0	2.1	21,027	792	18,510	444
Transport equipment nec	0.7	0.3	0.4	2.9	100.0	2.4	27.8	27.9	2,448	58	681	684
Electronic equipment	4.3	2.1	1.7	8.0	100.0	3.3	18.6	13.2	14,551	487	2,709	1,922
Machinery and equipment nec	7.0	5.2	7.3	13.0	100.0	5.2	48.8	13.3	23,344	1,221	11,384	3,107
Manufactures nec	3.6	3.2	2.6	4.9	100.0	6.1	33.7	9.8	12,082	737	4,075	1,182
Electricity	0.5	0.1	0.8	0.1	100.0	1.3	72.7	1.6	1,798	23	1,307	29
Gas manufacture distribution	1.3	0.9	0.1	0.8	100.0	4.8	4.8	4.7	4,277	203	206	203
Water	0.0	0.0	0.0	0.0	100.0	4.1	57.1	6.4	91	4	52	6
Construction	0.6	0.1	0.4	0.0	100.0	1.7	30.0	0.6	1,860	32	558	11
Trade	3.8	1.9	3.8	0.9	100.0	3.6	47.1	1.7	12,642	454	5,954	212
Transport nec	2.2	0.7	2.5	2.3	100.0	2.2	53.6	7.6	7,212	159	3,865	546
Sea transport	0.5	0.5	0.5	0.1	100.0	6.9	48.2	0.8	1,769	122	854	15
Air transport	1.1	1.0	1.2	0.4	100.0	6.1	52.4	2.6	3,696	227	1,937	97
Communication	1.5	2.6	1.7	0.9	100.0	11.9	52.7	4.3	5,166	617	2,723	223
Financial services nec	1.1	1.2	1.0	4.3	100.0	7.8	45.2	28.6	3,572	279	1,613	1,021
Insurance	0.4	0.2	0.6	0.4	100.0	3.6	70.3	6.7	1,418	51	996	95
Business services nec	9.9	21.4	9.2	16.7	100.0	15.1	43.8	12.1	33,069	5,001	14,473	3,989

Recreation and other services	1.1	1.0	1.4	1.5	100.0	6.6	57.5	9.5	3,703	245	2,131	353
PubAdmin	1.1	0.4	1.1	3.5	100.0	2.6	48.6	22.7	3,660	94	1,780	831
Defence Health												
Educat												
Dwellings	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	7.0	46.8	7.1	334,627	23,379	156,737	23,899

Table 5. Netherlands gross exports by product and destination

% change from base							
	destination						
	Total	UK	EU	USA	Total	EU	USA
Agriculture	-0.6	-15.3	-0.3	0.2	3,606	2,805	112
Vegetables and Fruits	-2.6	-17.9	-0.4	0.2	5,137	3,597	58
Horticulture	-1.3	-12.1	0.3	1.5	9,473	6,019	419
Other foods	0.1	-13.2	0.8	1.0	20,323	13,818	1,760
Meat products	-12.9	-34.8	-1.8	-2.4	6,054	3,513	9
Other processed foods	-3.0	-22.4	-0.3	-0.5	19,077	12,701	335
Natural resources	-0.9	-10.7	-0.5	-0.2	686	592	6
Oil	-0.6	0.0	-0.6		42	41	-
Gas	0.2	-9.0	6.0	10.0	8,634	4,052	40
Textiles	-1.8	-22.4	0.7	0.6	2,881	1,908	152
Wearing apparel	-2.6	-38.4	0.8	-0.2	723	603	4
Leather products	-2.3	-21.9	0.7	0.0	325	247	2
Wood products	-2.2	-27.1	0.8	0.1	1,042	803	18
Paper products publishing	-0.9	-15.3	0.3	0.7	8,207	5,500	175
Petroleum, coal products	-0.9	-11.0	-0.4	0.3	41,657	26,868	3,690
Chemical rubber plastic prods	-1.1	-19.4	0.5	0.2	69,622	46,253	5,251
Mineral products nec	-1.4	-22.3	0.3	0.6	2,138	1,576	55
Ferrous metals	0.1	-15.6	0.5	0.9	16,097	11,327	401
Metals nec	0.9	-23.4	1.8	2.2	5,167	4,109	91
Metal products	-1.3	-21.5	0.6	1.0	8,843	5,939	297
Motor vehicles and parts	1.3	-21.8	4.2	0.5	12,985	8,698	218
Transport equipment nec	1.5	-21.0	2.4	2.4	4,838	1,824	772
Electronic equipment	-3.0	-17.6	-1.1	-0.3	11,159	7,631	223
Machinery and equipment nec	-0.3	-17.5	1.0	1.1	35,593	19,052	2,834
Manufactures nec	0.0	-15.3	1.1	1.3	7,720	5,441	470
Electricity	-0.1	-9.9	-0.1	0.9	1,062	491	42
Gas manufacture distribution	0.3	-9.4	0.1	0.7	1,462	811	44
Water	-0.4	-10.5	0.2	0.8	54	29	5
Construction	-0.4	-10.6	-0.1	0.0	2,719	1,129	12
Trade	-0.2	-7.1	0.1	0.3	6,748	3,715	278
Transport nec	-0.3	-7.9	-0.2	0.3	17,564	3,082	1,170
Sea transport	-0.2	-11.5	0.4	0.0	17,317	1,753	22
Air transport	-0.3	-6.4	0.4	0.0	11,159	2,144	1,412
Communication	-0.5	-22.4	1.7	0.3	4,762	2,726	351
Financial services nec	0.9	-6.2	5.5	-0.4	1,421	368	477
Insurance	0.1	-7.8	0.4	0.3	1,572	987	138
Business services nec	0.2	-8.7	1.1	0.4	37,873	16,917	3,211
Recreation and other services	-0.6	-8.2	-0.1	0.6	2,493	1,284	144
PubAdmin Defence Health	-0.8	-12.1	-0.5	0.3	4,758	1,659	740
Educat							
Dwellings					-	-	-
Total	-0.8	-16.7	0.6	0.5	412,994	232,012	25,436

Table 6. Sector shares of total production in each region

Sector	Netherlands	European Union
Agriculture	0.9	1.2
Vegetables and Fruits	0.3	0.3
Horticulture	0.7	0.2
Other foods	2.4	2.0
Meat products	0.6	0.5
Other processed foods	2.2	1.8
Natural resources	0.1	0.4
Oil	0.1	0.1
Gas	0.9	0.0
Textiles	0.4	0.6
Wearing apparel	0.1	0.4
Leather products	0.0	0.3
Wood products	0.2	0.7
Paper products publishing	2.0	1.8
Petroleum, coal products	3.6	2.1
Chemical rubber plastic prods	6.7	4.8
Mineral products nec	0.5	0.9
Ferrous metals	1.3	1.2
Metals nec	0.4	0.8
Metal products	1.9	1.9
Motor vehicles and parts	1.1	3.0
Transport equipment nec	0.5	0.8
Electronic equipment	0.9	1.0
Machinery and equipment nec	4.4	5.7
Manufactures nec	1.1	1.1
Electricity	1.1	1.8
Gas manufacture distribution	0.5	0.1
Water	0.2	0.2
Construction	7.0	6.8
Trade	9.4	11.8
Transport nec	4.1	4.7
Sea transport	1.2	0.8
Air transport	1.0	0.8
Communication	2.0	2.0
Financial services nec	3.9	3.4
Insurance	1.2	1.2
Business services nec	16.6	14.5
Recreation and other services	1.8	2.6
PubAdmin Defence Health Educat	14.6	12.5
Dwellings	2.3	3.4
Total	100.0	100.0

Table 7. Production effects

Sector	% change	
	Netherlands	European Union
Agriculture	-1.9	-0.7
Vegetables and Fruits	-2.5	-0.9
Horticulture	-1.2	-0.7
Other foods	-0.3	-0.6
Meat products	-9.1	-1.1
Other processed foods	-2.3	-0.9
Natural resources	-0.8	-0.5
Oil	0.8	0.1
Gas	0.0	3.9
Textiles	-1.2	-0.9
Wearing apparel	-1.9	-2.0
Leather products	-1.7	-1.2
Wood products	-1.0	-1.6
Paper products publishing	-0.7	-0.8
Petroleum, coal products	-0.8	-0.5
Chemical rubber plastic prods	-0.8	-0.9
Mineral products nec	-0.9	-0.8
Ferrous metals	0.1	-0.5
Metals nec	0.9	-1.8
Metal products	-0.7	-0.8
Motor vehicles and parts	0.5	0.7
Transport equipment nec	0.7	-0.8
Electronic equipment	-2.4	-1.5
Machinery and equipment nec	-0.3	-0.6
Manufactures nec	-0.3	-0.8
Electricity	-0.6	-0.6
Gas manufacture distribution	-0.4	-0.6
Water	-0.6	-0.6
Construction	-0.8	-0.7
Trade	-0.6	-0.5
Transport nec	-0.5	-0.7
Sea transport	-0.2	-0.3
Air transport	-0.3	-0.6
Communication	-0.3	-0.4
Financial services nec	-0.3	0.5
Insurance	-0.4	-0.6
Business services nec	-0.3	-0.4
Recreation and other services	-0.6	-0.6
PubAdmin Defence Health Educat	-0.9	-1.2
Dwellings	-0.4	-0.1

Table 8. Per cent change in factor income

	Land	Technical and Assistant Professionals	Clerks	Service and shop assistants	Office managers and Professionals	Agricultural and other low skilled workers	Capital	Natural Resources
European Union 26	-3.4	-1.2	-0.7	-0.9	-1.2	-0.8	-0.4	-1.9
Netherlands	-7.3	-1.4	-0.9	-1.0	-1.5	-1.1	-0.5	-1.0

Table 9. Value at base

	Land	Technical and Assistant Professionals	Clerks	Service and shop assistants	Office managers and Professionals	Agricultural and other low skilled workers	Capital	Natural Resources
European Union	54,609	1,002,047	493,276	490,497	1,435,272	716,483	5,820,190	25,917
Netherlands	1,835	26,325	20,324	15,906	67,270	28,238	428,099	4,740

Table 10. Per cent change in factor demand in Netherlands by sector by factor

	Land	Technical and Assistant Professionals	Clerks	Service and shop assistants	Office managers and Professionals	Agricultural and other low skilled workers	Capital	Natural Resources	Total labour change
Agriculture	-0.1	-2.7	-2.0	-2.0	-2.7	-2.0	-1.3	-1.8	-2.4
Vegetables and Fruits	-0.8	-3.3	-2.7	-2.7	-3.3	-2.7	-1.9		-3.0
Horticulture	0.6	-2.0	-1.4	-1.4	-2.0	-1.4	-0.5		-1.7
Other food products		-1.4	-0.6	-0.6	-1.4	-0.6	0.0		-1.0
Meat products		-10.1	-9.4	-9.4	-10.1	-9.4	-8.7		-9.7
Processed foods		-3.4	-2.6	-2.6	-3.4	-2.6	-1.9		-3.0
Natural resources		-2.1	-0.8	-0.8	-2.1	-0.8	-0.6	-0.6	-1.3
Oil		-0.7	0.7	0.7	-0.7	0.7	0.8	0.9	0.0
Gas		-1.5	-0.1	-0.1	-1.5	-0.1	0.0	0.1	-0.7
Textiles		-2.0	-1.3	-1.3	-2.0	-1.3	-0.6		-1.6
Wearing apparel		-2.7	-2.1	-2.1	-2.7	-2.1	-1.3		-2.4
Leather products		-2.5	-1.8	-1.8	-2.5	-1.8	-1.1		-2.1
Wood products		-1.8	-1.2	-1.2	-1.8	-1.2	-0.3		-1.5
Paper products publishing		-1.6	-0.9	-0.9	-1.6	-0.9	-0.2		-1.2
Petroleum, coal products		-1.6	-1.0	-1.0	-1.6	-1.0	-0.2		-1.3
Chemical rubber plastic prods		-1.7	-1.0	-1.0	-1.7	-1.0	-0.3		-1.3
Mineral products nec		-1.7	-1.1	-1.1	-1.7	-1.1	-0.3		-1.4
Ferrous metals		-0.8	-0.1	-0.1	-0.8	-0.1	0.7		-0.4
Metals nec		0.1	0.8	0.8	0.1	0.8	1.6		0.5
Metal products		-1.5	-0.8	-0.8	-1.5	-0.8	0.0		-1.1
Motor vehicles and parts		-0.3	0.4	0.4	-0.3	0.4	1.2		0.1
Transport equipment nec		-0.3	0.5	0.5	-0.3	0.5	1.2		0.1

Electronic equipment		-3.2	-2.4	-2.4	-3.2	-2.4	-1.8		-2.8
Machinery and equipment nec		-1.2	-0.5	-0.5	-1.2	-0.5	0.3		-0.8
Manufactures nec		-1.1	-0.5	-0.5	-1.1	-0.5	0.4		-0.8
Electricity		-1.9	-1.1	-1.1	-1.9	-1.1	-0.4		-1.5
Gas manufacture distribution		-1.6	-0.9	-0.9	-1.6	-0.9	-0.2		-1.3
Water		-1.7	-1.0	-1.0	-1.7	-1.0	-0.3		-1.4
Construction		-1.8	-1.1	-1.1	-1.8	-1.1	-0.3		-1.3
Trade		-1.4	-1.0	-1.0	-1.4	-1.0	0.0		-1.1
Transport nec		-1.3	-0.9	-0.9	-1.3	-0.9	0.1		-1.1
Sea transport		-1.0	-0.5	-0.5	-1.0	-0.5	0.4		-0.7
Air transport		-0.9	-0.5	-0.5	-0.9	-0.5	0.6		-0.7
Communication		-1.2	-0.5	-0.5	-1.2	-0.5	0.2		-0.8
Financial services nec		-1.3	-0.6	-0.6	-1.3	-0.6	0.2		-1.1
Insurance		-1.3	-0.7	-0.7	-1.3	-0.7	0.2		-1.1
Business services nec		-1.2	-0.6	-0.6	-1.2	-0.6	0.3		-1.0
Recreation and other services		-1.7	-0.9	-0.9	-1.7	-0.9	-0.2		-1.0
PubAdmin Defence Health Educat		-1.6	-1.2	-1.2	-1.6	-1.2	-0.1		-1.5
Dwellings		-1.4	-0.8	-0.8	-1.4	-0.8	0.0		-1.2
Total	0.0	-1.5	-0.9	-1.0	-1.6	-1.1	0.0	0.0	-1.3

Table 11. values (USD millions)

	Land	Technical and Assistant Professionals	Clerks	Service and shop assistants	Office managers and Professionals	Agricultural and other low skilled workers	Capital	Natural Resources
Agriculture	822.1	7.6	5.5	3.4	75.9	55.2	1635.6	231.8
Vegetables and Fruits	375.8	2.7	1.9	1.2	26.5	19.3	644.8	
Horticulture	637.0	4.6	3.3	2.1	45.6	33.2	1059.5	
Other food products		11.6	10.5	4.7	19.8	22.0	5640.9	
Meat products		1.4	1.3	0.6	2.4	2.7	815.2	
Processed foods		14.0	12.7	5.8	24.0	26.7	6119.2	
Natural resources		1.1	0.4	0.1	1.0	2.5	939.3	151.3
Oil		0.1	0.0	0.0	0.1	0.2	560.5	256.6
Gas		1.8	0.7	0.1	1.6	4.1	8678.8	4100.6
Textiles		2.0	1.8	0.8	3.5	3.9	1067.9	
Wearing apparel		0.7	0.6	0.3	1.2	1.4	126.4	
Leather products		0.2	0.2	0.1	0.4	0.4	78.9	
Wood products		3.2	2.9	1.3	5.5	6.1	503.4	
Paper products publishing		22.7	20.5	9.3	38.7	43.2	8182.5	
Petroleum, coal products		1.7	1.6	0.7	3.0	3.3	380.9	
Chemical rubber plastic prods		18.0	16.3	7.4	30.7	34.3	17403.3	

Mineral products nec	7.2	6.5	2.9	12.3	13.7	1348.1
Ferrous metals	8.3	7.5	3.4	14.1	15.8	3116.8
Metals nec	2.2	2.0	0.9	3.7	4.2	623.9
Metal products	13.6	12.3	5.6	23.2	25.9	4991.3
Motor vehicles and parts	5.0	4.5	2.0	8.5	9.5	2716.1
Transport equipment nec	7.4	6.7	3.0	12.6	14.1	1422.4
Electronic equipment	7.3	6.6	3.0	12.5	13.9	2443.6
Machinery and equipment nec	20.7	18.8	8.5	35.4	39.5	14697.1
Manufactures nec	10.3	9.3	4.2	17.6	19.6	3198.6
Electricity	5.0	6.2	0.2	8.0	4.3	8724.1
Gas manufacture distribution	4.3	5.4	0.2	7.0	3.8	4078.5
Water	1.5	1.9	0.1	2.4	1.3	1255.6
Construction	92.9	43.1	5.4	92.9	390.3	21810.8
Trade	157.5	251.7	713.3	335.1	164.2	51322.0
Transport nec	29.8	89.3	15.2	40.5	11.4	13883.2
Sea transport	3.3	9.9	1.7	4.5	1.3	3565.0
Air transport	6.0	17.9	3.0	8.1	2.3	1313.5
Communication	24.2	72.6	12.4	32.9	9.3	13806.7
Financial services nec	107.6	75.3	2.3	64.6	0.3	36060.3
Insurance	40.5	28.3	0.9	24.3	0.1	5403.6
Business services nec	290.7	173.6	57.9	496.6	36.3	95574.7
Recreation and other services	22.0	22.9	84.4	16.2	65.9	10142.9
PubAdmin Defence Health Educat	886.2	359.9	519.6	1372.3	57.7	60442.5
Dwellings	2.0	0.8	1.2	3.1	0.1	12320.6

Simulation Tariff Rates

It is assumed that once the United Kingdom formally leaves the customs union, imports of UK good into the European Union would face the region's MFN rates (Table 12). Imports into the United Kingdom from the Netherlands and the remaining 26 EU member states would face the same MFN rates. Moreover since the effects of a UK exit are simulated before any new trade agreements are reached, it is assumed that UK exporters would face MFN treatment in all other markets in the simulation scenario, and the UK would, in turn, apply the EU's MFN rates on goods from non-member countries.

The MFN bilateral bound rates between the United Kingdom and non-EU member countries, for the simulation, are applied as a mark-up on the current applied rates in the model database. The mark-up is based on the WTO information in the WITS-IDB database, and is computed to increase the applied rate in the database by the same amount as in the WITS-IDB. It is calculated as one plus the percent increase between the effectively applied tariff rate and the MFN bound rate and is computed for each sector and for each trading partner. The new tariff rate applied by the United Kingdom on goods imported from non EU member countries is computed as the applied rate in the database multiplied by the markup rate between the effectively applied rate and MFN bound rates of the European

Union (Table 13). If goods from a sector and trading partner enter the European Union duty free, then new tariff rate applied is the EU's MFN bound rate for that sector and partner. The simulation tariff rate applied on UK exports by non-EU countries is computed and applied in a similar fashion. A markup rate, based on the percent increase between the effectively applied and MFN bound rate for each UK trading partner, is applied to the import tariff rate faced by the United Kingdom in foreign markets (Table 14). If goods from the United Kingdom enter duty free in the base situation, the MFN bound rate of the region is used as the simulation tariff rate.

Table 12. Post-Brexit ad valorem tariff rates applied to goods traded between the UK and EU (including the Netherlands)

Sector	Tariff rate
Agriculture	2.3
Horticulture	1.5
Vegetables and Fruits	3.6
Other foods	2.4
Other processed foods	11.7
Meat products	7.7
Wood products	1.2
Chemical rubber plastic prods	2.9
Electronic equipment	0.7
Natural resources	0.0
Gas	0.7
Oil	0.0
Mineral products nec	3.6
Petroleum, coal products	3.2
Metal products	2.4
Ferrous metals	0.5
Metals nec	2.3
Machinery and equipment nec	1.5
Manufactures nec	1.3
Paper products publishing	0.0
Leather products	6.7
Textiles	8.1
Wearing apparel	10.9
Motor vehicles and parts	5.9
Transport equipment nec	2.3
Electricity	0.0
Gas manufacture distribution	0.0

Source: Author's calculation based on the WITS-IDB database 2016 EU MFN Bound import tariff rates. Simple average across partners of weighted average of EU bilateral bound rates

Table 13. Mark-up rate applied to the current bilateral import tariff rate in order to calculate the United Kingdom's Post-Brexit tariff rate.

Sectors	Exporter					
	CAN	CHN	IND	LATAM	USA	ROW
Agriculture	1.00	1.00	5.00	2.19	1.00	2.84
Horticulture	1.00	1.00	3.81	18.25	1.00	5.71
Vegetables and Fruits	1.00	1.14	1.24	3.75	1.04	6.12
Other foods	1.02	1.00	2.73	2.56	1.01	1.93
Other processed foods	1.02	1.03	1.94	2.15	1.04	5.48
Meat products	1.02	2.52	1.58	1.18	1.01	1.72
Wood products	1.00	1.00	16.33	1.31	1.00	2.24
Natural resources	1.00	1.00	1.00	1.00	1.00	1.00
Gas	1.00	1.00	1.00	7.00	7.00	7.00
Oil	1.00	1.00	1.00	1.00	1.00	1.00
Mineral products nec	1.00	1.00	2.86	3.54	1.00	2.78
Petroleum, coal products	1.93	1.76	1.93	2.61	1.87	2.27
Leather products	1.01	1.00	2.08	1.25	1.01	2.27
Textiles	1.01	1.00	1.19	5.64	1.01	10.55
Wearing apparel	1.00	1.00	1.30	11.72	1.00	7.07
Paper products publishing	1.00	1.00	1.00	1.00	1.00	7.00
Chemical rubber plastic prods	1.00	1.00	1.29	2.11	1.16	2.66
Ferrous metals	1.00	1.00	20.50	1.13	1.00	5.08
Metals nec	1.44	1.04	1.85	4.10	1.00	4.62
Metal products	1.00	1.00	17.44	2.41	1.00	2.76
Motor vehicles and parts	1.00	1.00	1.09	7.98	1.00	4.45
Transport equipment nec	1.00	1.00	1.00	1.00	1.00	1.51
Electronic equipment	1.00	1.19	11.50	35.00	1.30	2.63
Machinery and equipment nec	1.00	1.00	62.00	2.44	1.00	2.03
Manufactures nec	1.00	1.00	41.00	6.57	1.00	2.86
Electricity	1.00	1.00	1.00	1.00	1.00	1.00
Gas manufacture distribution	1.00	1.00	1.00	1.00	1.00	1.00

Source: Author's calculation based on the WITS-IDB database. Based on the 2016 tariff rates for the EU 28. The markup rate is calculated as one plus the percent increase between the effectively applied rate and MFN bound rates of the European Union in each sector and for each partner. The markup rate is multiplied with the current bilateral applied rate in the model database to simulate the post-BREXIT tariff rate. To calculate mark-up in WITS-IDB if the effectively applied rate is 0, then a small applied rate is used (0.1%) to calculate the markup.

Table 14. The mark-up multiplied by each countries ad valorem tariff rate, giving the new tariff rate UK exporters could face post-UK exit.

Sectors	Importer					
	can	chn	ind	latam	usa	row
Agriculture	2.76	1.01	7.87	7.98	5.10	6.79
Horticulture	1.31	1.00	2.26	5.22	2.03	6.82
Vegetables and Fruits	1.07	1.00	1.68	4.41	3.17	4.13
Other foods	1.07	1.00	1.01	3.29	1.00	2.84
Other processed foods	1.08	1.00	3.84	3.11	1.00	3.30
Meat products	1.38	1.00	3.33	36.56	1.00	4.57
Wood products	1.70	1.00	3.53	2.82	1.00	3.56
Natural resources	6.25	1.03	5.58	9.57	1.00	19.15
Gas	1.00	1.00	1.00	350.00	1.00	73.80
Oil	1.00	1.00	1.00	194.94	1.00	3.35
Mineral products nec	3.48	1.08	4.20	4.63	1.00	2.65
Petroleum, coal products	7.57	1.03	9.23	10.71	3.18	10.54
Ferrous metals	47.00	1.01	12.42	9.67	1.00	11.86
Metals nec	26.70	2.38	4.57	13.32	1.00	5.35
Metal products	3.65	1.04	3.84	4.55	1.00	2.67
Machinery and equipment nec	6.53	1.07	4.11	5.24	1.00	3.80
Manufactures nec	1.25	8.25	3.71	6.37	1.00	3.05
Paper products publishing	1.00	1.37	5.77	6.52	1.00	5.27
Leather products	1.37	1.53	2.54	11.86	1.02	2.27
Textiles	2.04	1.25	3.90	3.79	1.00	4.91
Wearing apparel	1.07	2.00	3.78	2.41	1.00	3.45
Chemical rubber plastic prods	2.02	1.15	4.39	4.92	1.03	4.10
Motor vehicles and parts	1.02	1.07	2.04	2.80	1.00	3.89
Transport equipment nec	1.00	4.89	2.80	3.91	1.00	3.89
Electronic equipment	1.00	1.00	1.51	9.77	1.00	3.96
Electricity	1.00	1.00	1.00	1.00	1.00	1.00
Gas manufacture distribution	1.00	1.00	1.00	350.10	1.00	4.74

Source: Author's calculation based on the WITS-IDB database. Based on the most recently available tariff rates in the database. For Canada and the EU 2016 tariff rates are available. For China, India, and the United States 2015 tariff rates are used. For countries in Latin America and the Rest of World regions, tariff years ranged from 2011-2016.

The markup rate is one plus the percent increase between the effectively applied rate applied to UK imports and MFN bound rates of the importing country. The markup rate is multiplied with the current bilateral applied rate in the model database to simulate the post-BREXIT tariff rate. To calculate mark-up in WITS-IDB if the effectively applied rate is 0, then a small applied rate is used (0.1%) to calculate the markup.

Increase cost of non-tariff measures (NTMs)

Once the UK leaves the customs union, introduction of administrative rules like customs declaration, border checks, and health or technical compliance reviews would increase the cost of trade between the UK and the remaining EU countries. Moreover as the two regions are no longer bound to maintaining the same rules, regulatory divergence would add additional cost to exporters in not only meeting differing requirements to trade but also verifying that requirements are met. These cost would occur on both sides of the UK-EU border and would apply to both goods and services trade. Goods and services being exported from the UK would be treated as coming from any other non-EU member state. EU and Dutch exporters would be required to comply to UK regulations to gain access to its market. These increase costs on both the trade of goods and services are captured by

imposing non-tariff measures (NTMs) on goods and services. The increase in NTM costs is applied as an iceberg cost for the simulation.

The per cent changes in the NTMs on exports from the service sector are computed as 50% of the increase in tariff equivalents of NTMs faced by the exporter once trade between the United Kingdom and EU member states is governed by MFN status (Table 15). The tariff equivalents of services NTMs is equal to the weighted average of the CEPII import restrictiveness index across all of a country's trading partners. The NTMs faced by exporters under MFN rules, is the weighted average of the index where EU countries or the UK, depending on the exporter, is at the same level as of the rest of world.

NTMs in the goods sector are based on a new set of tariff equivalent rates estimated by the OECD (2018B). Ad Valorem Equivalents based on a price-based estimated are derived for roughly 5 000 products on a bilateral basis and explicitly distinguish between several types of measures. Types of NTMs on goods trade are included in the analysis: Tariff equivalents on SPS measures, which are largely limited to the agriculture sector; and Technical Barriers to Trade (TBT) measures, which are more uniformly used across sectors with peaks in textiles, processed foods, and chemicals. Trade weighted averages of the NTM cost faced by a non-EU country when exporting into the EU are computed for the two types of NTMs at the sector level. The sum of the two types of NTMs is assumed to be the total NTM costs. The increase in non-tariff related costs, post-Brexit, of trading goods between the United Kingdom and the European Union is assumed to be 50% of sum of the two types NTMs (Table 16).

Table 15. Per cent Increase in Non-Tariff Measures on Services, by product

Service sector	NLD to UK
Construction	2.7
Trade	0.6
Transport nec	2.0
Sea transport	8.7
Air transport	2.1
Communication	16.3
Financial services nec	0.4
Insurance	0.1
Business services nec	1.4
PubAdmin Defence Health Educat	5.6

Source: author's calculation based on Fontagné, L., C. Mitaritonna and J. Signoret (2016), "Estimated Tariff Equivalents of Services NTMs", CEPII Working Paper, No. 2016-20, August; and Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R. and de Vries, G. J. (2015), "An Illustrated User Guide to the World Input–Output Database: the Case of Global Automotive Production", Review of International Economics, 23: 575–605.

**Table 16. Per cent Increase in Non-Tariff Measures on Goods between UK and EU
(including Netherlands)**

Sectors	UK and EU/NLD
Agriculture	4.0
Vegetables and Fruits	11.5
Horticulture	4.5
Other foods	5.0
Meat products	9.3
Other processed foods	7.3
Natural resources	0.0
Oil	0.0
Gas	0.0
Textiles	4.9
Wearing apparel	9.3
Leather products	1.4
Wood products	12.4
Paper products publishing	4.5
Petroleum, coal products	0.0
Chemical rubber plastic prods	4.0
Mineral products nec	5.5
Ferrous metals	3.7
Metals nec	1.4
Metal products	3.6
Motor vehicles and parts	13.2
Transport equipment nec	3.3
Electronic equipment	3.0
Machinery and equipment nec	3.5
Manufactures nec	2.4

Source: OECD (2018B).

Table 17. Sector Aggregation

Broad illustrative sectors	METRO estimation sectors
Agri-Food	Agriculture
	Vegetables and Fruits
	Horticulture
	Other foods
	Meat products
	Other processed foods
Energy & Natural Resources	Natural resources
	Oil
	Gas
	Petroleum, coal products
	Mineral products nec
Materials Manufacturing	Textiles
	Wearing apparel
	Leather products
	Wood products
	Paper products publishing
Chemicals	Chemical rubber plastic prods
Metals	Ferrous metals
	Metals nec
	Metal products
Motor vehicles	Motor vehicles and parts
Transport equipment nec	Transport equipment nec
Electronic equipment	Electronic equipment
Machinery and equipment nec	Machinery and equipment nec
Manufactures nec	Manufactures nec
Electricity & Water	Electricity
	Water
Gas manufacture distribution	Gas manufacture distribution
Construction	Construction
Trade	Trade
Transport & Communication	Transport nec
	Sea transport
	Air transport
	Communication
Financial & Insurance	Financial services nec
	Insurance
Business services	Business services nec
Public Sector & Other Services	Recreation and other services
	PubAdmin Defence Health Educat
Dwellings	Dwellings