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ORIGINAL ARTICLE

An Economic Assessment of the EU–Japan Economic Partnership Agreement with Realistic Preference Utilization Rates

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Abstract

Recent years have seen an increased focus on the implementation of Preferential Trade Agreements (PTAs). While the number of PTAs has risen remarkably since early 2000, data on the utilization of preferential tariffs under these agreements point out that some businesses have not gained access to all the benefits that PTAs can provide. When utilization rates are low, the impact of the agreement will likely differ from what was anticipated by ex-ante economic research. This paper conducts a dynamic Computable General Equilibrium (CGE) analysis of the expected impact of the EU–Japan Economic Partnership Agreement and compares a scenario that includes realistic preference utilization data with a standard scenario where all tariff liberalization is assumed to be fully utilized by businesses. The results show considerable differences between the two scenarios and illustrate the need to make the inclusion of credible utilization data standard practice in the modelling of international trade.

Keywords: EU–Japan EPA; trade agreements; computable general equilibrium; tariffs; preference utilization rates; rules of origin

1. Introduction

The number and ambition levels of Preferential Trade Agreements (PTAs) have grown rapidly over the past 20 years. Policymakers and businesses have increasingly become aware of the importance of the effective implementation of these agreements. As such, more attention has been devoted to the extent to which the preferential tariffs under a PTA are utilized. This can be measured by so-called Preference Utilization Rates (PUR), which give an indication about whether businesses are indeed claiming the benefits that were foreseen during the negotiations of the PTA. Specifically, this paper investigates the role of PUR on the estimated impact of the EU–Japan Economic Partnership Agreement (EPA) that came into force on 1 February 2019. The results of this study will significantly contribute to determining the importance of realistic assumptions about PUR instead of the standard implicit assumption that PUR is 100%.

Governments have good reason to focus on the percentage of exports and imports that are making use of the PTAs they negotiate: strong utilization of the preferential tariffs can provide a clear justification for the high costs of negotiating a PTA. Previous studies have found large variations in utilization rates across time, agreements, and tariff lines (Takahashi and Urata, 2010; Nilsson and Preillon, 2018; DG Trade, 2019). For example, European exports to Mexico had an average PUR of 85.1% in 2016 whereas this was only 37.8% for exports to Costa Rica

(Nilsson and Preillon, 2018). In some cases, low preference utilization might deter a country from engaging in further trade liberalization. The assistant secretary-general of India's Forum for Trade Remedies lists low PUR – around 10% – of Indian exports as one of the reasons that India cannot move ahead with its trade policy (Rathore, 2019).

More research is required about the reasons underlying low preference uptake and the effect this has on the implementation of PTAs. Importantly, the inclusion of less-than-perfect preference utilization data in economic impact assessments of PTAs can highlight the necessity for implementation strategies. Such assessments could demonstrate how detailed monitoring of the implementation phase is necessary to ensure that businesses gain access to all possible benefits that were acquired, most often through long and costly negotiations.

As with all PTAs, the final impact of the EU–Japan (EPA) will depend on the extent to which preferential tariffs are utilized. Both the EU and Japan have PTAs where PUR are relatively low (Takahashi and Urata, 2010; Nilsson and Preillon, 2018; DG Trade, 2019). PUR data for 2019 and 2020, the first years after entry into force of the EU–Japan EPA, illustrate the importance of effective implementation and awareness building: in the first six months after the entry into force of the EPA only 13.8% of European exports made use of tariff preferences (JETRO, 2019). If the EPA follows the pattern of other European and Japanese PTAs, PUR can be expected to gradually rise from these low initial levels to around 70% on average, as is for example the case for the EU–South Korea Free Trade Agreement (FTA) (Nilsson and Preillon, 2018).

Because of the above, the actual tariff liberalization in the EU–Japan EPA will not match the hypothetical reduction that was negotiated and foreseen in the impact assessments of the agreement, which implicitly assumed immediate perfect PUR (Francois et al., 2011; DG Trade, 2018). Many exporters will continue to use Most Favoured Nation (MFN) tariffs, even when eligible for preferential tariffs, which will likely dampen the economic impact of the EPA. So far, few analyses of trade agreements take PUR and the transition phase into account. Two exceptions are the impact assessment of the Canada–Korea FTA by Ciuriak and Xiao (2014) and the Asian Development Bank study by Menon (2013). Both Menon (2013) and Ciuriak and Xiao (2014) include fixed levels of PUR across years in a dynamic analysis with the same PUR across sectors. Possible extensions of these two studies could take into account (1) rising levels of preference uptake after the entry into force of the PTA and (2) disaggregated PUR by sector. These challenges are tackled for the EU–Japan EPA in the present paper.

First, including PUR estimates is not yet standard practice in economic impact assessments. As a result, there has not yet been an exploration of the possible methods to include PUR estimates in a dynamic and disaggregated fashion. Second, to the author's knowledge, there has so far been only one study comparing a standard economic impact assessment with an impact assessment that includes PUR data (i.e. Menon, 2013).

This paper builds on the work by Menon (2013), and Ciuriak and Xiao (2014) and conducts an impact assessment of the EU–Japan EPA that includes expected PUR. The assessment is conducted with a Computable General Equilibrium (CGE) analysis of the EPA comparing two scenarios: one with assumptions of perfect uptake of tariff preferences and one with assumptions of imperfect uptake. The main question that this paper aims to answer is how much the economic impact of a PTA will differ between a scenario without any assumptions on preference utilization and a scenario that assumes realistic utilization rates.

The current study proposes a more rigorous way of implementing PUR data in a CGE analysis. This includes the disaggregation of data by sector and modelling increasing utilization rates during the first years after implementation. Specifically, PUR data will be disaggregated by sector based on the available PUR data for 2019–2020 by the Directorate-General for Trade (DG Trade) at the European Commission (DG Trade, 2021a, 2021b). Using disaggregated sectoral PUR can help indicate which sectors are most at risk of losing out on the benefits of the EPA and provide policy guidance.

The novelty of this paper lies in the presentation of a method to prepare data for CGE analyses of PTAs. Whereas there are model extensions that could be done to better represent PUR, this paper takes into account that most of the existing governmental impact assessments of PTAs are done using the same standard model. As such, there are several benefits to using the same standard model as the existing impact assessments: (1) the results of the current paper can be compared to existing impact assessments, and (2) the methods of this paper are easily accessible for use in future impact assessments that make use of the standard model. In other words, by using the same model specifications as most governmental studies, we obtain results that are more relevant for policy-makers.

The rest of this paper is structured as follows: Section 2 gives an overview of the existing literature about PUR. Section 3 delves into the PUR data for the EU–Japan EPA and Section 4 describes the methods of the CGE analysis, including how PUR are taken into account. Section 5 contains the results and discussion and the last section concludes.

2. Previous Studies

2.1 PUR

There are some variations in how to calculate or define PUR. In this paper, we follow the method employed by DG Trade at the European Commission (see e.g. DG Trade, 2021a). DG Trade calculates PUR as the ratio of preferential usage over preferential eligibility, meaning that PUR is expressed as a percentage. The preferential usage is the monetary value of trade entering a country under a preferential tariff regime, and the preferential eligibility is the monetary value of the trade that is eligible to use a preferential tariff regime.

The current study mainly focuses on PUR from an exporter perspective, seeing preferential tariffs as a way to make their products more competitive in a foreign market. However, it is important to note throughout the paper that it is the importer that holds the end responsibility for claiming the preferential tariff and it is also the importer who will pay the MFN tariff if preferential tariffs are not utilized. To benefit from a PTA, both exporter and importer need to fulfil their side of the requirements and a certain amount of cooperation between the two sides is necessary. For more information on the importer perspective, we refer to Kasteng and Inama (2018) and Kasteng and Tingvall (2019).

Several important features of PUR have become apparent in the literature. Firstly, the results of studies conducted in different regions are not always directly comparable due to the different calculation methods used. Some studies omit tariff lines where the MFN tariff is already 0% while other studies include these tariff lines in the calculation. Consequently, PUR may seem lower for studies using the latter method, as businesses have no incentive to comply with the requirements of a PTA if the MFN tariff is already 0% (Takahashi and Urata, 2010). To get a better overview of where businesses struggle with preference uptake, it is more accurate to include only those tariff lines where the MFN tariff is strictly positive, in other words, where there is a preference margin (Nilsson and Preillon, 2018; PwC, 2018).

Secondly, there might be large variations of utilization rates across different sectors under the same PTA. Several studies provide PUR disaggregated by sector (Nilsson and Preillon, 2018; PWC, 2018; DG Trade, 2023). Disaggregated PUR data are vital to gain insight into the causes of low preference utilization. For example, both Keck and Lendle (2012) and Nilsson (2011) investigate whether PUR are higher for sectors where the preference margin is larger and, hence, businesses have more of an incentive to comply with the requirements of an agreement. A survey among Korean businesses conducted by Cheong (2014) found that low tariff preferences are the main reason for not utilizing PTAs. In one of the most detailed studies on preference utilization up to date, conducted with data for trade between South Korea and Sweden, Kasteng and Tingvall (2019) find that the size of the transaction is one of the most important factors in determining whether importers will use tariff

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preferences. The study finds that both large and small businesses use PTAs in a rational way that minimizes the overall cost of duties paid.

A characteristic of PUR is that they tend to be low in the first years after the implementation of a PTA and will tend to increase gradually afterwards. This is illustrated by the first few years of implementation of the EU–Japan EPA (JETRO, 2019, 2020). When businesses become acquainted with a new PTA and adapt their business structure to the rules of origin and other requirements, preference utilization will start to pick up. As a consequence, there might be an implementation lag associated with the adoption of PTAs.

Regarding the reasons for low PUR, in a survey among Korean exporters, low preferential margins were the most frequently cited reason for not using PTAs, followed by a lack of information about PTAs (Cheong, 2014). Other impediments that are identified are complicated origin provisions, administrative costs, and non-tariff barriers (Cheong, 2014). Nilsson (2011) investigates exports from developing countries to the EU and finds that the overall value of trade flows has a stronger influence on preference utilization than the rules of origin or preference margins. Besides the overall value of trade flows, Kasteng and Tingvall (2019) find that the size of the individual import transaction is also important in determining whether a company will use preferential tariffs. In this study, Swedish importers are more likely to use tariff preferences when the transaction values are high, indicating that there is an administrative burden involved in claiming preferential tariffs.

Several studies on PUR in the EU found that PUR are overall higher for imports to the EU than for exports from the EU to partner countries. In a study for UNCTAD in 2018, this trend was consistent across all 17 PTAs that were analysed (Kasteng and Inama, 2018). For the EU–South Korea Free Trade Agreement (FTA), PUR of exports from Korea to the EU were 19 percentage points higher than those of exports to Korea (Kasteng and Inama, 2018). Because of similarities between EU–South Korea trade and EU–Japan trade, we will refer to the EU–South Korea FTA later in this paper to determine expected future values of PUR for the EU–Japan EPA.

If the uptake of preferences under a PTA varies between partner countries, this could indicate that there are issues with implementing the PTA locally. Although there is no conclusive research on this, the report by the National Board of Trade Sweden offers some possible explanations such as contestation regarding the implementation of the PTA on both sides of the border (Kasteng and Inama, 2018).

Lastly, the analysis by Menon (2013) focuses on trade liberalization in East Asia and compares a standard scenario without assumptions about PUR – implicitly assuming 100% utilization – with one with realistic PUR. The results show non-linearity in the differences between GDP results for the two scenarios, meaning that using unrealistic PUR may not only lead to overstating the impact of a PTA, this may also skew the results in a false direction. Menon (2013) suggests that the incomplete utilization of trade liberalization options reduces trade diversion, which could lead to a smaller decrease in GDP for regions outside of the PTAs than the initial decrease expected from complete trade liberalization.

2.2 The EU–Japan Economic Partnership Agreement

Several impact assessments were conducted about the EU–Japan EPA using CGE models. Copenhagen Economics (Sunesen et al., 2009) performed one of the first impact assessments. The study employs the CGE model developed by Francois, van Meijl, and van Tongeren (2005), and the underlying data of the CGE model is based on the Global Trade Analysis Project (GTAP) database. The report considers several scenarios and different options for the reduction of non-tariff barriers. Depending on the scenario, the study finds a relative increase in European GDP between 0.1% and 0.14%. For Japan, the study finds a relative increase in GDP ranging from 0.2% to 0.31%. The larger increases in GDP are the result of more ambitious non-tariff barrier removals (Sunesen et al., 2009).

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Before starting the negotiations for the EU–Japan EPA, the European Commission carried out an impact assessment in 2012 (European Commission, 2012), equally using the CGE model developed by Francois, van Meijl, and van Tongeren (2005). The authors consider several scenarios for liberalization under the EU–Japan EPA, including a more conservative and more ambitious scenario. Both scenarios include full tariff liberalization and some reduction of non-tariff barriers. However, there is a larger reduction of non-tariff barriers in the ambitious EPA scenario. Additionally, for each scenario, the report considers an 'asymmetric' EPA, where there are differences in the amount of non-tariff barrier removals in the EU and Japan. Depending on the scenario, the report finds a relative increase in European GDP ranging from 0.34% to 1.88%, with a larger increase if the agreement is ambitious and symmetrical. In Japan, the relative increase in GDP ranges from 0.27% to 0.67% (European Commission, 2012).

In 2018, the European Commission's Directorate-General for Trade (DG Trade) carried out an impact assessment using the GTAP model GTAP-Dyn (DG Trade, 2018). The authors model a reduction of tariffs (including Ad-Valorem Equivalents (AVEs) for Tariff Rate Quotas and specific duties), a reduction of non-tariff barriers, and a reduction of services barriers. The tariff liberalization occurs over time, based on the phasing-out of tariffs in the schedules of the EU–Japan EPA, and the reduction of non-tariff barriers is based on the consultation of the negotiators of the agreement within DG Trade. By 2035, the report finds a 0.14% relative increase in EU GDP compared to the baseline and a 0.61% relative increase in Japanese GDP. In terms of bilateral exports, there is a 13.2% relative increase in EU exports to Japan and a 23.5% relative increase of Japanese exports to the EU (DG Trade, 2018).

While all of the aforementioned studies conducted rigorous analyses of the EU–Japan EPA, the effect of PUR on the impact of the agreement is not considered. Moreover, for a comprehensive comparison of the different impact assessments of the EU–Japan EPA, please see Chowdhry et al. (2018).

3. PUR Data for the EU–Japan Economic Partnership Agreement

A 2019 report by the Japanese Export and Trade Organization (JETRO) shows that on average during the first six months after implementation of the EPA, only 13.8% of European imports entered Japan using preferences (JETRO, 2019). JETRO also reports that after the first year after entry into force, PUR for Japanese exports to the EU were around 40%, with higher rates for agricultural products and foodstuffs than for manufacturing (JETRO, 2020). Additionally, a 2019 survey by JETRO found that out of 452 businesses trading with the EU, 36.7% were already using the EPA (JETRO, 2020). For some EU Member States, utilization rates of exports are influenced by just a few dominant sectors. For example, about half of the value of preferential exports from Italy to Japan was comprised of heated tobacco products (JETRO, 2021).

In 2021, the European Commission published a full dataset of PUR for imports and exports across a wide group of PTAs at the HS Section level covering the period of 2019–2020 (DG Trade, 2021a, 2021b).[1] According to these datasets, the average PUR of EU exports to Japan was 53% and 63% in 2019 and 2020 respectively, based on the value of trade between the regions. For Japanese exports to the EU, PUR were 38% and 60% in the same years.[2] These data illustrate that there is indeed a learning effect and that utilization rates are fairly similar, on average, on both sides.

The disaggregated data by sector and by year in Figure 1 (DG Trade, 2021a, 2021b) illustrate that utilization rates also rise in all HS Sections individually between 2019 and 2020, although the strength of this effect varies between sectors. Especially for European exports, some agricultural and food sectors (HS S1, S2, and S4) have high utilization rates of over 80% from the start. The

[1]These PUR are based on the preferences that were effectively granted, as registered by customs authorities (DG Trade, 2021a, 2021b).

[2]As stated previously, PUR data distributed by organizations in different regions are not always comparable. The data by the European Commission diverge in some ways from the data reported by JETRO. Therefore, to keep consistency across the data used in this study, the simulations will be based on one data source only.

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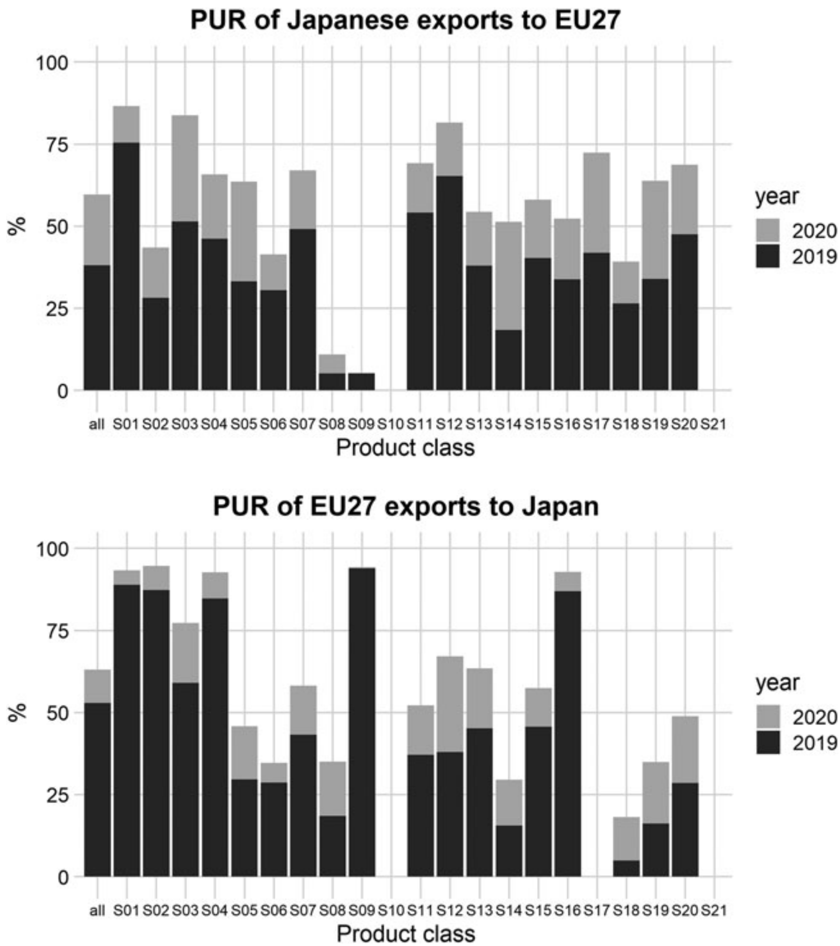

Figure 1. PUR disaggregated by HS Section

Note: The bars indicate the level of PUR in 2019 and the additional growth of PUR in 2020. *Source:* DG Trade (2021a, 2021b) (visualization by author).

EU has similarly high PUR for exports of wood products (HS9) and machinery and mechanical appliances (HS16). By 2020, there were high PUR (>80%) for Japanese exports of animal products and animal or vegetable fats (HS1 and HS3), footwear and headgear (HS12), and PUR of 72% for transportation equipment (HS17). The latter is no surprise, given that the reduction of the EU's 10% MFN tariff on cars was an important objective for the Japanese negotiators of the EU–Japan EPA (Shimbun, 2017).

It is noteworthy that there is a substantial amount of variation between the PUR of Japanese exports of transport equipment (S17) to the different EU Member States. In 2020, the PUR for S17 exports to Luxembourg was a mere 3.41%, while the PUR for exports to the Netherlands was 91.4%. Again, it is important to state that there are large differences in the trade values of Japanese exports to these two countries, a mere 178 thousand EUR for Luxembourg compared to over 1 billion EUR for the Netherlands. Given that there are only a few large automotive companies in Japan, it can safely be assumed that Japanese exports for this sector reflect the export activities from the same set of companies exporting to different European destinations. It is therefore puzzling that these companies would be able to benefit from the EPA for exports to some Member States but not for others.

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One explanation could be that the variation is due to different levels of awareness about the EPA on the importer side, across the Member States.[3] As stated previously, Kasteng and Tingvall (2019) stress the importance of viewing PUR from the importer perspective, and this anecdotal evidence provides support for their point of view. Lastly, Japan's high PUR for exports of motor vehicles seems to indicate that even small preference margins matter greatly for this sector: the EU's 10% MFN tariff will be phased out over a relatively long period of seven years, meaning that the preference margins in 2019 and 2020 were not yet substantial.

For some sectors, PUR data in both 2019 and 2020 were missing (see also Figure 1). These are S10 and S21 for both sides (wood pulp products and works of art) and S17 for EU exports. With regards to European exports of motor vehicles, it is worthwhile to state that the Japanese MFN tariff on cars is already 0%, and that even if there are positive tariffs for other transport equipment, the preference margin is usually low. Therefore, preference utilization for S17 will be relatively more important for Japanese exports than for European ones.

Table 1 shows the average MFN tariffs in the EU and Japan for different product categories. For instance, it is clear from Table 1 that the MFN tariff in Japan for transport or non-electrical machinery is already 0% on average. Therefore, low PUR for EU exports to Japan for these sectors would be less important. Additionally, Table 1 also shows the share of product categories within each region's imports.

Additionally, Table 2 gives an overview of the importance of different products within bilateral EU–Japan trade flows. The HS Sections with the highest trade values are chemicals, machinery and appliances, and transport equipment. High levels of PUR are especially important for those sectors where the trade flows are large and the MFN tariffs are steep.

Considering the importance of chemicals in EU–Japan trade, it is remarkable that the PUR for chemical and pharmaceutical products is among the lowest of all sectors, for both Japanese and European exports with PUR of 41% and 35% respectively in 2020.

The trade of leather products equally suffers from low PUR, with PUR of 35% and 11% for European and Japanese exports respectively in 2020. This is a possible concern for the implementation of the EU–Japan EPA: exports of leather products were expected to benefit considerably from liberalization in the EPA (DG Trade, 2018).

4. Methods

Ex-ante economic impact assessments of the EU–Japan EPA agree that the agreement will boost bilateral trade between the regions and that some specific sectors in both the EU and in Japan, such as motor vehicles and pharmaceuticals, stand to gain considerably (Francois et al., 2011; DG Trade, 2018). However, these impact assessments assume that 100% of eligible trade will use the preferential tariffs from day one of the entry of the agreement into force. As illustrated previously, this is not the case in reality. Low PUR seem to be inevitable during the first few years after implementation and this should be reflected in impact assessments to improve the accuracy of the predicted effects of trade agreements. A dynamic analysis of the EPA will take into account both rising utilization rates when businesses get accustomed to the agreement, as well as the phasing out of previously existing tariffs. The method to conduct such an analysis is set out in the following subsections.

4.1 PUR in the Current Study

The current study will examine the impact of the EU–Japan EPA using a computable general equilibrium (CGE) model. Two CGE simulations are conducted: one assuming perfect uptake

[3]Another explanation could be that some Member States serve as a point of entry for imports that will later be re-exported to other Member States and as such have better infrastructure to deal with the administration regarding PTAs, e.g. ports and resources in the Netherlands for imports.

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Table 1. Average MFN rates and shares of products in imports

Product category	EU Average MFN rate	Share in EU imports (%)	Japan average MFN rate	Share in Japanese imports (%)
Animal products	17	0.3	10.5	1.9
Dairy products	38.4	0.1	81.6	0.2
Fruit, vegetables, plants	10.1	1.7	9.6	1.4
Coffee, tea	5.9	0.9	14.3	0.4
Cereals & preparations	13.7	0.7	29.7	1.5
Oilseeds, fats & oils	6.8	1.8	6.3	1
Sugars and confectionery	24.6	0.1	23.8	0.1
Beverages & tobacco	19	0.6	13.7	1.2
Cotton	0	0	0	0
Other agricultural products	3.1	0.5	3.8	0.7
Fish & fish products	11.5	1.3	5.7	1.9
Minerals & metals	2	16.7	0.9	23.3
Petroleum	2.5	11.4	0.7	10.7
Chemicals	4.5	13.7	2.1	12.2
Wood, paper, etc.	1.1	2.8	1	3
Textiles	6.5	2.4	5.3	2
Clothing	11.5	3.7	8.9	3.1
Leather, footwear, etc.	4.1	2.4	8.8	1.6
Non-electrical machinery	1.8	11.6	0	9.3
Electrical machinery	2	14.5	0.1	14.7
Transport equipment	5.3	6.2	0	3.9
Manufactures, n.e.s.	2	6.9	1.1	5.9

Source: WTO (2024).

of PUR and one allowing for realistic PUR data. First, several assumptions need to be considered: (1) How will the PUR data be aggregated across regions? (2) How will the PUR data be adapted to the sectoral aggregation used by the CGE model? (3) Which PUR data can be used for future years where levels of preference utilization are not yet known?

Because a CGE analysis requires a certain level of regional and sectoral aggregation, the 27 EU Member States[4] will not appear individually in the simulations. However, rather than having a fully aggregated EU27 region, we split up the Member States into four groups. This serves two purposes: As stated previously, PUR varies between Member States both for exports to Japan and for imports from Japan. In order to make use of the available data for 2019 and 2020 as efficiently as possible, the Member States are aggregated based on their average trade-weighted levels of PUR across 2019–2020. In this way, we obtain four groups with different maximum levels of PUR. By comparing the results of these different groups, we observe how sensitive the analysis is to the maximum level of PUR that is assumed in the long run.

[4]Because of Brexit, the UK is not considered as part of the EU, even for 2019. Rather, the UK is included as a separate region in the analysis.

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Table 2. EU trade in goods with Japan in 2021, mln. EUR

HS Section	EU Imports	EU exports	Total
I Live animals; animal products	75.0	2291.9	2366.8
II Vegetable products	73.2	516.4	589.6
III Animal/vegetable fats and oils	48.4	286.6	335.0
IV Foodstuffs, beverages, tobacco	295.1	4255.0	4550.1
V Mineral products	217.5	643.3	860.9
VI Chemicals	7956.8	16453.3	24410.1
VII Plastics, rubber	3110.1	1509.2	4619.3
VIII Raw hides and skins	41.5	1120.2	1161.7
IX Wood, charcoal and cork	7.9	1692.4	1700.3
X Pulp of wood, paper	180.1	415.7	595.8
XI Textiles and textile articles	715.5	1633.3	2348.8
XII Footwear, headgear	77.5	319.5	397.0
XIII Stone, glass and ceramics	675.3	472.0	1147.3
XIV Pearls, precious metals	335.9	1586.4	1922.3
XV Base metals	2737.3	1907.4	4644.7
XVI Machinery and appliances	25309.5	9291.1	34600.5
XVII Transport equipment	12988.6	10272.0	23260.6
XVIII Optical instruments etc.	5624.0	5113.2	10737.2
XIX Arms and ammunition	23.8	18.3	42.1
XX Miscellaneous articles	1348.5	608.8	1957.3
XXI Works of art and antiques	26.4	43.7	70.1

Source: DG Trade (2023).

EU1 consists of the Member States with the largest average PUR across 2019–2020. The countries in this group are smaller economies and, with the exception of Austria, their exports were concentrated in a single industry. EU2 is made up of smaller or middle-size economies whose exports are more diverse compared to EU1. EU3 contains the largest European economies, including Germany, France, and Italy. These three countries have mixed export profiles, with a fair amount of heavier industries such as pharmaceuticals or transport equipment. Lastly, EU4 is again made up of small- to mid-size economies such as Belgium and Ireland. The PUR for this group are heavily influenced by an underutilization of preferences in the chemical and pharmaceutical industries. Detailed graphs can be found in Supplementary Appendices 1 and 2.

Additionally, the aggregation of Member States is based on the PUR for European exports towards Japan rather than imports from Japan for the following reasons: First, the sectoral structure of exports from Member States to Japan varies more between countries than what is the case for exports from Japan to Member States. This is clear from the figures in Supplementary Appendices 1 and 2. Therefore, using European export PUR for the aggregation allows, to some extent, to take into account the sectoral structure of trade and how the sectoral composition of exports influences PUR. Second, PUR for European exports shows more potential for a neat division into four groups, with larger differences between quartiles and no outliers. PUR for Japanese exports, however, are more concentrated around the mean, with smaller interquartile distances and several outliers. The aggregation of EU Member States can be found in Table 3.

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Businesses are still adapting to the EU–Japan EPA and consequently, utilization will continue to climb after 2020 until businesses reach a more or less steady level. This means that assumptions are necessary to approximate the expected future levels of preference utilization. Therefore, we base future levels of PUR on the PUR for the EU–South Korea FTA in 2019 (DG Trade, 2021a, 2021b).[5] This is eight years after the provisional entry into force of the EU–South Korea FTA and we can assume that the PUR had reached a reasonably steady level by 2019. The structure of trade between Japan and the EU and South Korea and the EU is similar. Moreover, as stated in the literature review, South Korea also devotes substantial efforts to the implementation phase of PTAs. Therefore, the EU–South Korea PUR can be seen as a reasonable approximation for the final PUR levels within the EU–Japan EPA. In addition, we assume that the PUR for the EPA will grow linearly from 2020 to 2027.[6] The assumed maximum levels of PUR for each region are displayed in Table 4.

In reality, PUR may not grow linearly over time; however, to date there has not yet been a thorough investigation into the average growth trajectory of PUR after the entry into force of a PTA. Future research could compare the development of PUR for different PTAs to provide additional detail to CGE impact assessments that incorporate PUR into the analysis. We introduce a policy scenario where PUR develop non-linearly over time in the motor vehicle sector (see Section 4.6 for a detailed description). This policy scenario provides a sensitivity analysis to the linear growth assumption.

4.2 A Dynamic CGE Model for the Global Economy

CGE models present a stylized structure of the economy as a whole and are often used for 'what if' analyses. They allow for the evaluation of policy interventions on the overall economy, as the model includes links between all economic actors: productive sectors, households, government, investment, and different factors of production. Because of their suitability for policy analysis of the whole economy, CGE models have become a standard tool in the ex-ante analysis of PTAs (Aguiar, Chepeliev et al., 2019).

The CGE model used in this paper is the latest recursive-dynamic extension of the GTAP model and its corresponding database, GTAP-RD (Aguiar, Corong, and van der Mensbrugghe, 2019).

Firm behaviour is characterized by perfectly competitive markets and a Constant Elasticity of Substitution (CES) nested production structure (Corong et al., 2017).

Private, household demand is modelled using a Constant Differences of Elasticity (CDE) specification, an implicitly additive expenditure function that results in non-homothetic household preferences (Corong et al., 2017).

Factors of production can either be perfectly mobile across sectors, partially mobile or specific to a sector, depending on the Constant Elasticity of Transformation (CET) (Corong et al., 2017). The default choice for the different labour categories in the dynamic model is to make them fairly mobile (CET = −2). Given the low unemployment in the Japanese labour market (OECD, 2021), the default choice of relatively mobile labour is retained.

The model allows for imperfect substitution both between imports and domestically produced commodities as well as between imports from different origins through the two-level Armington assumption (Corong et al., 2017).

The model dynamics include the updating of factors of production, changes to technology, changes to preferences, and changes to policies. To include these dynamics, we conduct a baseline simulation with projections for the population in each region, as well as yearly shocks to the labour force and GDP projections (Aguiar, Chepeliev et al., 2019). Lastly, the baseline can include

[5]Due to the exceptional nature of trade in 2020 as a result of COVID-19, 2020 was not chosen as the reference year.

[6]In a few cases where the PUR for the EPA were already higher than the PUR for the EU–South Korea FTA, the 2020 values for the EPA were retained and kept constant across all years of the analysis.

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Table 3. Aggregation of EU Member States based on PUR for exports to Japan in 2019–2020

EU region	Description	EU Member State
EU1	Q1: Weighted PUR (exports) for 2019 and 2020 between 86% and 94%	Austria, Finland, Greece, Luxembourg, Latvia, Malta
EU2	Q2: Weighted PUR for 2019 and 2020 between 70% and 83%	Cyprus, Czech Republic, Denmark, Estonia, Netherlands, Romania, Sweden
EU3	Q3: Weighted PUR for 2019 and 2020 between 50% and 65%	Germany, Spain, France, Croatia, Italy, Poland, Portugal
EU4	Q4: Weighted PUR for 2019 and 2020 between 14% and 46%	Belgium, Bulgaria, Hungary, Ireland, Lithuania, Slovenia, Slovakia

Source: Data: DG Trade (2021a, 2021b).

Table 4. Assumed PUR per region from 2027 onwards (maximum levels of PUR)

Sector	EU1	EU2	EU3	EU4	Japan
Crops	92.6	91.4	96.0	96.4	78.9
Meat, livestock	91.0	90.5	86.9	85.5	70.3
Extraction	60.9	58.5	81.1	85.8	77.8
Processed food	87.2	90.1	85.0	94.6	69.0
Textile, Apparel	81.2	64.1	64.8	74.9	81.2
Leather	85.4	77.5	61.7	67.3	67.3
Transport equip.	97.3	93.0	92.8	94.4	96.3
Light mnfc	67.0	66.0	67.6	71.1	61.9
Elec machinery	64.7	65.6	59.7	66.4	58.7
Heavy mnfc	77.3	75.7	80.8	83.9	81.1

policy changes, such as other PTAs in which either Japan or the EU are involved. We will consider such a shift in the baseline in our analysis (see section 4.4 below).

For the analysis, the world countries and regions are aggregated as in Table 5. Besides the aggregation of EU regions as explained earlier, we include the US, the UK, and the countries belonging to two other mega-PTAs.[7] These other PTAs are the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP). For a full list of the countries in each group, see Supplementary Appendix 3. Supplementary Appendix 3 also includes a table with the aggregation of commodities.

4.3 Closure of the Model

The closure in the present analysis follows that of the European Commission's economic impact assessment (DG Trade, 2018) and keeps the quantity (i.e. supply) of primary factors in each region fixed while the regional price of endowments is endogenous. Therefore, the results will not give insight into the effect of the policy shock on employment levels overall. However,

[7]This aggregation for CPTPP and RCEP will aid the baseline PTA tariff scenario that is included in the sensitivity analyses.

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Table 5. Aggregation of regions in the CGE analysis

Region	Description
JAPAN	Japan
EU1	EU27 MS with highest PUR
EU2	EU27 MS with 2nd highest PUR
EU3	EU27 MS with 3rd highest PUR
EU4	EU27 MS with 4th highest PUR
CPTPP	CPTPP signatories
RCEP	RCEP signatories (not in CPTPP)
US	United States of America
UK	United Kingdom
RESTOFWORLD	Rest of the World

although the overall quantity is kept fixed, this closure rule still allows observing shifts of factors between sectors (DG Trade, 2018).

4.4 Baseline Simulation

GTAP-RD includes a baseline simulation for the entire period of analysis. The baseline projections for GDP are based on OECD data using scenario two of the Shared Socioeconomic Pathways (SSP2).[8] Changes to the labour force – with changes applied similarly for skilled and non-skilled labour – are equally based on SSP2, as are the baseline projections for population growth. The data were aggregated using GTAP's aggregation utility (Corong, 2020). Policy projections of the UK–Japan Comprehensive Economic Partnership Agreement, the Regional Comprehensive Economic Partnership (RCEP), and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) are also included in the baseline. Tariff liberalization under CEPA is modelled in a similar way as for the EU–Japan EPA, given that differences between these two agreements are negligible considering the level of aggregation of the analysis. For CPTPP and RCEP, tariff liberalization is modelled with slightly less detail, considering tariff liberalization for manufacturing, agriculture, and a list of products that are exempt from liberalization. The tariff schedules for these two agreements in the analysis are based on Japanese official government documents (JETRO, 2018; MOFA, 2021) and liberalization is phased in according to the time frames in the respective agreements.

4.5 Policy Shock

The tariff reduction schedule of the EU–Japan EPA is analysed at the HS 6 level and consequently aggregated to the sectoral aggregation in this study using the Tariff Analytical Simulation Tool for Economists (TASTE) (Horridge and Laborde, 2008).[9] TASTE operates on a large database of bilateral trade flows as well as countries' bound and applied import tariffs. It allows users to aggregate tariffs, or tariff liberalization, from the more detailed HS 6-digit level to the broader level of sectoral aggregation that is used in the CGE analysis.

Tariff liberalization in the EPA is decided at a detailed level: the HS 8-digit level for Japanese tariffs and the Combined Nomenclature level for EU tariffs. Although the EPA will liberalize most

[8]SSP2 is the 'Middle of the Road' scenario.
[9]For more information, see www.gtap.agecon.purdue.edu/resources/taste/taste.asp.

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trade between Japan and the EU, many tariffs are phased out according to different rules, over a period of up to 21 years, and there are exemptions to liberalization. To create as detailed a tariff policy shock as possible, all of the several thousand of these tariff lines and rules were evaluated. In the end, over 800 different tariff lines at the HS6 level were coded into rules for liberalization, for all the years over which the EPA will be implemented. This level of detail is unique compared to previous impact studies.

The current study focuses on two policy scenarios, complemented by additional analyses that serve as a sensitivity check. The first policy scenario is based on the common method where the preferential tariffs are assumed to apply to all eligible trade. In other words, implicitly, PUR are assumed to be 100%. A 'shock' is applied to the economy in equilibrium by reducing the applied tariffs between the EU and Japan after which the new equilibrium is computed. In the second analysis, realistic PUR are taken into consideration by multiplying the previously obtained shock calculation with a realistic utilization rate.

A shock file was produced for each year of tariff liberalization under the EU–Japan EPA. However, TASTE can calculate the power of the tariff shock only in reference to the base year (2014). Thus, after the first initial shock at entry into force, differences between total shocks were used to model the progressive phasing out of tariffs, as illustrated in Equation (1): *shtms* represents the shock (compared to the base year) to the tax on imports per type of good exported from one region to another in period t.[10]

$$power\ of\ shock_{t+1} = shtms_{t+1} - shtms_t \tag{1}$$

For the scenario with realistic PUR, the power of the shock is calculated in the following way,

$$power\ of\ shock_{t+1} = PUR_{t+1} * shtms_{t+1} - PUR_t * shtms_t \tag{2}$$

4.6 Sensitivity Analyses

The first sensitivity analysis includes non-tariff barrier liberalization for the EU–Japan EPA. PUR are mainly a tariff-related issue, and while addressing non-tariff barriers could possibly improve preference utilization, in the current analysis PUR are set exogenously. The effects of non-tariff barrier liberalization are complex and require careful modelling in a CGE analysis. In the current analysis, it is assumed that the removal of non-tariff barriers has no negative effects on EU–Japan trade volumes[11] and that the non-tariff barrier provisions of the EPA enhance trade for certain sectors.[12] The selection of sectors where non-tariff barrier liberalization is introduced is based on DG Trade (2018). In this report by DG Trade, the authors carried out a survey among negotiators of the EU–Japan EPA to determine the reduction of non-tariff barriers that is achieved in the EPA. Based on this survey, the report produces estimations of the ad-valorem equivalents of non-tariff barrier reductions. In our analysis, we use the same estimations as those reported in DG

[10]An alternative approach to modelling PUR, as employed in Burfisher et al. (2019), is to explicitly model the costs related to utilizing a PTA by adjusting the import-augmenting technological change parameter of the model, *ams*. This approach of negatively shocking the productivity parameter *ams* assumes that while a PTA decreases bilateral tariffs, there are administrative costs involved in using the PTA. The method could be regarded as an approximation to model PUR endogenously. While there is no explicit information on preference uptake, the modelled trade costs associated with the PTA will dampen the effects of the tariff liberalization. Because the current analysis is carried out at a time where some PUR data are already available for the EU–Japan EPA, we did not select the *ams*-approach and instead opted to fully use the available data by exogenously modelling preference uptake.

[11]This could for example be the case if non-tariff barriers are necessary to guarantee consumer confidence by ensuring that goods and services are up to certain standards and regulations. When non-tariff barriers are removed, some of this consumer confidence might disappear too.

[12]For more information on non-tariff barriers and the EU–Japan EPA, see Van der Vorst (2021).

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Trade (2018). The parameter that is shocked in the model is *ams,* the import-augmenting technological change variable (e.g. Fugazza and Maur, 2008; Van Tongeren et al., 2009). *Ams* is also said to represent 'iceberg trade costs' and hence this variable can be shocked to simulate a reduction of transaction and transport costs, as would happen when non-tariff barriers are removed. This sensitivity analysis will be referred to as the 'non-tariff barrier sensitivity analysis' in the results section.

To test the sensitivity of the results to the assumption that PUR grow linearly over time, the results section will include a brief policy analysis in which we investigate what the effect could be of implementing targeted Japanese policies to accelerate the increase of PUR for exports of motor vehicle and transport equipment to the EU. After the successful conclusion of the EPA negotiations, the Japanese motor vehicle sector was seen as one of the largest winners, with the relatively high European MFN import tariffs being phased out completely over a span of seven years (Shimbun, 2017). PUR for the first two years after entry into force of the EPA demonstrate that Japanese motor vehicle exporters are aware of the opportunities offered by the EPA, with high PUR of 41% and 71% in 2019 and 2020 respectively. The policy analysis introduces yet an alternative scenario where PUR are still included in the analysis, and PUR for motor vehicle exports from Japan to the EU reach their expected future steady level of 96% already in 2021 instead of in 2027. Such an accelerated uptake scenario could happen; for example, if the Japanese government and businesses paid special attention to stimulating the utilization of the EPA from the start.

Additionally, this policy analysis will compare the value of import duties paid under the accelerated uptake scenario with the standard imperfect uptake scenario, where the maximum level is only reached in 2027. We will look at duties paid as well as forgone duty savings for both these scenarios, following the methodology of Nilsson and Preillon (2018) and DG Trade (2021b). Foregone duty savings are those duties paid by the importers based on the MFN tariff while they were in fact eligible for the (reduced or zero) EPA tariff. These are obtained by calculating the duties paid under perfect PUR and subtracting these from the actual duties paid. Regarding these customs duties, it is important to state here that European import duties levied on Japanese products are paid by the European importer to the national customs authorities and collected at the European level.[13]

5. Results and Discussion

This section describes the most important results of the analysis, each time focusing on the difference between the scenario with full preference utilization and the scenario with realistic utilization rates. The first subsection looks at results for changes in GDP, compared to the baseline simulation, followed by changes in export quantities and welfare. Next, we discuss the sensitivity analysis.

5.1 Results for GDP

The second and third columns of Table 6 describe cumulative changes in GDP by 2041 for each region in the analysis compared to the baseline simulation. Whereas GDP increases relative to the baseline for Japan and the four EU groups, GDP for regions outside of the EPA decreases slightly. This is most likely caused by trade diversion as a result of the EPA. In both scenarios, Japan's GDP increases most, which is to be expected due to the relative sizes of the regions. However, it is important to note that non-tariff barriers are not considered in this first analysis and will be considered in the sensitivity analysis. Non-tariff barriers were an important concern for the

[13]For more information, see e.g. the Government of the Netherlands' webpage on 'Taxes on imported goods', www.government.nl/topics/export-import-and-customs/taxes-on-imported-goods.

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Table 6. GDP quantity index, percentage change, GTAP-RD model, author's simulation

(1) Region	(2) PUR = 100% (S1)	(3) PUR < 100% (S2)	(4) Difference in % point (S2-S1)	(5) Share (S2/S1)
Japan	0.101	0.081	−0.02	0.80
EU1	0.019	0.016	−0.003	0.84
EU2	0.016	0.013	−0.003	0.81
EU3	0.011	0.008	−0.003	0.73
EU4	0.042	0.034	−0.008	0.81
CPTPP	−0.008	−0.006	0.002	0.75
RCEP	−0.01	−0.007	0.003	0.70
US	−0.003	−0.002	0.001	0.67
UK	−0.007	−0.006	0.001	0.86
RestofWorld	−0.008	−0.006	0.002	0.75

EU side during negotiations – Japan already has overall low MFN tariffs – and this current analysis likely underestimates the total increase in GDP for the EU because non-tariff barriers are not yet included.

The main objective of the current paper is to compare the two different PUR scenarios. Columns four and five of Table 6 report simple, percentage point differences between the two sets of results as well as the GDP in the scenario with realistic PUR expressed as a share of the GDP in the scenario with full PUR. It is clear that there is some non-linearity between the results for the different regions, as was also found by Menon (2013). Compared to the scenario with full PUR, the negative results for the regions outside of the EPA are improved more by allowing <100% PUR than the decrease in the positive results for Japan and the EU. The trade diversion theory of Menon (2013) seems to be supported: The RCEP region – for which relative changes in GDP are the most negative in the full utilization scenario – only experiences 70% of that negative change in the realistic utilization scenario.

There are also differences between the results for the EPA signatories. Interestingly, even though EU4 is the region that starts with the lowest PUR in 2019–2020, the region is less affected by the inclusion of realistic PUR than EU3. Japan has relatively high levels of preference utilization, and it is possible that the results indicate that the countries in EU4 will also benefit to a larger extent from the increased, cheaper Japanese imports. This could be the case for example if countries in EU4 such as Belgium, which might use Japanese intermediary inputs for its motor vehicle or pharmaceutical sector, rely to some extent on Japanese imports as intermediary inputs in certain industries. This would explain why EU4's lower export PUR is not reducing GDP as much in the scenario with realistic utilization rates.

Compared to previous impact assessments of the EU–Japan EPA, the results for GDP are on the lower end, especially for the EU regions. In the main analysis, this is partly because no reduction of non-tariff barriers is assumed. As section 5.4 will demonstrate, in the sensitivity analysis with non-tariff barrier reductions, the results for GDP are higher compared to the main analysis. Yet, even in the sensitivity analysis, the relative change in GDP is lower than in previous studies. A possible explanation for this is that, compared to other studies, we assume fairly modest non-tariff barrier liberalization. Additionally, some of the previous studies assume a full liberalization of tariffs, which is not the case in the current study. Because the full schedule of tariff liberalization had been published by the time of our analysis, we also modelled the remaining tariffs in a few sectors that will continue to have import tariffs.

5.2 Results for Exports between Japan and EU

Table 7 shows the percentage point differences between the two scenarios for changes in export growth relative to the baseline. It is important to note that the results are often negative as exports increase less in the imperfect uptake scenario compared to the scenario with perfect PUR. For Japanese exports, the inclusion of realistic utilization rates has varying effects on exports of meat and livestock to the four EU regions, even though PUR for Japanese exports are assumed to be similar across the EU regions. Similar differences are present for export growth in the extraction sector. The underlying reasons behind this variation are unclear: Japan exported barely any meat, livestock, or extraction to any of the EU Member States in 2019–2020 (see Supplementary Appendix 2). Due to the small starting values for these sectors, the absolute differences between the two scenarios are low, despite large percentage point differences.

The small differences for Japanese exports of transport equipment suggest that even with realistic PUR, Japanese producers of motor vehicles will be able to benefit substantially from the EPA. Nonetheless, given the importance of transport equipment for Japanese exports to the EU (Supplementary Appendix 2), these small percentage point differences will be substantial in absolute terms.

Differences in export growth from the EU to Japan vary across the groups for textiles, wearing apparel, and leather products. For exports of leather products, PUR has the largest impact on EU3. Italy, which is in this group, is the only Member State with substantial exports of this type of product to Japan before the EPA. Therefore, it seems that implementation monitoring might be specifically important for Italian exporters of leather products. The same holds for exporters of textiles and wearing apparel in Italy and Romania, belonging to EU3 and EU2 respectively.

5.3 Results for Welfare (EV)

Table 8 demonstrates that the inclusion of PUR in the analysis has a different effect on EV than on GDP (see Table 6). While GDP increases in each of the EU regions, there is a decrease in EV. Conversely, in Japan, EV increases significantly. As will be discussed in the next section, these negative changes in EV in the EU turn positive when non-tariff barrier liberalization is taken into account in the sensitivity analysis. The reason that EV is positive in Japan and negative in the EU is related to the two mega-PTAs that are included in the baseline, both of which include Japan and not the EU. Hence, Japan already increases its export markets in the baseline and capitalizes on this stronger position when the EU–Japan EPA is introduced. In this main analysis, the EU–Japan EPA leads to unbalanced liberalization of trade between the regions: Japan already has low MFN tariffs compared to the EU and hence, when only considering tariff liberalization, the EU market opens up relatively more compared to the Japanese market. When non-tariff barrier liberalization is included, the agreement becomes more balanced and EV for the EU turns positive (see section 5.4).

The inclusion of PUR leads to smaller differences in the results for EV compared to the results for GDP. In the EU, the lower uptake of PUR leads to even further decreases in EV. Similarly, EV in Japan increase less when PUR are lower.

5.4 Sensitivity Analyses

As expected, in the non-tariff barrier sensitivity analysis, the relative GDP growth for Japan and the EU increases both under perfect and imperfect preference uptake (see Table 9). While the comparison between the two scenarios retains a similar direction of results and exhibits the same non-linearity, in this sensitivity analysis, realistic PUR seem to matter even more. With similar PUR as in the main analysis, Japan now only experiences 70% of the growth in GDP

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Table 7. Difference in export growth, percentage point difference between scenarios, GTAP-RD model, author's simulation

Bilateral export growth (%)	Difference, JP exports to EU				Difference, EU exports to JP			
Sector	EU1	EU2	EU3	EU4	EU1	EU2	EU3	EU4
Crops	−3.27	−3.62	−3.82	−3.33	−0.19	−1.03	−0.66	−0.36
Meat, livestock	−80.27	−68.95	−37.46	−215.68	−9.61	−9.93	−13.87	−16.15
Extraction	−1.92	−24.08	−11.58	−4.97	−2.29	−2.32	−6.11	−0.77
Processed food	−28.79	−25.42	−24.88	−26.36	−3.88	−3.31	−4.47	−1.63
Textile, apparel	−16.44	−16.21	−17.03	−15.53	−9.40	−28.25	−30.71	−21.09
Leather	−35.40	−35.41	−35.41	−35.40	−8.19	−13.80	−24.09	−20.61
Transport equip.	−1.68	−1.66	−1.44	−1.72	−0.10	−0.10	−0.10	−0.11
Light mnfc	−3.84	−3.82	−3.26	−3.56	−4.69	−4.85	−3.23	−3.35
Elec machinery	−4.41	−4.27	−4.29	−4.50	−0.17	−0.15	−0.17	−0.17
Heavy mnfc	−4.23	−4.03	−4.21	−4.04	−1.44	−1.28	−1.75	−1.32
Services	0.12	0.13	0.12	0.13	−0.08	−0.08	−0.08	−0.09

Table 8. Welfare results (Equivalent Variation), GTAP-RD model, author's simulation

Region	PUR = 100% (S1)	PUR < 100% (S2)	DIFFERENCE (S2-S1)	Share (S2/S1)
Japan	32096.8	30747.6	−1349.2	0.96
EU1	−306.5	−322.8	−16.3	1.05
EU2	−795.6	−832.9	−37.3	1.05
EU3	−6503.9	−6702.1	−198.1	1.03
EU4	−407.6	−438.8	−31.1	1.08
CPTPP	−5073.9	−4747.3	326.6	0.94
RCEP	−18573.3	−17191.1	1382.2	0.93
US	−20511.7	−20152.3	359.4	0.98
UK	−3407.5	−3303.7	103.8	0.97
Rest of World	−48557.2	−47326.0	1231.2	0.97

in the realistic scenario compared to the scenario with 100% preference utilization. The EU regions experience a similar increase in differences between the two scenarios. This might be because non-tariff barrier liberalization reduces trade-related transaction costs for the EU and Japan, and if exports increase less with lower PUR, they miss out on more of these potential gains. In other words, there is more potential for GDP to grow when non-tariff barriers are also liberalized. Low PUR are a barrier to reaching this potential GDP growth, and this effect is amplified when the PTA is more ambitious and provides more possibilities for trade to grow because non-tariff barriers are also removed. Low PUR act as a barrier to reaching the increased potential of an ambitious PTA.

As stated in the section with the results for EV, the impact of the EU–Japan EPA on EV in the EU is positive in the sensitivity analysis, as can be seen in Table 10. Similarly as for GDP, the

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Table 9. GDP quantity index, percent change, GTAP-RD model, author's simulation, other agreements in policy baseline and removal of NTBs for the EU–Japan EPA

Region	PUR = 100% (S1)	PUR < 100% (S2)	Difference in % point (S2-S1)	Share (S2/S1)
Japan	0.132	0.093	−0.039	0.70
EU1	0.025	0.02	−0.005	0.80
EU2	0.02	0.015	−0.005	0.75
EU3	0.013	0.009	−0.004	0.69
EU4	0.05	0.034	−0.016	0.68
CPTPP	−0.009	−0.006	0.003	0.67
RCEP	−0.011	−0.006	0.005	0.55
US	−0.004	−0.003	0.001	0.75
UK	−0.009	−0.006	0.003	0.67
Rest of World	−0.01	−0.006	0.004	0.60

Table 10. Welfare results (equivalent variation), GTAP-RD model, author's simulation, other agreements in policy baseline and removal of NTBs for the EU–Japan EPA

Region	PUR = 100% (S1)	PUR < 100% (S2)	DIFFERENCE (S2-S1)	Share (S2/S1)
Japan	8390.1	5690.5	−2699.6	0.68
EU1	240.7	226.7	−14.0	0.94
EU2	527.8	532.1	4.4	1.01
EU3	692.5	652.6	−39.9	0.94
EU4	405.9	328.1	−77.8	0.81
CPTPP	−1583.1	−1100.4	482.7	0.70
RCEP	−5525.5	−3273.7	2251.9	0.59
US	−2321.3	−1667.9	653.5	0.72
UK	−672.8	−452.4	220.4	0.67
Rest of World	−6616.1	−4198.9	2417.2	0.63

inclusion of non-tariff barrier removals in the analysis increases the difference between the realistic PUR scenario and the scenario with 100% preference utilization.

In the policy scenario where motor vehicle exports from Japan to the EU are assumed to experience an accelerated uptake of tariff preferences as a result of targeted government policies, there is only a negligible effect on the increase of exports from Japan to the EU compared to the previous scenario with realistic PUR. Compared to the baseline, the percentage increases in exports of motor vehicles to EU1, EU2, EU3, and EU4 are 43%, 42%, 38%, and 43% respectively in both scenarios. This suggests that these results are sufficiently robust with regards to the assumption of linear growth of PUR over time. However, when we calculate the duties paid under both these scenarios, differences that are of relevance to the Japanese and European automotive industries become apparent.

As can be seen in both Tables 11 and 13, the total duties paid on motor vehicles imports from Japan to the EU decrease drastically in 2026, the year that the European import tariff on cars is fully phased out. Most tariffs are paid for imports to EU3 and EU4, two groups containing some

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Table 11. Realistic scenario: duties paid on European imports of Japanese motor vehicles and transport equipment in million USD, GTAP-RD model, author's simulation and calculation

Year	EU1	EU2	EU3	EU4
2019	76.8	120.6	588.0	199.3
2020	67.7	105.5	504.7	177.2
2021	60.0	93.9	446.9	156.5
2022	51.5	80.6	380.5	134.5
2023	40.9	64.1	301.4	106.7
2024	32.5	50.9	237.1	84.8
2025	21.4	33.5	155.4	55.8
2026	9.6	15.1	70.0	24.9
2027	5.5	8.7	40.2	14.4
Total	365.9	572.8	2724.2	954.1

of the larger European economies. Given the increase of trade obtained by the CGE analysis with realistic PUR, importers in EU3 and EU4 pay 2,724 million USD and 954 million USD respectively in import tariffs combined over the first nine years after entry into force of the EPA.

Table 12 shows the foregone duty savings under the realistic scenario, i.e., the MFN tariffs paid that should have been eligible for preferential treatment. For EU3 and EU4, this means that 683 million USD and 229 USD are unnecessarily paid due to incomplete utilization of the EPA in this scenario.

If, however, PUR for Japanese exports of motor vehicles and transport equipment were to increase faster (which is not unlikely given the steep increase in PUR between 2019 and 2020), duties paid and foregone duty savings decrease substantially. By 2027, EU3 and EU4 pay 315 million USD and 105 million USD respectively less in motor vehicle import tariffs.

Foregone duty savings are more than half for all the EU regions, as can be seen in Table 14. For EU3, foregone duty savings are 353 million USD lower and they are 120 million USD lower for EU4.

The main results section of this paper has shown that in the long run, a slow, linear, adoption of the preferential tariffs does not drastically skew the overall economic impact of the EPA, compared to a scenario with a more rapid uptake of tariff preferences. In the long run, the relative increases in exports of motor vehicles are highly similar and not dependent on the rate of uptake as long as similar maximum levels of PUR are reached in the end. Conversely, the amount of duty savings is sensitive to the growth rate of PUR over time.

This policy analysis has demonstrated that for individual sectors, a quick adoption of the preferential tariffs from year one of entry into force can make a large difference regarding duties paid and foregone duty savings, which is of considerable importance to a highly competitive sector such as the automotive industry. Japanese exporters and European importers of automotive products would strongly benefit from policies to accelerate the uptake of tariff preferences. The European importers benefit through the decrease in import duties that they pay and the Japanese exporters benefit because the demand for their product increases when Japanese cars can be offered on the European market at a lower price. However, the lower amount of duties paid in the accelerated uptake scenario also means that the European Union will gain a smaller amount of revenue related to customs duties.

5.5 Discussion of Policy Relevance

The results demonstrate the need to collect and disseminate more information related to the uptake of tariff preferences under PTAs. This can help businesses and policy makers to gain a

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Table 12. Realistic scenario: foregone duty savings on European imports of Japanese motor vehicles and transport equipment in million USD, GTAP-RD model, author's simulation and calculation

Year	EU1	EU2	EU3	EU4
2019	12.4	20.2	101.4	31.9
2020	9.0	14.7	74.2	23.3
2021	10.8	17.2	84.9	28.0
2022	11.8	18.7	91.1	30.6
2023	11.6	18.3	88.3	30.0
2024	11.3	17.8	84.9	29.4
2025	9.9	15.6	73.4	25.7
2026	7.6	11.9	55.6	19.7
2027	3.9	6.2	28.7	10.2
Total	88.3	140.5	682.5	228.8

Table 13. Accelerated uptake scenario: duties paid on European imports of Japanese motor vehicles and transport equipment in million USD, GTAP-RD model, author's simulation and calculation

Year	EU1	EU2	EU3	EU4
2019	76.8	120.6	588.0	199.3
2020	67.7	105.5	504.7	177.2
2021	52.4	81.8	385.9	137.0
2022	43.2	67.3	314.5	112.9
2023	33.8	52.8	245.3	88.6
2024	24.7	38.6	178.3	64.7
2025	15.2	23.7	109.1	39.7
2026	5.9	9.3	43.2	15.4
2027	5.5	8.7	40.2	14.4
Total	325.3	508.4	2409.2	849.0

Table 14. Accelerated uptake scenario: foregone duty savings on European imports of Japanese motor vehicles and transport equipment in million USD, GTAP-RD model, author's simulation and calculation

Year	EU1	EU2	EU3	EU4
2019	12.4	20.2	101.4	31.9
2020	9.0	14.7	74.2	23.3
2021	1.7	2.6	13.0	4.3
2022	2.1	3.3	16.2	5.5
2023	2.6	4.0	19.4	6.6
2024	3.0	4.7	22.5	7.8
2025	3.5	5.5	25.6	9.0
2026	3.9	6.2	28.7	10.2
2027	3.9	6.2	28.7	10.2
Total	42.1	67.3	329.6	108.7

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better understanding of the functioning of trade agreements, both during the negotiations as well as during the implementation phase. Moreover, some sectors and countries are more likely to lose out on the benefits provided under the EU–Japan EPA and there is a need for further investigation into the causes and effects of these sectoral and regional differences.

Additionally, while this study focused mainly on tariff liberalization, it has revealed how closely this issue is tied non-tariff barrier liberalization. If the uptake of tariff preferences is low and businesses do not fully utilize the tariff benefits of the EPA, they will also lose out on many of the non-tariff benefits. Therefore, policy makers should ideally take a holistic approach to the liberalization of tariff and non-tariff barriers and ensure that there is a sufficient level of coordination between both types of barriers during negotiations. This will be especially relevant during future negotiations related to the provision of mode 5 services, where services' inputs in a manufactured product provide the lion's share of the product's value added (Antimiani and Cernat, 2018).

The EU–Japan EPA establishes a Committee on Rules of Origin and Customs-Related Matters which will be vital in facilitating further uptake of tariff preferences. Since the implementation of the EPA in 2019, this Committee has already made progress on simplifying certain procedures and creating easier access to information and guidelines for businesses (European Commission, 2020, 2024). Additionally, the EU–Japan Strategic Partnership Agreement includes a reference to cooperation in the area of customs and the 'Agreement between the European Community and the Government of Japan on Cooperation and Mutual Administrative Assistance in Customs Matters'. Future cooperation on preference uptake via these channels will be vital to ensure effective implementation of the EU–Japan EPA. The results of this study can provide guidance about which sectors and regions will need extra support in implementing the EPA. For example, Japanese car producers and their European importers could benefit greatly from even small increases in the uptake of tariff preferences. This is also important in the context of Brexit, which might make the EU market – and access to the Customs Union and Single Market – more attractive to Japanese car producers compared to the UK market.

6. Conclusion

This paper has illustrated the importance of taking into account PUR data in economic impact assessments of PTAs by conducting a dynamic CGE analysis of the EU–Japan EPA with realistic PUR. Before delving into the economic analysis, we stressed that there is a need to devote more efforts to collecting PUR data in a systematic manner and making the data publicly available. This will make it easier to include realistic PUR in future impact assessments and increase our understanding of what drives preference utilization.

As expected, this analysis demonstrated that the effects of the EPA will be more subdued under a realistic scenario of preference utilization. This holds for the overall impact of the EPA on GDP growth and welfare as well as for sectoral changes in export growth. A positive finding is that an underutilization of preferences during the first years after entry into force does not seem to have a strong permanent impact on GDP growth. As long as reasonably high levels of PUR are achieved in the long run, the regions will experience much of the GDP growth that was expected based on standard impact assessments.

However, other results suggest that lower PUR can also make the impact of the agreement behave in unexpected ways compared to a standard impact assessment. Firstly, compared to a standard scenario with perfect PUR, there are large differences in the bilateral growth of trade that different EU regions experience for some sectors, such as agriculture or textile and wearing apparel. This might even happen when PUR across the EU regions are similar. For example, given the same realistic utilization rates, Japanese exports of meat and livestock to EU4 decrease much more than exports to EU3 compared to a standard perfect PUR scenario. So while realistic PUR

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might be less important to gauge the overall impact of a PTA on GDP, this latter finding stresses the importance of including realistic PUR. especially when conducting sectoral impact assessments.

Moreover, as already established by Menon (2013), there are some non-linearities in the outcomes for different regions when comparing the two scenarios. Therefore, the inclusion of realistic PUR is also necessary when estimating the negative impact of trade diversion on third countries.

Non-tariff barriers are another important factor related to the uptake of tariff preferences. Firstly, the removal of non-tariff barriers might increase PUR. However, in the current study PUR were set exogenously and thus endogenous PUR based on non-tariff barriers is a possible area for future research. Still, the inclusion of non-tariff barriers in a sensitivity analysis of this paper increased the gap between the scenario with perfect PUR and the scenario with realistic PUR. This finding suggests that the more progressive the agreement is in areas of non-tariff liberalization, the more missed opportunities there are if PUR are not sufficiently high.

Based on the sectoral results, several industries can be identified where implementation monitoring will prove to be indispensable. For example, even at high levels of PUR, monitoring the utilization of the agreement could lead to large absolute differences in exports for Japanese car manufacturers. On the European side, Italy might want to focus on providing its textile and leather exporters with the necessary knowledge to make efficient use of the EPA. Furthermore, while a slow adaptation of the EPA seems to matter less at a macroeconomic level, the policy analysis about duties paid related to motor vehicle exports from Japan illustrates that the rate of adaptation can matter greatly to individual sectors and hence to companies.

One of the limitations of this study is that future levels of PUR for the EU–Japan EPA are not yet known. Economic research has not yet provided conclusive answers about what drives PUR, whether it is the Rules of Origin in the PTA, the value of trade in a given sector, or an entirely different factor. Thus, future levels of PUR under the EU–Japan EPA were predicted based on PUR of the more mature EU–South Korea FTA. Therefore, part of the accuracy of the analysis depends on whether future PUR will indeed follow the trends of the EU–South Korea FTA. Future research could look further into the underlying reasons for different utilization rates, allowing us to make better predictions about PUR before a PTA is implemented. Such research could help policy makers design PTAs and implementation policies that are effective at raising PUR.

Future research could also compare the results of impact assessments with and without realistic PUR to the real-world change in trade between two PTA partners. This could give a further indication of which of the two methods is more accurate. As COVID-19 distorted and skewed regular trade patterns in 2020, we could not yet compare the results of the CGE analysis to the real-world data for EU–Japan trade. Moreover, future research could improve the understanding of PUR by working to include the impact of Rules of Origin and other issues related to PUR in a CGE framework (Narayanan et al., 2015).

In summary, this analysis has demonstrated that the inclusion of realistic PUR data in the economic impact assessment of PTAs should become more of a standard practice, depending on the aim of the economic impact assessment. Realistic PUR are especially important for sectoral analyses or analyses of welfare effects. However, from a policy perspective it is valuable to include realistic PUR even for impact assessments focused on more macroeconomic indicators such as GDP growth. When only perfect, unrealistic utilization rates are considered, this can lead to false expectations and a lack of attention for the implementation phase of PTAs. In view of the EU–Japan EPA, this study can serve as a reminder for the motor vehicle industry and the clothing industry that they should not let the benefits of the EPA pass by due to the initial hurdles for utilizing the agreement's preferences.

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