Trade Procedures and Trade Deflection

- The Case of the European Union

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Bachelor Thesis

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Abstract

As tariffs and other conventional barriers to trade have been substantially dismantled over the course of the past decades, the relative costs of inefficient trade procedures have risen and their trade distorting effects are gaining more attention from both policymakers and academics. The purpose of this study is to contribute to the emerging literature on the topic by turning the scope towards the EU, investigating if trade deflection occurs in the union due to the disharmonized trade procedures of the member countries. Using two specifications of a gravity model, the relationship between import volumes and trade procedure efficiency in the EU is empirically analyzed. Evidence of trade deflection is provided by proving that, all else equal, EU imports from the rest of the world will be greater in EU countries that have more efficient import procedures, and that EU imports from other EU countries will be greater from those that have more efficient import procedures. The investigation is made at a product level, also providing evidence that procedure-induced deflection will occur at a greater extent the more time sensitive the goods being traded are.

Key words: trade procedures, trade deflection, time sensitivity, EU, customs unions

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1. Introduction

Following the multilateral trade negotiation rounds of the past seven decades, average world tariff rates have dropped to historically low levels (WTO, 2020) and several non-tariff measures have either become prohibited or subjected to regulations or disciplines that prevent countries from abusing them (Hoekman & Kostecki 2009, pp. 265). While promising for the prospect of universal free trade, the dismantling of these conventional barriers to trade have also caused the relative costs of a previously ignored barrier to rise. This is the barrier of bureaucratic activities associated with trade, commonly referred to as *trade procedures* (Persson, 2012). While trade procedures are necessary to, amongst other things, ensure that national and international laws are being followed (OECD, 2012), they can also constitute substantial costs when inefficient, especially when trading in time sensitive goods (Persson, 2012). Policymakers and academics have started to pay attention to this issue, and several authors have since provided evidence that disparities in trade procedure efficiencies cause distortions to trade flows (see, for example, Nordås, Pinali & Grosso (2006), Wilson (2007) and Djankov, Freund & Pham (2010)).

As shown by Bourdet & Persson (2012), the EU is no exception. All though the EU members have been far-reaching in harmonizing other trade policies such as tariffs and standards and regulations, harmonization of trade procedures seems to have been left outside of the scope. The most recent information on EU import procedures shows a substantial variation in the time it takes to import a cargo into the various EU countries, from 5-6 days in the most efficient countries (such as Denmark and the Netherlands), to 18-19 days in the least efficient countries (such as Italy and Hungary) (The World Bank, 2015). Bourdet & Persson (2012) showed that such disparities cause significant distortions to the EU members trade with the rest of the world.

However, evidence that disparities in trade procedure efficiencies are causing distortions to EU trade with the rest of the world is also an indication of another potential consequence of disharmony. Combining this result with the fact that there is free movement of goods within the EU suggests that trade *deflection* might also be occurring, meaning that goods from the rest of the world are flowing through the most efficient member countries and into less efficient ones (Bourdet & Persson, 2012). If true, this could imply that the most efficient countries are profiting of the inefficiency of others. It would also contest the conventional notion that trade deflection between countries in a free trade agreement can be avoided solely by harmonizing

tariff levels, thereby offering new insights on the theory of trade deflection and on the issue of trade procedures. Therefore, the purpose of this study will be to contribute to the emerging literature by turning the scope towards the EU and investigating the relationship between trade procedures and trade deflection. The study will attempt to answer the question: Are the disharmonized trade procedures of the EU member countries causing trade deflection within the union?

To investigate whether disharmonized trade procedures are causing trade deflection in the EU, this study empirically analyzes data on the EU members import efficiencies and import volumes during the years 2006-2015, using different specifications of a gravity model. In a first step, it is investigated how EU import volumes from the rest of the world are affected by the import procedure efficiencies of the importers. In a second step, it is investigated how EU import volumes from other EU countries are affected by the import procedure efficiencies of the exporters. Because it is likely that trade deflection due to disharmonized trade procedures occurs to a greater extent when trading in time sensitive goods, the study is made at an HS2 product chapter level. Each chapter is ascribed an individual value of time sensitivity, and the variable measuring this is interacted with the variable that measures import procedure efficiency. Therefore, an interaction effect is captured that not only reveals if there is a relationship between import procedure efficiencies and import volumes, but also how this relationship changes depending on the time sensitivity of the good being traded.

1.1 Disposition

The following section will introduce the theory of procedure-induced trade deflection. In section 3, the data and methodology used in the study are explained and reviewed. In section 4, initial results are presented and robustness tests are performed. In section 5, the results are analyzed with respect to the underlying theory. In section 6, the conclusions are presented and further research on the topic is suggested.

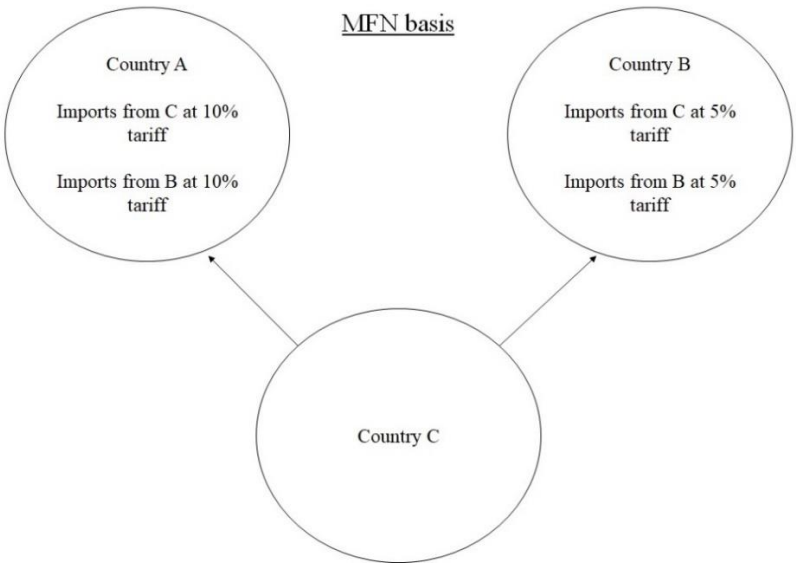
2. Theory and previous research

The purpose of this study is to investigate if trade deflection occurs in the EU due to the fact that the member countries have not harmonized their trade procedures. To the best of my knowledge, a similar study has not yet been published. Therefore, it is necessary to combine the conventional theory of trade deflection with the concept of trade procedures, so as to present a theoretical basis for the study. In this section, the conventional theory of trade deflection is first outlined. Following this, the concept of trade procedures is explained and previous research on their trade distorting effects is reviewed. Finally, the theory of trade deflection due to disharmonized trade procedures will be introduced.

2.1 Trade deflection

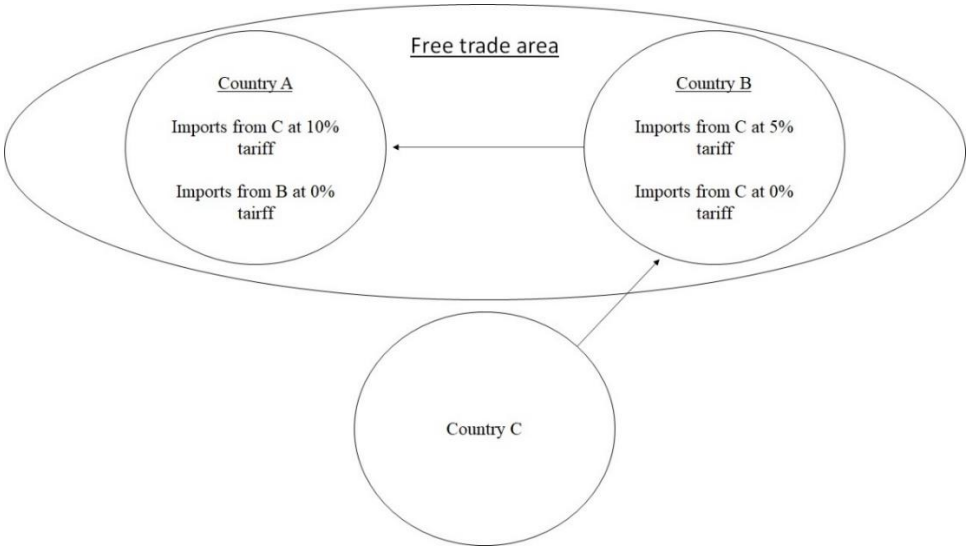
In the conventional notion, trade deflection is a potential side effect of two countries entering into a free trade agreement (FTA) without harmonizing their external tariffs. When this occurs, a way and an incentive for importers in the most trade restrictive country to bypass their own country's external trade policy is created (Baldwin & Wyplosz 2020, pp. 130). In order to explain this more carefully, let us assume that there are only three countries: A, B and C. Initially, none of these countries have entered into an FTA, meaning that they all trade with each other on a most-favored-nation (MFN) basis. Let us also assume that for a particular good in this initial scenario, C is an exporting country, A and B are importing countries and that C exports to both A and B. This scenario is illustrated in figure 2.1.

Figure 2.1: Trade between three countries on an MFN basis



Now let us assume that A and B enter into an FTA with each other. All trade between these two partner countries will now be duty-free. However, the partner countries can still apply different external tariffs towards countries outside of the FTA. Provided that the partner countries do not harmonize their tariff levels, it is in this this situation that the conventional notion of trade deflection will occur. There is now both a way and an incentive for importers in A to bypass their country's external tariff level towards C by rerouting their imports through B, thus facing only a 5% tariff (Baldwin & Wyplosz 2020, pp. 130). This scenario is illustrated in figure 2.2.

Figure 2.2: Trade deflection due to disharmonized external tariffs



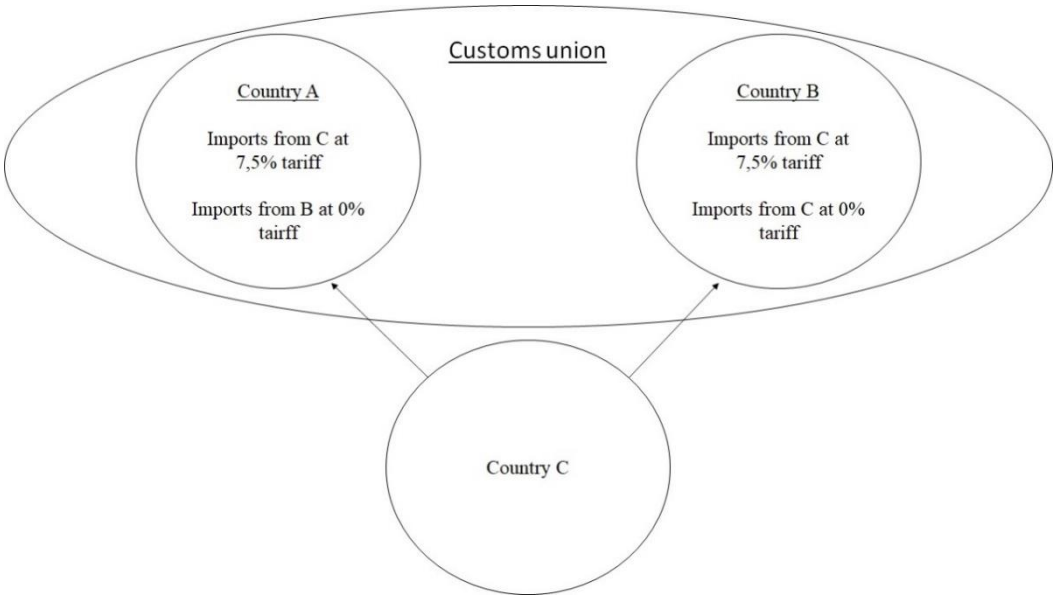
The occurrence of trade deflection is detrimental to the trade policy objectives of country A. First, it naturally follows from the discussion above that B will receive all tariff revenue on imports of the good from C into the FTA-region (see for example Richardson, 1995). Second, the bypassing of A's tariff suggests that the de facto tariff level in A will be that of B. Not allowing for transport costs, this implies that that the price of the imported good from C will fully assimilate in A and B at the initial price level in B, thus becoming lower in A than what was intended by their tariff level (see for example Shibata, 1967).

If the partner countries wish to avoid these consequences without harmonizing their tariff levels, they are forced to impose restrictions on re-exportation and subsequential border inspections to enforce them (Baldwin & Wyplosz 2020, pp. 130-131). However, besides disturbing trade flows between A and B and being costly, restrictions on re-exportation are not even necessarily effective. As was pointed out by Shibata (1967), even though restrictions will prevent the good from country C to flow directly through B and into A, it is still possible that a type of *indirect* trade deflection will occur. This is because the disparities in tariff levels combined with the

restrictions on re-exportation will cause price disparities between country A and country B. Therefore, provided that demand for the good is high enough in A and that firms in B are producing their own version of the good, firms in B will choose to sell all of their production in A where the price is higher. Meanwhile, the consumers demand for the good in B can be satisfied by imports from C at the initial price level.

Besides imposing restrictions on re-exportation, there is another option available to partner countries that wish to avoid trade deflection as it is understood in the conventional notion. This is to harmonize their external tariff levels and enter into a customs union (Baldwin & Wyplosz 2020, pp.130-131). Let us assume that after negotiations, A and B decide to apply a common tariff of 7,5% against C. Since there are no longer any disparities in their external tariff levels, it is no longer possible for importers in A to bypass their country's tariff level. Therefore, exports from C will return to being directed to both A and B. This scenario is depicted in figure 2.4.

Figure 2.4: Customs union



2.2 Trade procedures – general concept and previous research

Trade procedures are defined by the WTO (2012) as: *"…the activities, practices and formalities involved in collecting, presenting, communicating and processing data required for the movement of goods in international trade"*. In other words, they constitute all bureaucratic activities associated with importing or exporting goods. In this study, however, trade procedures will be even more broadly defined so as to include not just bureaucratic activities, but also port

and terminal handling and inland transportation. This is in line with much of the literature on the topic of simplifying or abolishing trade procedures (see, for example, Persson (2012) and Wilson (2007)). By using this broader definition, all time-consuming procedures associated with trade (excluding transportation between borders) are captured.

Because trade procedures are time-consuming, they are also costly. Among the costs associated with complying with trade procedures are storage costs for the goods while at the border and the cost of wages to the workers who are responsible for handling compliance. Other costs are most often associated with how time sensitive the goods being traded are, i.e., how quickly they depreciate over time. As is often recognized in the literature, the values of certain goods are more dependent than others on how quickly they can reach the consumer. This trait can perhaps most obviously be ascribed to goods which physical attributes worsen over time, i.e., fresh goods such as fruit and vegetables (Persson 2012, pp.15). However, goods also depreciate for other reasons. Persson (2012, pp.15) mentions, for example, that fashion items depreciate quickly due to quickly changing trends. The same goes for electronic or technological products, because of the rapid innovation that quickly renders these products obsolete (Hummels & Schaur 2012, pp.2936). Perhaps most interesting is the depreciation of intermediate goods, which was shown by Nordås, Pinali and Grosso (2006). They argue that since it is critical in global value chains that intermediate goods move swiftly between the different production sites, too burdensome trade procedures might cause otherwise competitive firms to not enter the market at all.

Several authors have empirically tested and concluded both that the costs associated with trade procedures have rather serious effects on trade volumes and that these costs vary depending on how time sensitive the good being traded is. Amongst these are Wilson (2007) who estimates the impact of trade procedures on trade volumes in a gravity model using six different measurements of border procedure inefficiency. Wilson finds that the effects are highly significant, estimating for example that a 10% decrease in the number of days spent at the border would generate a 6,3% increase in trade flows. While he does not define a metric for time sensitivity, Wilson does test this effect for different product groups and finds that the impact varies depending on which product is being traded.

Similarly, Djankov, Freund and Pham (2010) investigate the effect of export procedures on export volumes using a difference gravity equation and find that on average, an additional day spent at the border will cause a 1% reduction in trade volume. Much like what will be done in this study, these authors also define a metric for time sensitivity and regress trade volumes on

an integrated variable of trade procedure efficiency and time sensitivity. As expected, they find that the negative effect of inefficient trade procedures on trade volumes is larger the more time sensitive the good being traded is.

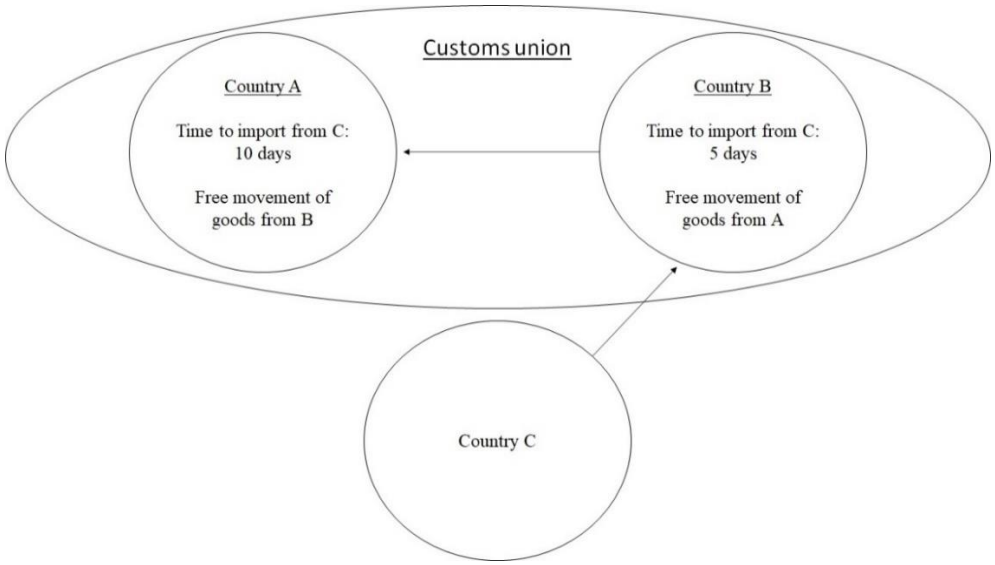
Most relevant to this particular study are the results provided by Bourdet & Persson (2012) that show the occurrence of trade distortions in EU trade due to disharmonized trade procedures. Much like what will be done in this study, the authors use World Bank data on how many days it takes for the various EU countries to import a standardized cargo and use this data as a proxy for the costs associated with time delays. They formulate a gravity equation that includes the time delay variable and run a regression on data on EU imports from the rest of the world at the HS level. Their results show that trade procedure inefficiency indeed has a significantly negative effect on import volumes and briefly mention that this may give rise to both direct and indirect trade deflection. Their estimate is substantial, suggesting that a percentage increase in time to import would decrease import volumes by 0.44%.

2.3. Trade deflection due to disharmonized trade procedures

Combining theory from section 2.1 and 2.2, it becomes apparent that the trade distorting effects of inefficient trade procedures suggest that entering into a customs union might not be an efficient way to combat trade deflection, unless this measure is accompanied by a harmonization of trade procedures. To illustrate this theory, let us assume that A and B enter into a customs union from having traded at an MFN basis. Let us also assume that it takes 10 days to import a good into A and 5 days to import a good into B and that the countries do not harmonize their trade procedures upon entering into the union. This implies that the procedural costs associated with importing the good from C are higher in A than in B. However, once A and B enter into the union there is free movement of goods between them. In other words, the trade in goods between them is not subjected to customs clearance, inspection, or any other form of trade procedure. This absence of trade procedures implies that the time it takes for one of the partner countries to import a good from the other is exactly equal to the time it takes to transport the good between them. Provided that the sum of the transport costs and the procedural costs of importing the good into B is smaller than the procedural costs of importing the good directly into A, there is now a way and an incentive for importers in A to reroute imports of the good from C through B. Thus, trade deflection occurs yet again, only this time it is induced by disharmonized trade procedures instead of disharmonized tariff levels. This scenario is depicted in figure 2.5.

As described in section 2.2, the costs of complying with trade procedures are higher when trading in goods that are time sensitive, and therefore the trade distorting effects of inefficient trade procedures are larger for more time sensitive goods. Therefore, it is also likely that procedure-induced trade deflection will occur to a greater extent the more time sensitive the good being traded is. Conversely, this also means that as time sensitivity decreases, so too does the incentive to reroute the good. In fact, would be reasonable to assume that certain goods are time insensitive enough for the costs of rerouting to exceed the costs of importing directly into A. For these goods, procedure-induced deflection should not occur at all.

Figure 2.5: Customs union with disharmonized trade procedures



The major difference in consequences between tariff-induced and procedure-induced deflection is that in a customs union, it is no longer the policy objective of A to maintain a higher price than B on imported goods from C. Yet, as pointed out by Bourdet & Persson (2012, pp. 303-304), when allowing for positive transport costs, it is likely that the disharmonized trade procedures will cause just that. Therefore, provided that firms in B are producing their own version of the good, there is once again an incentive for firms in B to sell their production in A, meaning that procedure-induced deflection could be indirect (Bourdet & Persson 2012, pp.303-304). Furthermore, as under tariff-induced deflection, the tariff revenue acquired when importing the good into the union will be captured by country B. However, in a customs union, the distribution of tariff revenue is not necessarily distributed in full to the member country that first acquires the good. In the case of the EU, only 20% of the revenue of an imported good will be distributed to the country in which the good first arrives (European Commission, 2020). Nevertheless, all of this will be captured by B.

3. Methodology

In this section, the methodological basis for the study is outlined. First, the variables and datasets used in the regression are explained and reviewed. Following this, the concept of the gravity model is introduced and the specific gravity equations used in this study are derived.

3.1 Data

3.1.1 Databases and variables

Imports: The data on EU imports are collected from the Eurostat database *"EU trade since 1988 by HS2-HS4 (DS-016894)"* (2020a). Eurostat is the official statistical office of the European Union and is tasked with providing statistics and data on Europe (Eurostat, 2020b). This specific dataset contains data on EU trade with both extra-EU and intra-EU countries at the individual country level during the years 1988 – 2020. The data are categorized at both the HS2 and the HS4 product chapter level and contains information on both imports and exports. Indicators on the magnitude of the trade flows are offered in both their value in euro and their quantity in 100 kilograms.

However, not all of the information captured in this dataset is necessary for this analysis. Fortunately, the website offers the possibility to customize datasets, and so several parts have been excluded. First, the magnitude of imports will only be measured in value in euros and not in weight. Second, data are collected at the HS2 and not the HS4 level. The primary reason for this is simplification. The HS2 level contains 97 different product chapters and should thus be varied enough to identify substantially different levels of time sensitivity. While the HS4 level would of course be even more detailed, it would also create an added number of observations with missing values. Third, data were only collected for the years 2006-2015. The primary reason for this is that these are the only years for which data are available on how much time a good spends in transit when imported to the various EU countries. Furthermore, few countries acceded to the EU during this period, which makes data collection easier. If several countries had acceded during different years of this time period, data would have been needed to be collected separately for these countries and added to the master dataset manually. This being said, Croatia has been excluded from the study since they acceded in 2015 and therefore would only contain relevant information for a part of this final year included in this study.

Time to import: Data on the time it takes to import goods into the various EU countries are collected from the World Banks *"Doing Business"* database (2020). Specifically, the website offers the opportunity to create a customized dataset depending on what topic the user wants to investigate. The customized dataset created for this study was on the *"Trading across borders"* topic. The original dataset contains six variables measuring the time it takes for each country to export and import goods, six variables measuring how much it costs for a country to import or export goods, two measuring the number of documents needed to export or import as well as four different scores and rankings for each country on how easy it is to trade with them. Out of the several measurements offered in this dataset, the *"Time to import (days)"* measurement has been chosen for this study. This variable measures how many days it takes to import a standardized cargo of goods by sea transport. Four stages are included in the measurement: document preparation, customs clearance and inspection, inland transport and handling and port and terminal handling. The score is a sum of how many days it takes to finish each stage separately, and it is assumed that each stage takes at least one day. Thus, the minimum number of days to import is four. The shipping time to the country is not included in the measurement. Histograms that show the spread of this variable over time in both raw and logarithmic form are presented in figures 3.1 and 3.2. As is apparent, the spread is rather substantial.

Figure 3.1: Histogram of days to import (raw)

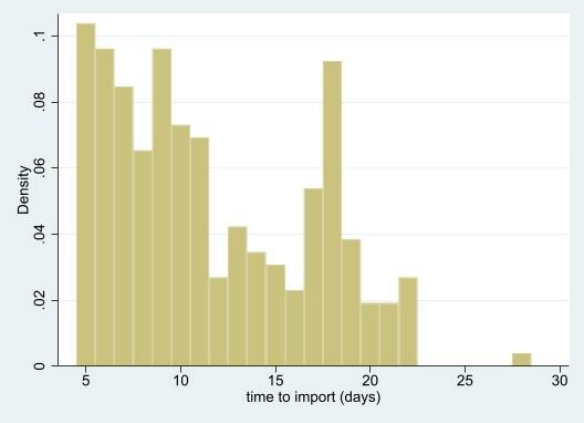
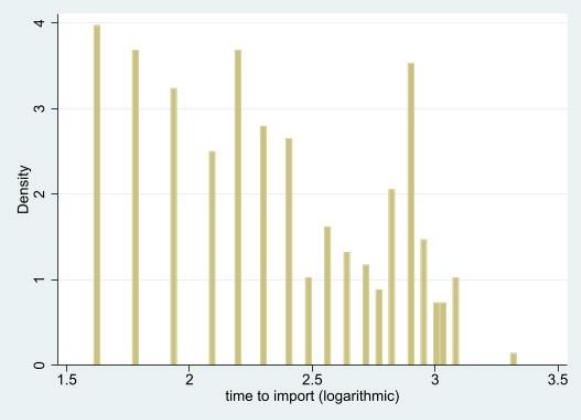


Figure 3.2: Histogram of days to import (log)



Time sensitivity: Finally, since there is no universal measurement of the time sensitivity of products, this will be proxied using data on the mode of transport with which the products were imported into the EU during a specific year. The rationale for this rests on the results of Hummels and Schaur (2013), who modelled the choice between air and ocean freight. They argue that since air transport is faster but also more expensive than transporting by ship, the benefit of the product reaching the consumer quickly must outweigh the premium paid for using air transport if this mode of transport is to be used. Because of depreciation costs, this applies

particularly well to time sensitive goods. In other words, the larger the share of air transport used to import a good, the more time sensitive the good should be. Therefore, time sensitivity is calculated as:

$$\frac{Imports\ of\ the\ product\ chapter\ by\ air\ transport}{Imports\ of\ the\ product\ chapter\ by\ all\ modes\ of\ transport}$$

The data used for this measurement are collected from the Eurostat database *"EXTRA EU trade since 2000 by mode of transport (HS2-HS4) (DS-043328)"* (2020c). As with the other dataset on EU trade that is used in this study, these data are categorized at both the HS2 and the HS4 product chapter level and the magnitude of the trade flows is measured in both their value in euro and their quantity in 100 kilograms, but for this study only the HS2 level and the value in euro indicator are used. Nine modes of transport are recorded: sea, rail, road, air, post, fixed mechanism, inland waterway, self-propulsion and unknown. Data are available for the years 2000 – 2020, but only the year 2015 has been used. Histograms that show the spread of this variable in both raw and logarithmic form are provided in figures 3.4 and 3.5. As is apparent, the majority of the goods are not particularly time sensitive. However, the spread is still rather substantial, with some shares of air transport amounting to nearly 90% of the import value. In logarithmic form, the spread is less substantial and the weight has shifted towards the center of the mass. The values have also become negative, meaning that the smaller the value in absolute terms, the more time sensitive is the good.

Figure 3.4: Histogram of time sensitivity (raw)

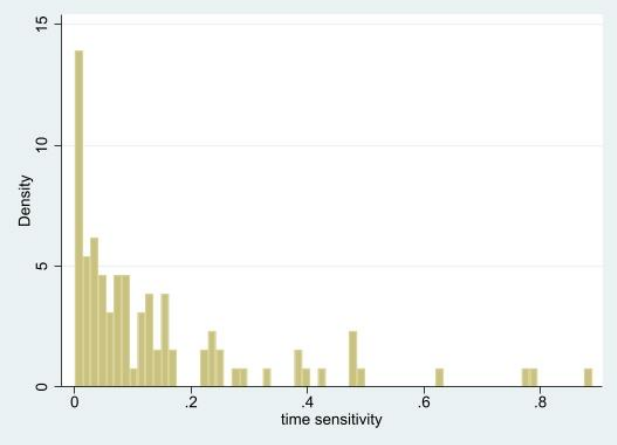
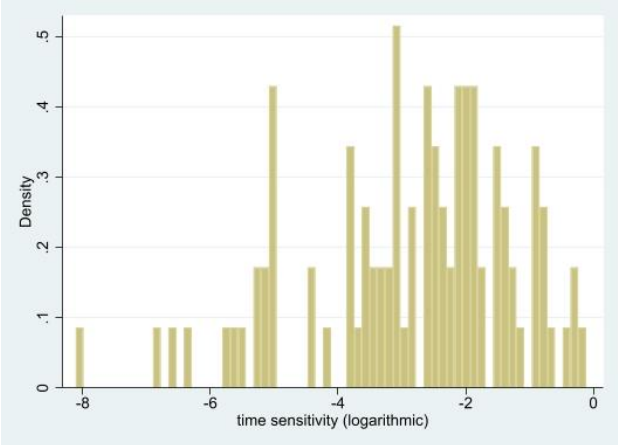


Figure 3.4: Histogram of time sensitivity (logarithmic)



3.1.2 Limitations of the data

As previously mentioned, the time in transit variable measures how many days it takes to import a standardized cargo of goods by sea transport and measures the process in four stages: document preparation, customs clearance and inspection, inland transport and handling and port and terminal handling. All though the time associated with document preparation, customs clearance and inspection and inland transport can be expected to be the same no matter which mode of transport is used when importing a good, the "port and terminal" part of the measurement explicitly links the data to imports by sea transport. The data are therefore limited to just this mode of transport and does not consider that countries may be more effective when importing goods by other modes. In other words, there is a risk that this measurement is not perfectly representative of a country's import procedures. If, for example, the Netherlands mainly imports by sea transport and Bulgaria mainly by land-based transport, it is likely that each country will be more effective than the other with regards to import procedures associated with the mode of transport that they mainly import by. Regardless of this, Bulgaria's effectiveness in importing by land would not be recorded in these data.

Another potential problem with the data is that Bulgaria and Romania are included in the study even though they did not accede into the EU until 2007. This means that imports to these two countries are reported for the year 2006 even though they were not part of the union during this year. This decision has been made because removing them from the study for one single year would have produced an unbalanced panel data set. The other alternatives available to maintain balance would be to exclude these two countries from the study completely, even though they were part of the union for 9 out of 10 years. This would have been far more misleading than wrongfully allowing them to be part of the study for one year. Similarly, it seemed far more damning to choose the third alternative, which would have been to exclude 2006 entirely from the study, thus reducing the size of the sample by 10%.

3.2 The gravity model

3.2.1 Background

Inspired by Newtons law of universal gravitation, the gravity model initially built only on the rather simple assumption that bilateral trade is determined by countries sizes and proximities to each other. Trade flows should thus gravitate towards large, closely located countries rather

than small and remote ones. All though the model was introduced by Tinbergen as early as 1962 and was quickly proven rather successful in estimating the determinants of bilateral trade flows, it was not until rather recently that the model became accepted in mainstream trade research as a viable option for estimating the determinants of bilateral trade. The reason for this is that the model lacked a theoretical foundation and was therefore criticized for being little more than physics analogy (Head & Mayer 2013, pp. 6-9). A theoretical basis for the gravity model was first introduced by Anderson (1979), in which he also introduced the concept of multilateral trade resistance. The introduction of multilateral resistance was highly important, because it recognized the rather important fact that trade between two countries cannot simply be explained by how likely it is that these two countries will trade with each other, but also how likely it is that either country will choose to trade with any other country instead.

While Anderson did succeed in providing a theoretical basis for the gravity model, trade economists were still reluctant to accept it due to the perception that the derivation was too complicated. It was not until the theoretical basis was refined and simplified by Anderson & van Wincoop (2003) that this ultimately began to change (Head & Mayer 2013, pp. 9-10). The simplified gravity model introduced in by Anderson & van Wincoop can be expressed as:

$$M_{ij} = \frac{y_i y_j}{y^w}\left(\frac{t_{ij}}{P_i P_j}\right)^{1-\sigma} \tag{1}$$

where M_{ij} denotes the volume of imports in country i from country j, y denotes expenditures (proxied by GDP) and y^w denotes world GDP. t_{ij} is the bilateral trade resistance, which is the cost of trade between country i and country j. Since this trade cost is an unobserved factor, it is often proxied by a set of other variables. In the original derivation by Anderson & van Wincoop (2003), this includes only the distance between the two countries and a dummy variable explaining whether they share a border or not. However, as is also mentioned by Anderson & van Wincoop (2003, pp. 12), at this point other authors had identified several other variables that should contribute to or diminish bilateral trade resistance. Common examples of such variables are dummies that capture whether they share a common language and whether they used to be in a colonial relationship. P_i and P_j are the multilateral trade resistance terms, which are simply captured by each country's set of bilateral trade resistance with all countries, expressed as:

$$P_i = \left[\sum_j (\beta_j p_j t_{ij})^{1-\sigma}\right]^{1/(1-\sigma)} \text{ and } P_j = \left[\sum_i (\beta_i p_i t_{ij})^{1-\sigma}\right]^{1/(1-\sigma)} \tag{2}$$

Finally, σ is the elasticity of substitution between goods of different origins, assumed to be greater than 1. This way, an increase in the multilateral trade resistance for the importer will increase that country's imports from the exporter. Taking logs of equation (1) in order to prepare it for linear estimation provides us with the following expression:

$$lnM_{ij} = lny_i + lny_j - lny^w + (1-\sigma)lnt_{ij} - (1-\sigma)lnP_i - (1-\sigma)lnP_j \quad (3)$$

3.2.2 Specifications of the regressions

Imports from extra-EU countries

As previously mentioned, this study will attempt to capture the existence of procedure-induced trade deflection in the EU by specifying two regressions: one estimating the impact of import procedures on EU trade with extra-EU countries (i.e., countries outside the EU) and one estimating the impact of import procedures on EU trade with intra-EU countries (i.e., other EU countries). Let us start by specifying the regression for extra-EU trade. First, since the study includes several years, an additional index t must be added to expression (3). Furthermore, the rationale behind the assumption that disharmonized import procedures will cause trade deflection in the EU is that it is less costly to trade with countries that have more efficient border procedures. This should especially apply to trade in products that are time sensitive, because there are depreciation costs associated with these goods. In other words, bilateral trade resistance should also include both a variable measuring import procedure efficiency *and* a variable measuring how the effect of import procedure efficiency on import volumes changes depending on the time sensitivity of the good being traded, such that taking logs of the bilateral trade resistance yields:

$$\begin{aligned} lnt_{ijtc} = {} & \ln(Common\_border_{ij}) + \ln(Distance_{ij}) + \ln(Time\_to\_Import) \\ & + (lnTime\_to\_Import_{it} * lnTime\_Sensitivity_c) \end{aligned} \quad (4)$$

where t_{ijtc} is the bilateral trade resistance between country i and country j during time period t when trading in good c. Substituting t_{ij} in (3) with expression (4) thus yields the following estimation equation:

$$\begin{aligned} lnM_{ijct} = {} & \beta_1 + \beta_2 lny_{it} + \beta_3 lny_{jt} + \beta_4(1-\sigma)\ln(Common\_Border_{ij}) \\ & + \beta_5(1-\sigma)\ln(Distance_{ij}) + \beta_6(1-\sigma)ln(Time\_to\_import_{it}) \\ & + \beta_7(1-\sigma)(lnTime\_to\_import_{it} * lnTime\_Sensitivity_c) \\ & + \beta_8(1-\sigma)lnP_{it} + \beta_9(1-\sigma)lnP_{jt} + \varepsilon_{ijct} \end{aligned} \quad (5)$$

where β_1 can be interpreted as world GDP (Adam & Cobham 2007, pp. 5-6).

As previously mentioned, multilateral trade resistance is simply the set of each country's bilateral trade resistance with all other countries. However, since multilateral resistance terms are unobserved factors, they must also be proxied. Fortunately, it is not necessary proxy them in the same way as the bilateral trade resistance terms, which would require inclusion of data on every variable that constitutes bilateral trade resistance for all combinations of country-pairs. Instead, it is common practice to control for these factors by imposing *importer* and *exporter fixed effects*. Imposition of such effects will identify a different intercept and a common slope for every exporter and importer country, thus capturing the common effect of the determinants for all countries. Since the study is made on panel data over several years, it is necessary to also let the fixed effects control for variation over time, such that we have *exporter-time* and *importer-time* fixed effects (Head & Mayer 2013, pp. 25).

Besides controlling for multilateral trade resistance, there are additional advantages to using exporter-time and importer-time fixed effects. First, they make it possible to simplify the estimation equation somewhat, since all variables that explicitly measures country-specific effects over time will be omitted in the regression. Therefore, the GDP variables can be removed. Second, since the fixed effects also control for unobserved factors, it is not necessary to attempt to identify and include every possible country-specific determinant of trade in the regression. However, country-time fixed effects do not control for all multilateral trade resistance, only observed and unobserved country-specific determinants of trade. This does not include all determinants that we have identified as contributors to bilateral and multilateral trade resistance, such as distance or sharing a border. To capture these determinants, *country-pair* fixed effects need to be included (Adam & Cobham 2007, pp. 14-15). Finally, to avoid the estimation being disturbed by variation over time that is incurred by exogenous factors such as business cycle fluctuations or shocks to specific industries, *product-time* fixed effects need to be included.

However, the inclusion of importer-time and exporter-time fixed effects also poses a problem to the investigation of trade deflection due to disharmonized trade procedures. From the discussion above, it becomes apparent that inclusion of such fixed effects control for *all* country-specific determinants of trade. This of course includes import procedure efficiency, which is the very determinant that this study intends to estimate. In other words, it is not possible to regress import volumes on import procedures while still fully controlling for multilateral

trade resistance. This is a problem that has largely been ignored by most authors on this topic, with the exclusion of Djankov, Freund & Pham (2010). However, this problem does not imply that it is impossible to acquire dependable estimates to investigate the effect of trade procedures on trade distortions. This is because the inclusion of exporter-time and importer-time fixed effects does not omit the integrated variable of import procedure efficiency and time sensitivity, meaning that inference will mainly have to be drawn from estimates of this variable. This is further explained in section 3.3.

Summarizing the effects of including exporter-time, importer-time and country-pair fixed effects, the GDP variables, $(Common\_Border_{ij})$, $\left(Distance_{ij}\right)$, the multilateral resistance terms and $Time\_to\_import_{it}$ are all removed from the estimation equation. Thus, the final estimation equation for imports from extra-EU countries will be:

$$lnM_{ijct} = \beta_1 + \beta_2(1-\sigma)(lnTime\_to\_Import_{it} * lnTime\_Sensitvitity_c) + \left(Country\_Pair_{ij}\right) + (Importer\_Time_{it}) + (Exporter\_Time_{jt}) + (Product\_time_{ct}) + \varepsilon_{ijct} \quad (6)$$

Imports from intra-EU countries

The estimation equation for intra-EU imports is also derived from the Anderson & van Wincoop (2003) gravity equation and will attempt to measure almost the exact same effect as the extra-EU trade estimation equation. Naturally, the estimation equations will therefore be very similar. However, there is one fundamental difference. When estimating imports from extra-EU countries, we are interested in in what EU country will be the importer, assuming that it will be the country with the most efficient trade procedures. When estimating imports from intra-EU countries, however, we are interested in what EU country will be the *exporter*, once again assuming that this will be the country with the most efficient trade procedures. If both these assumptions hold, it will be a strong indication that EU countries with efficient trade procedures import goods from the rest of the world and then re-export them to other EU countries (alternatively, that the most efficient countries import goods from the rest of the world and sell their own production in less efficient countries, as is the case under indirect trade deflection). The index of the $Time\_to\_Import$ variable must therefore be changed from i to j, so as to measure EU imports as a function of the trade procedure efficiency of the EU exporter. The estimation equation for EU imports from other EU countries will therefore be:

$$lnM_{ijct} = \beta_1 + \beta_2(1-\sigma)(lnTime\_to\_Import_{jt} * lnTime\_Sensitvitity_c) + (Country\_Pair_{ij}) + (Importer\_Time_{it}) + (Exporter\_Time_{jt}) + (Product\_time_{ct}) + \varepsilon_{ijct} \quad (7)$$

3.2.3 The interaction term

Because it has several implications for the interpretation of the estimates and therefore the subsequential discussion and conclusion, it is important to note that the integrated variable of $Time\_to\_Import$ and $Time\_Sensitvitity$ is an *interaction term.* Interpreting the estimate of a coefficient of an interaction term is different from interpretating the estimate of a coefficient of an explanatory variable in an additive regression. This is because the coefficient of an interaction term does not measure a direct effect on the dependent variable. Instead, when both of the variables in an interaction term are continuous, the coefficient measures the change in the effect of one of the variables in the interaction term on the dependent variable when the other variable (the *moderator*) increases. Which variable is the moderator is entirely arbitrary (Aguinis & Gottfredson, 2010), but in this particular case the interpretation of the estimate is much more reasonable if the time sensitivity variable is assumed to be the moderator. Furthermore, since all variables are in logarithmic form, the effects are interpreted as percentage changes. Translating this to match equation (6) and (7) yields: β_2 estimates how the effect of a percentage increase in $Time\_to\_Import$ on M_{ijct} changes when there is a percentage increase in $Time\_Sensitvitity$ (see, for example, Aguinis & Gottfredson (2010) or Djankov, Freund & Pham (2010)).

This explanation of the coefficient of an interaction term applies to when both variables in the interaction term are continuous. However, in this study, regressions will also be made in which the time sensitivity variable is treated as a dummy variable. This changes the interpretation of the estimate of the coefficient somewhat. When the moderator is treated as a dummy variable, the coefficient measures the difference in effect on the dependent variable of the explanatory variable between when the moderator assumes a value of 1 and when it assumes a value of 0. In this particular case, goods that are above a certain level of time sensitivity will be defined as "time sensitive", assuming a value of 1. Goods that are below this level will be defined as "time insensitive", thus assuming a value of 0. Remembering still that all variables are in logarithmic form and that their effects are therefore expressed in percentage terms, the interpretation of the estimates can be translated into equation (6) and (7) as: β_2 estimates how large the difference

is of a percentage increase in $Time\_to\_Import$ on M_{ijct} between goods that are time sensitive and goods that are time insensitive (see, for example, Aguinis & Gottfredson (2010) or Djankov, Freund & Pham (2010)).

Because the estimates that will be received in this study are estimates of coefficients of interaction terms, they are not direct estimates of the effect of import procedures on import volumes. However, this does not mean that inference regarding procedure-induced deflection cannot be drawn from them. Because they estimate how the effect of time to import changes as the time sensitivity of the good being traded changes, a significate estimate thus implies that time to import *does have* an effect on import volumes. While it is true that this effect could be positive or negative, it should be safe to assume that a positive effect would be most unlikely. This is because a positive effect would imply that trade volumes are larger between countries for which the costs of trade is higher, which would be equivalent to countries trading more with those countries that have higher tariff levels. However, since this is still a possibility, section 4.3 will provide a robustness test in which import volumes are regressed directly on import procedures, without fully controlling for multilateral trade resistance. While such estimates should be interpreted cautiously, high statistical significance and a negative slope for those estimates should at least further substantiate the intuition regarding the relationship between import procedures and import volumes.

Furthermore, even though the estimates of the interaction term (combined with the robustness test of section 4.3) will be successful in evaluating whether imports procedures have an effect on import volumes, and therefore whether deflection occurs, they will not indicate *how much* import volumes are affected by increases in time to import. However, such estimates are not necessary to evaluate *if* procedure-induced trade deflection occurs. To evaluate if procedure-induced deflection occurs as it has been presented in section 2.3, it is sufficient to find: (1) whether increased time to import has a negative effect on EU imports from extra-EU countries, (2) whether increased time to import for an EU exporter has a negative effect on EU imports from that exporter and (3) whether these effects occur to a greater extent the more time sensitive the goods being traded are. All of these conditions are satisfactorily evaluated from estimates of the coefficients of the interaction terms when combined with the robustness test of section 4.3.

4. Results

In this section, the results of estimating equations (6) and (7) when time sensitivity is treated as a continuous variable are initially presented. Following this, a robustness test is performed in which the standard errors are evaluated and adjusted. Following this, the direct effect of import procedures on import volumes is estimated. Finally, results of estimating equations (6) and (7) when the time sensitivity variable is treated as a dummy variable for several different definitions of time sensitivity are presented.

4.1 Regressions with continuous moderator

The results from estimating equation (6) are presented in table 4.1. As can be read from the table, the coefficient of the interaction term is highly statistically significant and has a negative sign. This implies that time to import does have an effect on import volumes, and that this effect is increasingly negative the more time sensitive the good being traded is. For every percentage increase in the time sensitivity of the good being traded, EU imports from extra-EU countries are reduced by 0.0677% more from a percentage increase in the time it takes to import.

Table 4.1: Regression on extra-EU imports

	(1)
VARIABLES	logvalue
logdaysens	-0.0677***
	(0.00453)
Constant	10.33***
	(0.0275)
Observations	950,597
R-squared	0.459

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results from estimating equation (7) are presented in table 4.2. The results are very similar to those in table 4.1, in that the integrated variable has a negative sign and is highly statistically

significant. This implies that an EU exporters time to import does have an effect EU imports from that exporter, and that this effect is increasingly negative the more time sensitive the good being traded is. The estimate, however, is somewhat lower, now being interpreted as that for every percentage increase in the time sensitivity of the good being traded, EU imports are reduced by 0.0523% more from a percentage increase in the time it takes for the EU exporter to import.

Table 4.2: Regression on intra-EU imports

	(1)
VARIABLES	logvalue
logdaysens	-0.0523***
	(0.00384)
Constant	13.28***
	(0.0254)
Observations	531,860
R-squared	0.688

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.2 Adjusted standard errors

Initial results provide a negative slope and a high statistical significance. Provided that import procedures have a negative effect on import volumes, this is a strong indication of procedure-induced deflection. Unfortunately, there is a risk that inference from these results might not be trustworthy. This is because the panel data used in this study are based on observations from the same set of countries over a specific set of years. Because it is reasonable to assume that the import patterns of any country will not change very drastically over this relatively short time period, it is also likely that each of these countries import approximately the same volumes of each product chapter every year. It is also likely that they will import from the same countries over time. Therefore, there is a risk that there might be correlation between observations from an individual country in one year and observations from the same individual in another year. If there is such correlation between observations from the same individual, it would mean that the data are divided into so called “clusters” for each individual. While the application of individual

fixed effects would control for some of this correlation, they would not control for all correlation in the *error terms*. This phenomenon, known as "clustered errors", causes large t-statistics, incorrectly small standard errors and low p-values, making inference unreliable. Furthermore, due to the heterogeneity of the countries, it is also likely that the error terms are heteroscedastic (Cameron & Miller, 2015).

Table 4.3 and 4.4 presents the results for White's heteroscedasticity test for both extra-EU and intra-EU imports. In both cases, the estimations are highly statistically significant. Thus, it can be concluded that the error terms are heteroscedastic. Having concluded this, it becomes apparent that the standard errors must be adjusted in some way. According to Cameron & Miller (2015), this can be done either by applying cluster-robust standard errors or default standard errors, and it is possible to test which of these approaches should be used. However, before testing for this it must first be established at which level (country-pair, importer-time, exporter-time or product-time) it is likely that there is correlation between the observations, and thereby at which level the standard errors should be cluster-robust (if such standard errors are to be applied at all). It is possible to test for this by adding levels of clustering in different stages and see if there is an appreciable difference to the standard errors when one level is added. If there is, then that level should be included (Cameron & Miller 2015, pp.17).

Table 4.3: White's test for heteroskedasticity, extra-EU imports

	(1)
VARIABLES	e2
logdaysens	-0.321***
	(0.00336)
Constant	6.029***
	(0.0238)
Observations	950,597
R-squared	0.010

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.4: White's test for heteroskedasticity, intra-EU imports

	(1)
VARIABLES	e2
logdaysens	-0.0889***
	(0.00283)
Constant	3.285***
	(0.0217)
Observations	531,860
R-squared	0.002

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results for different levels of clustering for extra-EU imports are reported in table 4.5 and for intra-EU imports in table 4.6. For both tables, column (1) displays the results for clustering the at the country-pair level, column (2) for adding the importer-time level, column (3) for adding the exporter-time level and column (4) for adding the product-time level. For extra-EU imports, the country-pair and importer-time levels generate the greatest difference to the standard errors. For intra-EU imports, the country-pair and exporter-time levels generate the greatest difference.

These results are arguably very reasonable. As previously mentioned, the import pattern of any country is unlikely to change drastically every year, meaning that it is likely that there should be correlation between observations of trade between country-pairs over time, which is captured in both table 4.5 and 4.6. Furthermore, it is also unlikely that the import procedures of any country should change very drastically every year. Therefore, it is likely that there should be correlation between observations of import procedure efficiencies for each country over time. In the case of extra-EU imports, imports are expressed as a function of the efficiency of the importers trade procedures. Therefore, it makes sense that the correlation between import procedures is captured at the importer-time level in table 4.5. Conversely, in the case of intra-EU imports, imports are expressed as a function of the efficiency of the exporters trade procedures, and it is therefore reasonable that the correlation between import procedures is captured at the exporter-time level in table 4.6. Whether the differences between country-pair clustered standard errors and country-pair and exporter-/importer-time clustered standard errors are "appreciable" is of course a matter of definition. However, because they are justifiable and

because the inclusion of them reduce the level of significance from 1% to 5% in both cases, they will be included in this analysis.

Table 4.5: Different levels of clustering for extra-EU imports

VARIABLES	(1) logvalue	(2) logvalue	(3) logvalue	(4) logvalue
logdaysens	-0.0677***	-0.0677**	-0.0677**	-0.0677**
	(0.0250)	(0.0288)	(0.0282)	(0.0300)
Constant	10.33***	10.33***	10.33***	10.33***
	(0.151)	(0.174)	(0.170)	(0.181)
Observations	950,597	950,597	950,597	950,597
R-squared	0.459	0.459	0.459	0.459

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.6: Different levels of clustering for intra-EU imports

VARIABLES	(1) logvalue	(2) logvalue	(3) logvalue	(4) logvalue
logdaysens	-0.0523***	-0.0523***	-0.0523**	-0.0523**
	(0.0152)	(0.0158)	(0.0220)	(0.0224)
Constant	13.28***	13.28***	13.28***	13.28***
	(0.100)	(0.104)	(0.145)	(0.147)
Observations	531,860	531,860	531,860	531,860
R-squared	0.688	0.688	0.688	0.688

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Having concluded that the error terms are heteroscedastic and at what level the standard errors should be cluster-robust (if such standard errors should be applied at all), it is now possible to test if the standard errors should be adjusted by adding default standard errors or cluster-robust standard errors. The test is similar to that of deciding at which level the standard errors should be cluster-robust. If there is an appreciable difference between default standard errors and cluster-robust standard errors, the cluster-robust standard errors should be used (Cameron & Miller 2015, pp.17). The results of the test for both extra- and intra-EU imports are displayed in tables 4.7 and 4.8. For both tables, column (1) displays default standard errors and column (2) displays cluster-robust standard errors at the appropriate levels previously decided.

Evidently, there is a large difference between the default standard errors and the cluster-robust ones in both cases. Thus, we can conclude that cluster-robust standard errors should be applied and that the results in 4.1 and 4.2 are significant at the 5% level.

Table 4.7: Robust vs. cluster test, extra-EU imports

VARIABLES	(1) logvalue	(2) logvalue
logdaysens	-0.0677*** (0.00500)	-0.0677** (0.0288)
Constant	10.33*** (0.0304)	10.33*** (0.174)
Observations	950,597	950,597
R-squared	0.459	0.459

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.8: Robust vs. cluster test, intra-EU imports

VARIABLES	(1) logvalue	(2) logvalue
logdaysens	-0.0523*** (0.00434)	-0.0523** (0.0216)
Constant	13.28*** (0.0287)	13.28*** (0.142)
Observations	531,860	531,860
R-squared	0.688	0.688

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3 Direct effect of import procedures on import volumes

Having concluded that the results provided in table 4.1 and 4.2 are cluster- and heteroscedasticity-robust and significant at the 5% level, this is a clear indication of trade deflection. However, as explained in section 3.3, all though it is highly unintuitive and in defiance of theory, there is a risk that there is a positive relationship between import procedures and import volumes. If this were the case, the results in table 4.1 and 4.2 would

only imply that the positive relationship between import procedures and import volumes would be *reduced* by 0.0677% and 0.0523% from a percentage increase in time to import. In other words, it would not imply that the *negative* effect of import procedures on import volumes is *increased* the more time sensitive the good being traded is, and thus not confirm the notion of procedure-induced deflection. Therefore, in order to strengthen the indications of deflection, it can be useful to estimate the direct effect of import procedures on import volumes. As is explained in section 3.3, it is not possible to obtain such estimates while still fully controlling for multilateral trade resistance, and therefore such results should be interpreted cautiously. However, provided that the estimates are highly significant, they could assist in substantiating the intuition regarding the relationship between import procedures and import volumes.

Because the direct effect of import procedures on import volumes cannot be estimated while controlling for multilateral trade resistance, estimation equations (6) and (7) must be modified. Since importer and exporter fixed effects are no longer included, these terms must be excluded from the regression. Furthermore, removing them implies that the GDP variables are no longer controlled for and must therefore be added back into the equation. Summarizing, this yields the estimating equation:

$$lnM_{ijct} = \beta_1 + \beta_2 lny_{it} + \beta_3 lny_{jt} + \beta_3(1-\sigma)\ln(Time\_to\_Import_{it}) + \left(Country\_Pair_{ij}\right) + (Product\_time_{ct}) + \varepsilon_{ijct} \quad (8)$$

The results for estimating equation (8) for both extra-EU and intra-EU trade is reported in table 4.9 and 4.10, where “loggdp_importer” is the logarithmic GDP of the importer, “loggdp_exporter” is the logarithmic GDP of the exporter and “logday” is the logarithmic time to import. As can be read, the estimate of time to import is highly statistically significant and has a negative sign for both extra-EU and intra-EU trade. Therefore, the estimates suggest that there is a negative relationship between time to import and import volumes, further substantiating the intuition.

Table 4.9: Direct regression for extra-EU trade

VARIABLES	(1) logvalue
loggdp_importer	0.823***
	(0.126)
loggdp_exporter	-0.0506
	(0.126)
logday	-0.345***
	(0.109)
Constant	-1.266
	(2.603)
Observations	124,770
R-squared	0.428

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.10: Direct regression for intra-EU trade

VARIABLES	(1) logvalue
loggdp_importer	0.722***
	(0.0382)
loggdp_exporter	0.694***
	(0.0394)
logday	-0.287***
	(0.0348)
Constant	-6.313***
	(0.817)
Observations	537,921
R-squared	0.684

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.4 Regressions with dummy moderator

The results for estimating the coefficient of the interaction term when time sensitivity is treated as a dummy variable are presented in tables 4.11 and 4.12. As previously explained, treating time sensitivity as a dummy variable means that the estimates will measure how much greater the effect of time to import on import volumes is for goods that are defined as time sensitive

compared to those that are defined as time insensitive. The regression has been made four times, each time with decreased requirement for the products to be defined as time sensitive: first that they must exceed the -1 level of time sensitivity, then the -2 level, then the -3 level and finally the -4 level (for reference, see section 3.1.1, figure 3.4). The estimates are cluster- and heteroskedasticity-robust at the appropriate levels decided in section 4.2.

For both extra-EU and intra-EU imports, the estimates for the -1 and -2 levels are highly statistically significant. For intra-EU imports, this applies to the -3 level as well. For both extra-EU and intra-EU imports, the -4 level has a positive sign and is statistically insignificant. For extra-EU imports, the estimates suggest that for every percentage increase in the time it takes for an EU country to import a good, the country's imports of time sensitive goods will decrease by 34% more than the country's imports of time insensitive goods when time sensitivity is defined at the -1 level, 31.6% more at the -2 level, 9.49% more at the -3 level, and 9.82% less at the -4 level. For intra-EU imports, the estimates suggest that for every percentage increase in the time it takes for an EU exporter to import a good, EU imports from that exporter will decrease by 40.4% more for time sensitive goods than time insensitive goods when time sensitivity is defined at the -1 level, 42.8% more at the -2 level, 12.9% more at the -3 level, and 7.23% less at the -4 level.

Table 4.11: Dummy regressions for extra-EU imports

	(1)	(2)	(3)	(4)
VARIABLES	logvalue	logvalue	logvalue	logvalue
oneday	-0.340***			
	(0.0735)			
twoday		-0.316***		
		(0.0591)		
threeday			-0.0949	
			(0.0802)	
fourday				0.0982
				(0.102)
Constant	10.91***	11.04***	10.92***	10.59***
	(0.0287)	(0.0496)	(0.120)	(0.197)
Observations	960,619	960,619	960,619	960,619
R-squared	0.455	0.455	0.455	0.455

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.12: Dummy regressions for intra-EU imports

VARIABLES	(1) logvalue	(2) logvalue	(3) logvalue	(4) logvalue
oneday	-0.404***			
	(0.0485)			
twoday		-0.428***		
		(0.0375)		
threeday			-0.129***	
			(0.0456)	
fourday				0.0723
				(0.0583)
Constant	13.77***	13.97***	13.83***	13.50***
	(0.0149)	(0.0284)	(0.0648)	(0.111)
Observations	537,921	537,921	537,921	537,921
R-squared	0.687	0.687	0.686	0.686

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Discussion

Section 4 has presented the estimation results from the estimation equations (6) and (7) both when time sensitivity is treated as a continuous variable and when it is treated as a dummy variable. In addition, two robustness tests have been performed. In this section, these results are discussed with respect to the theory of procedure-induced deflection presented in section 2.3.

Having further substantiated intuition with the results of the robustness test provided in section 4.2, it is safe to say that the estimate presented in table 4.1 suggests that the EU countries with less efficient import procedures will have smaller import volumes from the rest of the world, especially of goods that are time sensitive. On a general level, this estimate is thus in line with previous research on trade distortions due to inefficient trade procedures, especially that of Djankov, Freund & Pham (2010): less efficient trade procedures will reduce the volume of trade, especially for trade in time sensitive goods. On a more specific level, this estimate also confirms the findings of Persson & Bourdet (2012), who showed that the disharmonized trade procedures of the EU are causing distortions to the member countries trade with the rest of the world. Building on those findings, table 4.1 also provides an estimate of how this effect varies depending on the time sensitivity of the good being traded. A percentage increase in an EU importers time to import has a negative effect on its volume of imports from extra-EU countries, and this effect is expected to increase by 0.0677% as the time sensitivity of the good being traded increases by 1%. The results of table 4.11 help to interpret this increasingly negative impact by showing that when the time to import increases by 1%, imports of the most sensitive goods (those above the -1-level of time sensitivity) drop by 34% more than imports of other goods.

As for the results of table 4.2, these are completely new findings, showing that an increase in the time it takes for an EU *exporter* to import goods reduces EU imports from that exporter, *and* by how much this effect increases as the time sensitivity of the good being traded increases. A percentage increase in an EU exporters time to import has a negative effect on the volume of EU imports from that exporter, and this effect is expected to increase by 0.0523% as the time sensitivity of the good being traded increases by 1%. From the results of table 4.12, it is shown that a percentage increase in time to import reduces EU imports of the most time sensitive goods from this exporter by 40% more than of other goods. From the results of the robustness test provided in section 4.3, it can be concluded that these estimates, as well as the ones of table 4.1 and 4.11, are cluster- and heteroskedasticity-robust and significant at the 5% level.

Combining the estimates of table 4.1 and 4.2 and the results of table 4.11 and 4.12 provides a strong indication that trade deflection due to disharmonized trade procedures does occur in the EU. In a first step, table 4.1 provides evidence that, all else equal, the EU countries with the most efficient import procedures will import the largest volumes from the rest of the world, and relatively more so when the goods are time sensitive. In a second step, table 4.2 provides evidence that, all else equal, EU imports from other EU countries will be larger from those countries that have the most efficient import procedures, and relatively more so when the goods are time sensitive. In other words, goods are flowing from the rest of the world into the most efficient EU countries, and from these countries to the rest of the EU.

However, there is a possible objection to this indication. Specifically, there is a possible objection to the notion that the results of table 4.2 and 4.12 are indicative of trade deflection. This is that, as is shown by Wilson (2007, pp. 7-8), there is a high correlation between import procedure efficiency and export procedure efficiency for most countries. Because time to export is of course also important when trading in time sensitive goods, and because there is a high correlation between import and export procedure efficiency, the results of table 4.2 and 4.12 could be caused by the fact that import procedure efficiency works as an excellent proxy for export procedure efficiency. In other words, the fact that the EU countries with the most efficient import procedures will export more to the rest of the EU would have nothing to do with their import procedures being efficient, but rather with their export procedures being efficient. This would of course contest the notion of procedure-induced trade deflection. However, as is explained in section 2.3, because the EU is a customs union there is free movement of goods between the member countries. In other words, there are virtually no export procedures associated with intra-EU trade. Therefore, while import procedures work as an excellent proxy for export procedures, it is hard to imagine why export procedures would be such a significant determinant of intra-EU trade. It is true that the discussion above implies that if equation (7) had been regressed on trade between countries that are not in a customs union, similar results to those in table 4.2 and 4.12 might still be produced due to the correlation. However, because the EU countries are in a customs union, it is more reasonable to assume that the import procedures are producing these results than the export procedures. Therefore, the indication of procedure-induced deflection remains strong.

All though it cannot be concluded from these results, tables 4.11 and 4.12 might also be indicating another aspect of procedure-induced trade deflection in the EU: that goods below a certain level of time sensitivity are not being subjected to trade deflection at all. This is

suggested from the fact that when time to import increases, there is a very large difference in impact on imports of goods above the -1 level of time sensitivity and the ones below, but an insignificant difference in impact on imports between the goods above the -4 level of time sensitivity and the ones below. Combining these results suggests that the impact on imports of the very majority of the goods above the -4 level must be almost identical to the impact on imports of the goods below this level. Because the results only explain how large the *difference* in impact is, and not how large the *actual* impact is, it may very well be that there is a negative impact on the goods below the -4 level that simply happens to be very similar to the majority of the goods above this level. However, it would perhaps be more reasonable to assume that the impact is highly similar because it is virtually non-existent for goods that are below a certain level of time sensitivity. This is because, as is explained in section 2.3, trade deflection is unlikely to occur in trade of all goods. If the good being traded is associated with very low depreciation costs, then the costs of rerouting it might be higher than importing the it directly. If this assumption were correct, it would produce similar results to those in table 4.11 and 4.12. However, it cannot be concluded that this is the cause.

6. Conclusions

Substantial efforts to liberalize trade in areas such as tariffs reductions and abolishment or regulation of conventional non-tariff barriers have been made during the past seven decades. However, alongside the progression, the relative costs of inefficient trade procedures have been on the rise, making research on this topic increasingly necessary. The purpose of this study has been to contribute to the emerging literature by turning the scope towards the EU and investigating the relationship between trade procedures and trade deflection in customs unions, attempting to answer the question: Are the disharmonized trade procedures of the EU member countries causing trade deflection within the union?

Building on estimations from two gravity equations; one estimating the effect of import procedures on EU imports from extra-EU countries and one estimating the effect of import procedures on EU imports from intra-EU countries, the study has provided evidence that trade deflection due to disharmonized trade procedures does occur. The study has been made on a product chapter level, using an integrated variable of time to import and time sensitivity to estimate how the effect of import procedures on import volume increases as the time sensitivity of the good being traded increases.

Evidence has been provided that a percentage increase in time to import has a negative effect on the EU volume of imports, and that this effect increases by 0.0677% as the time sensitivity of the good being traded increases by 1%. Evidence has been also been provided that EU imports from extra-EU countries of the very most time sensitive goods drop 34% more than imports of other goods from a percentage increase in time to import. Similarly, evidence has been provided that a percentage increase in time to import of an EU exporter has a negative effect on EU imports from this exporter, and that this effect increases by 0.0523% as the time sensitivity of the good being traded increases by 1%. Evidence has also been provided that imports of the very most time sensitive goods from an EU exporter drop 40% more than imports of other goods from a percentage increase in the exporters time to import. The combination of these results provides evidence that goods are flowing from the rest of the world into the most efficient EU countries, and from these countries to the rest of the EU. This is a strong indication that trade deflection due to disharmonized trade procedures does occur in the EU, and that this deflection occurs to a greater extent the more time sensitive the good being traded is.

6.1 Further research

Having provided evidence of trade deflection in the EU due to disharmonized trade procedures, there are several questions that are left unanswered and that should be subjected to further research. First, while the study does provide evidence of trade deflection due to disharmonized trade procedures, it is not investigated what *type* of trade deflection this is. As explained in section 2.1, trade deflection can be direct, meaning that products will enter the most efficient country and later be re-exported to less efficient ones. However, trade deflection can also be indirect, meaning that firms in the efficient country exploit the higher price of goods in the inefficient country and supply their products there instead of in their domestic market, forcing their domestic market to rely on imports.

Furthermore, all though the occurrence of trade deflection is concluded, the welfare implications and consequences of this deflection has been left outside of the scope of this study. Potential consequences have been suggested in section 2.3, mentioning firms and governments in efficient countries profiting of less efficient ones by capturing more tariff revenue and exploiting price disparities. While it directly follows from the occurrence of trade deflection that more tariff revenue will be captured by the efficient country, the existence of price disparities due to disharmonized trade procedures and the subsequential notion that firms in efficient countries profit of this is merely a suggestion derived from the conventional consequences of disharmonized tariff levels in an FTA. Further research on this topic is welcomed and can be concluded relevant and necessary following the results presented in this study.

7. References

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