ECORYS

The economics benefits of customs

Final report

Client: Topsector Logistiek

Rotterdam, 22 December 2016

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Management summary

Introduction/aim of this study

For an open economy and logistics hub like the Netherlands, well-functioning customs services are important. The intensity of international trade between countries depends on trade costs. Waiting times in harbours, long clearance procedures and/or lack in transparency about such procedures, are examples of trade barriers that increase the cost of doing business across borders. Based on this, the better trade facilitation services the Customs Administration of the Netherlands provides, the higher the volumes of trade that can be expected.

This study analyses the impact from improvements in customs-related indicators on trade between countries. We also analyse the extent to which an increase in trade from such improvements may contribute to increased GDP per capita. By doing so, the study gives an overview of the long-run effects from policies aimed at trade facilitation. It is up to Dutch Customs to formulate specific projects to actually improve Dutch performance in the customs-related indicators identified in this study. Box 1 gives an example of a measure recently introduced by the Customs Administration that may contribute to trade facilitation, in this case the reduction of transport costs per container.

> **Box 1: specific trade facilitating measures by Customs Administration of the Netherlands**
> On an annual basis, Dutch customs scans about 55,000 containers that enter the port of Rotterdam by sea. These containers used to be taken out of the logistic process, to be transported to a fixed scan in a customs office. The costs associated with this (including costs of transport, re-planning and late delivery) have been estimated at EUR 1200 per container. In recent years, scans have been installed at the port terminal. As a result, 65 percent of the containers are currently scanned at the terminal. The advantage of this is that the scanning of the containers reduces problems in the logistics process, as delays and re-planning are now avoided.

Methodology

In the analysis we first identified those customs-related indicators that have a robust relationship with international trade. This analysis led us to exclude indicators whose relationship with trade could not be established beyond a reasonable doubt, or whose estimated effect varied too much when combined with different indicators, or whose estimated effect was simply at odds with expectations (i.e., the wrong sign). Next, we proceeded with a smaller subset of indicators for which data over time was available. It is generally understood in econometrics that panel data, i.e., data with information about differences between subjects – here countries – as well as differences over time, provide more reliable estimates. This set of indicators is presented in the table below.

Results trade

The table below illustrates the impact on bilateral trade from a five-percent improvement in the indicators identified above. That is, the table gives the impact on trade when the cost, time or the number of documents to export and import would each be 5 percent below their current level. We point out that the data represent impacts *on average*, i.e., across all countries. It therefore gives and indication of the benefits that the Netherlands (and other countries) can expect from an improvement on these indicators. The table indicates that a reduction in the cost to export of 5 percent, increases trade on average by 2 percent, while reducing the other export indicators (the number of documents to export or time to export) increases international trade by 3.5 to 3.9 per cent. The gains in trade from lower barriers to import are smaller, but still significant, at approximately 0.7-0.8 percent. These results indicate that actions by Dutch Customs aimed at (further) reducing the time and number of documents to export are expected to have a relatively

high pay-off. At the same time, the question is what is needed to achieve further improvements in the indicators, as this may be easier to achieve for some indicators than others. Comparing the performance of the Netherlands vis-a-vis the best performing country (this difference is referred to as distance to the frontier), can be a starting point for this analysis: if this difference is relatively large, it suggests there is room for improvement in Dutch performance on that indicator. Of the indicators in the table below, the indicator with the largest distance to frontier for the Netherlands is costs to import. The extent to which improvements in an indicator are possible (including the investment associated with it) and the pay-off of these improvements therefore need to be carefully weighted.

	Impact on trade from a 5-precent improvement in indicators
Origin/ exporter indicators	
Cost to export deflated per container	2.0%
Time to export	3.9%
Documents to export number	3.5%
Destination/ importer indicators	
Cost to import deflated per container	0.8%
Time to import	0.7%
Documents to import number	0.8%

Dutch customs was also interested in the contribution of four different policy dimensions of customs and their contribution to trade, more specifically, in the contribution of innovation, ICT performance, inspections and rely on self-regulation. With the input of the Dutch customs, composite indicators were calculated, as there are no clear definitions or individual indicators linked related these dimensions. The next table shows the results of this analysis, and shows the increase in trade if the performance in an indicator increases by 1 percentage point. This shows that in particular ICT performance and self-regulation have the largest effects on trade flows. It is however more difficult to interpret these figures, as it is not clear what a 0.01 improvement on an indicator means.

Policy dimension	Innovation	ICT performance	Inspections	Self-regulation
Exporter	2.7	4.1	3.8	3.9
Importer	1.5	2.0	1.8	2.1

Results income

To what extent do the increases in trade identified above contribute to income levels? We have investigated the impact of trade openness, i.e., the sum of imports and exports over GDP, on the level of GDP per capita. These impacts are well documented in the literature. We estimate the impact on GDP per capita in *the long run*.[1] This study illustrates that reducing the time to import raises long-run GDP on average by 0.3 percent, whilst a reduction in the time to export raises long-run GDP on average by 1.5 percent. The impacts for the other four dimensions are within this range. To illustrate the meaning consider the following calculation. Dutch GDP per capita in 2014 was €39,300. Assuming that this is the long-run level, an increase of 1.5 percent in GDP per capita due to trade facilitation implies an income gain per capita of €600.

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[1] This is a situation in which the economy in on its steady-state, structural growth path, Short-term dynamics and effects from business cycles are absent. This is based on work done by the Netherlands Bureau for Economic Policy Analysis (CPB).

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Policy implications

As mentioned before, this study gives an overview of the long-run effects from policies aimed at trade facilitation and shows that an improvement in the customs-related trade facilitation performance can lead to a significant increase in trade flows as well as income. It also implies that a deterioration in this performance can lead to a decrease in trade and income.

The results of this study can help policy makers in assessing different policy options. For example, in times of budget cuts, different policy options can be compared with respect to their expected impact on trade, by looking at the extent to which certain policy measures will change the indicators presented above. But also in times of investments, different policy options can be compared with respect to the extent to which they may lead to increased trade flows. The current performance of the Netherlands vis-à-vis its competitors on the identified indicators may be an interesting starting point to identify areas for improvement.

The performance on the customs-related indicators can be linked to four policy areas that customs distinguishes: innovation, ICT performance, inspections and rely on self-regulation. Almost all indicators that have been identified to have a significant impact on trade are primarily (but not exclusively) linked to ICT performance, with the exception of number of documents, which is more closely related to self-regulation. This provides further suggestions on the area in which Dutch customs could invest.

Of course, the costs associated with improving the performance also need to be taken into account By providing an estimate of the benefits of improvements, the results of this study could be used as an input for a cost-benefit analysis of specific measures.

1 Objectives and approach

1.1 Background and objectives of the study

In a globalizing world that is increasingly built on fragmented and just-in-time supply chains, trade facilitation- and customs services more specifically become increasingly important as determinants of comparative advantage.[2] The key performance dimensions of these services relevant for businesses evolve around providing (i) a reliable and predictable environment that enables supply chain operators to plan and structure their processes and operations (e.g. defining different kinds of stock levels), and (ii) efficient and fast handling that enables companies to optimally exploit the benefits of internationalisation (e.g. become lean, or have access to key inputs, etc.). On the other hand, for society as a whole, customs take the role of implementing important parts of a country's trade policy. This concerns tariff collection, but also the enforcement of certain non-tariff barriers related for example to food safety standards.

For an open economy and logistics hub like the Netherlands, well-functioning customs services are important. The intensity of international trade between countries depends on trade costs. Waiting times in harbours, long clearance procedures and/or lack in transparency about such procedures, are examples of trade barriers that increase the cost of doing business across borders. Based on this, the better trade facilitation services the Customs Administration of the Netherlands (from now on referred to as Dutch customs) provides, the higher the volumes of trade that can expected. In addition to trade, the Netherlands Foreign Investment Agency (NFIA) and the Holland International Distribution Council also use the Dutch customs performance as an asset which makes the Netherlands attractive as a location for foreign companies "the Dutch customs authorities are well-known for their practical and pro-active approach towards facilitating trade and customs procedures. This fact supports the Netherlands preferred status as a country in which to locate importing activities."[3]

This study analyses the impact of customs-related indicators on trade between countries. We also analyse the extent to which an increase in trade from improvements in customs-related indicators may increase GDP per capita. This study gives an overview of the long-run, effects from trade facilitation.

Dutch customs can subsequently formulate specific projects to actually improve Dutch performance in the policy dimensions identified in this study. The ToR distinguishes four channels through which Dutch customs seeks to improve performance: 1) innovation, 2) rely on self-regulation, 3) ICT and 4) inspection performance. This study illustrates how these four channels are linked to the customs-related indicators in this study.

1.2 Approach and analytical framework

We use state-of-the-art methodologies that are rooted in and take account of recent theoretical advances, and that provide sufficient robustness to withstand political scrutiny. In order to determine the impact on trade from various facilitation variables we use a gravity model. The gravity

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[2]   Inefficient customs procedures can lead to additional trade costs and make a country less attractive for investment, as indicated e.g in OECD (2005) The costs and benefits of trade facilitation, OECD Policy Brief, October 2005.

[3] `   See: http://www.ndl.nl/wp-content/uploads/2013/01/Customs_and_taxation-Why_invest_in_NL.pdf

model is a commonly used econometric tool to explain differences in international trade between countries.

An important issue in international trade is the issue of trade diversion. If Dutch performance in trade facilitation deteriorates, this will affect Dutch trade flows negatively, and some of these trade flows are likely to be diverted to another country. For instance, instead of importing through Rotterdam, firms may then choose to import through the port of Antwerp. Similarly, if the Netherlands improves its performance on one of the trade facilitation variables, the impact of this change on trade flows will be bigger if other countries do not make a similar improvement in their performance. This implies that we do not only need to focus on the performance of Dutch Customs, but also of other countries. Hence, the comparative approach of the gravity model is especially well-suited to address the questions discussed above.

The issue of relative performance is also important for identifying the areas where Dutch Customs can still improve. In some areas, the performance is already among the best in the world, which leaves relatively limited room for further improvement, while in other areas, much more can still be achieved. Next to the relative contribution to trade flows of different trade facilitation indicators, the relative performance to the best performing countries (referred to as "distance to frontier") is therefore also important to keep in mind.

The overall framework of the study is summarised in Figure 1.1Figure 1.1, while the next section presents the methodology in more detail. The figure shows that the first step involves an extensive data collection and compilation exercise, including a detailed data availability assessment. On the basis of this step we know what indicators we can build on in the subsequent analysis.

In the analysis we first identified those customs-related indicators that have a robust relationship with international trade (section 2.2). This analysis leads us to exclude indicators whose relationship with trade could not be established beyond a reasonable doubt, or whose estimated effect varies too much when combined with different indicators, or whose estimated effect is simply at odds with expectations (i.e., the wrong sign). Next, we proceeded with a smaller subset of indicators for which data over time was available (section 2.3). It is generally understood in econometrics that panel data, i.e., data with information about differences between subjects – here countries – as well as differences over time, provide more reliable estimates. After establishing the extent to which different customs-related variables facilitate trade, we can subsequently extrapolate impacts on the level of income (section 2.4).

The trade facilitation indicators can be develop into a set of customized ones that are of particular interest to the client, linking the variables to the four areas highlighted in the ToR, i.e., innovation, rely on self-regulation, ICT and inspection performance.

As a final step, we conduct three small case studies, in which we look at a specific policy of Dutch Customs. The aim is to see how specific measures affect trade, but also to assess, to the extent possible, the benefits and costs of a specific measure to different stakeholders. This enables to analyse issues that cannot be fully entailed in the modelling framework (e.g. due to data limitations).

It should be noted that the focus of the present research is on the trade facilitating role of Customs Administration. Other benefits that customs provides to society have not been explicitly included. For example, increased safety and security resulting from customs inspection will generate benefits to society which we have not attempted to quantify in this study. Also, possible benefits from increased (foreign) investment of companies have only been taken into account to the extent these

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generate trade. The analysis also links customs performance to trade, and does not look at the costs associated with this performance (only to some extent in the case studies).

Figure 1.1:   **Approach to the study**
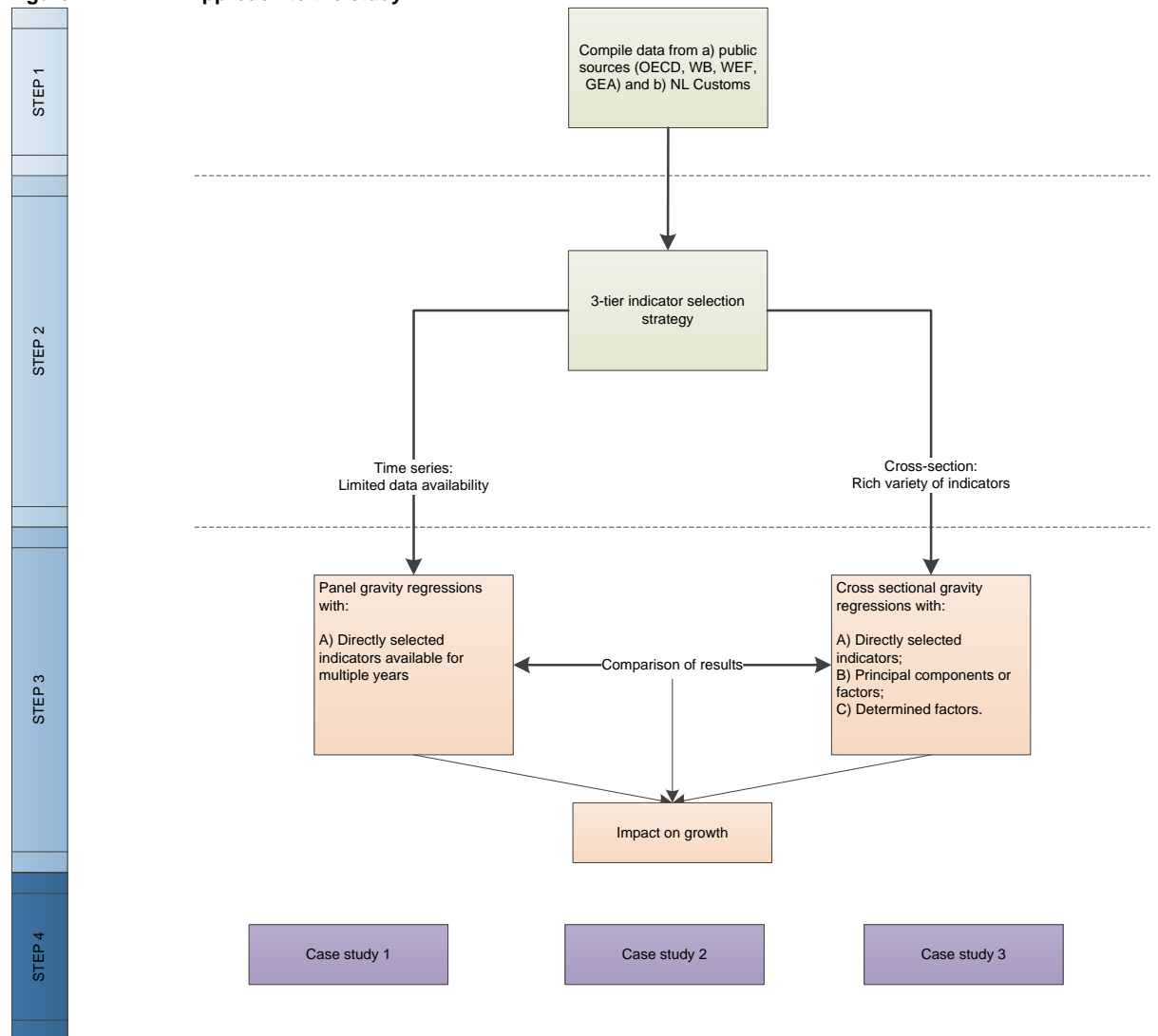
Source: Ecorys (2015)

1.3   Methodology

In assessing the effects from trade facilitation a large number of customs-related indicators have been considered. These include different types of indicators, such as performance-based indicators (e.g. days for clearance), legislative indicators (e.g. number of documents to import), and indicators reflecting perceptions generated by expert surveys (e.g. the percentage of respondents rating the transparency of customs clearance processes as often/ nearly always).

We only used data from internationally established sources. The advantage of using international data is that this allows for better comparability. This is needed because as explained in section 1.2, the relative performance matters, and therefore we do not only need data on trade facilitation in the Netherlands, but also in other countries. The more countries covered in the analysis, the more reliable the results of the quantitative analysis will be.

We have compiled a dataset with indicators originating from a large number of sources:

- World Bank Doing Business Indicators (only *Trading across borders*);
- World Bank Logistic Performance Indicator (LPI);
- World Bank Domestic Logistics Performance Index (LPI);
- World Economic Forum Enabling Trade Index;
- OECD Trade Facilitation Indicators (TFI) Database.

From these sources, we selected those (subsets of) indicators that are relevant in the context of this research. For example, the World Bank Doing Business dataset contains many indicators, but we only included the ones for the sub-set trading across borders. The focus is thus on indicators related to trade facilitation. A full overview of the collected indicators is presented in Annex A.

The challenge is to reduce the number of trade facilitation variables to a set of indicators that best represent the challenges of this research spelled out in the ToR. In order to tackle this systematically, we first briefly introduce the sources of raw data, and then present our strategy for the selection of indicators to be used in the gravity framework. This is important to get a good sense of what actually has been measured in order to draw good conclusions from the gravity regressions.

1.3.1 Trade facilitation data

The last decade has seen a surge of data collection efforts related to trade facilitation measures. These programs are usually rather resource intensive. Thus, it is not particularly surprising to see big international organisations like the OECD and the World Bank being the most relevant data providers. The following provides more information on the sources from which we collected the data.:

- **World Bank Doing Business Indicators – Trading Across Borders**, is based on a regular survey of stakeholders related to import-export procedures. It contains information such as number of documents to export/import, time to export/import in aggregate, as well as split into Customs clearance and inspections, Ports and terminal handling, Inland transportation and handling;
- **World Bank International Logistics Performance Index (LPI),** is based on a survey of logistics professionals providing scores on Customs, Infrastructure, International shipments, Logistics quality and competence, Tracking and tracing, Timeliness;
- **World Bank Domestic LPI**, is based on a survey of logistics professionals and looks at the logistics environment and institutions, i.e. Level of fees and charges, Quality of infrastructure, Competence and quality of services, Efficiency of processes, Sources of major delays, and Changes in the logistics environment;
- **World Economic Forum (WEF) – Enabling Trade Index (ETI)** includes aspects of efficiency and transparency in border administration. This sub-index is composed of elements sourced from international institutions (e.g. World Bank – see above), as well as items from the WEF Executive Opinion Survey, e.g. time predictability of import procedures;
- The **OECD** has compiled their **Trade Facilitation Indicators (TFIs)** from various sources (among others the ones mentioned above but also national customs websites, the World Customs Organisation (WCO), as well as the Global Express Association).

After integrating the indicators from all these datasets into a single dataset, we have removed double entries and adjusted the coding of the variables such that higher values indicate a 'more trade friendly' policy. In sum, this resulted in a dataset of more than 280 trade facilitation indicators with nine of them available over a longer time period (nine years).

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The number of indicators available in these databases is too large to be analysed one by one. In addition, some indicators are more relevant than others (e.g., some relate more to infrastructure and logistics and cannot be influenced by customs). We therefore limit our focus on a number of variables that appear to be most relevant for actual policies by customs authorities. In the following section, we outline the approach to do this in a transparent and effective way.

1.3.2 Creating and selecting relevant indicators

In order to structure the indicators selection process – that is, those indicators that will be plugged into gravity regressions as one of the variables that explain trade– we have adopted a 3-tier approach. Optimally, each of these approaches results in variables to be transferred to gravity.

Direct implementation

Considerations: the first, and most obvious, option is to simply use (a selection of) the available indicators that can be directly transferred to the gravity model. The advantage of this strategy is that including direct measures will make it easier to interpret the regression results. For example, we would be able to make inferences on how a reduction of days in-transit, or a reduction/increase[4] in the number of documents necessary to import impact trade flows. On the downside, one has to assume that (i) not all indicators can be included in one gravity model (due to for example multicollinearity, i.e. significant correlation between independent variables), and (ii) that the dimensions the client is interested are either too complex to be represented by one variable or cannot be represented perfectly by the available data.

Our approach: from the long-list of 280 indicators, with input of Dutch Customs we have selected 32 indicators which are subsequently considered to be most interesting within the scope of this project, as these are indicators customs can influence (see Annex A). The effects of the relevant customs-related indicators are then estimated in a gravity model(see section 1.3.3), using a method developed by Sala-i-Martin (1997)[5]. Following his approach, all possible combinations of four indicators at the same time are included in the gravity model. We therefore run almost 200,000 regressions, which allows us to analyse the impact of these indicators in a thorough manner.

Exploratory multivariant analysis (EMA)

Considerations: the second option is a common data reduction techniques such as principal component analysis (PCA) to narrow down the set of variables in a "more structured" way. The PCA approach allows the data "to speak for itself", and results in a small number of components. This approach captures most of the variances of the selected indicators in single, uncorrelated components.[6] In other words, it groups indicators that move in the same direction. The advantage of this option is that it offers a neutral way to structure and pick up variance contained in the sample of variables. However, this might come at the cost of the interpretability of results, as generated constructs could consist of a large variety of indicators and therefore be difficult to interpret. Further, given the dimensionality of the data (100+ indicators with ca. 150 country observations) sample size might become an issue.

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4   Actually, some studies show a trade facilitating effect with regard to the number of documents needed (cf. Wilson, 2007). An explanation could be that these documents also include quality assuring documentation. Taking this into account, such findings are very well in line with the notion of international standards (e.g. SPS or TBT) having positive impacts on trade in some circumstances.

5   Xavier X. Sala-I-Martin (1997). *I Just Ran Two Million Regressions*. The American Economic Review; Vol. 87 No. 2, pp. 178-183.

6   More formally, a PCA model takes the form of $PC_1 = a_1X_1 + a_2X_2 + \ldots + a_kX_k$ with PC_1 being the first principal component capturing most of the variance in the k original variables, while PC_2 does the same only under the condition that it is uncorrelated to PC_1.

Our approach: we apply the PCA approach both to all identified indicators, and to the selected indicators (see above). However, it soon became apparent that this method did not lead to results that are useful for the purpose of this study and the results have therefore not been included in this report[7]

Confirmatory factor analysis (CFA):

Considerations: A third approach is confirmatory factor analysis. Here we have the freedom to set a model structure *a priori,* allowing us to independently construct the content of our indicator (as opposed to e.g. a PCA, where components by definition capture most of the variance in the sample). The clear advantage is that we have full control over how indicators are constructed, and still pick up on what variables cause which variances. Thus, a CFA offers a nice way to reap the benefits of an EMA, while leaving the option open to construct indicators along the policy dimensions spelled out in the terms of reference, namely:

a. *Innovation;*
b. *Rely on self-regulation;*
c. *ICT infrastructure performance;*
d. *Inspections.*

Our approach: the four policy dimensions are not fully self-explanatory and at first sight have some overlap (e.g. system innovation will often require improvements in ICT infrastructure performance). Allocating the different indicators to these four investments areas is therefore no straightforward task. E.g. the indicator pre-shipment will be relevant for inspections, but also involves ICT. Most of the indicators are relevant for more than one policy dimension, and have been distributed (in shares) over multiple policy dimensions. Given the limitations of this approach (distribution of shares among dimensions and interpretation of results), this analysis is only presented in Annex C.

1.3.3 Trade data

These indicators were then linked to bilateral trade data. These flows were retrieved from UNCTADstats for the years 2006 to 2014, i.e., those years for which we have certain customs-related indicators available. In order to cover as many country pairs as possible we used mirroring. This means that we filled gaps in reported import values with the mirrored export trade flows. For example, if Botswana does not report any imports from the Netherlands, but the Netherlands reports an export flow to Botswana, we have filled the gap with the reported export Netherlands – Botswana trade flow. In cases where both values are available we chose for the reported import value. This is common practice since it is assumed that imports are recorded more accurately due to generating tariff revenues.

1.3.4 Gravity model of international trade and trade facilitation

The effects of customs-related variables on international trade are investigated by using a gravity-model analysis. The gravity model is the most widely used spatial interaction model to study a variety of origin–destination flow phenomena, varying from commuting, telecommunication and asset flows, to migration and trade. Analogous to the law of gravity in physics it is assumed that trade between two countries is proportional to their economic size (mostly measured by GDP) and their proximity (cf. Tinbergen, 1962[8]). While this is of course an oversimplification, this relationship has proven to be empirically rather stable. This stability called for a theoretical framework, which was first introduced by Anderson (1979)[9]. The basic gravity model postulates that bilateral trade

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[7]   The results are available upon request.
[8]   Tinbergen, Jan. "An analysis of world trade flows." Shaping the world economy (1962): 1-117.
[9]   Anderson, James E. "A theoretical foundation for the gravity equation." The American Economic Review (1979): 106-116.

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depends on the economic size of the trade partners, which reflects market size and purchasing power, and a variety of measures of economic distance (or proximity) between the countries to reflect trade costs. With regards to border costs, Anderson and van Wincoop (2003)[10] made a significant contribution by introducing relative trade cost to the gravity framework – captured by so called multilateral resistance terms (MRTs).

The ingredients of a gravity model of trade can be depicted as;

$$E_{o,d,t} = C + X_{s,t} + Y_{d,t} + Z_{s,d,t} + \epsilon_{s,d,t}$$

It relates a bilateral trade flow ($E_{o,d,t}$) to origin-specific variables ($X_{s,t}$), destination specific variables ($Y_{d,t}$), and bilateral (pair-specific) variables ($Z_{s,d,t}$). For estimation purposes, the equation also includes a constant and an error term. As such, the model can identify sources of variation related to structural drivers of trade flows. Source and destination specific variables are the aforementioned economic mass measured by GDP, as well as, for example, institutional parameters such as governance indicators, or more related to this study, variables representing the quality of the trade facilitation/customs infrastructure in the importing and exporting country.

Eventually, all of these variables influence trade of a country with all its partners, e.g., the quality of the Dutch legal system or customs facilities are not only enjoyed by a particular exporter to the Netherlands, but by all of them. In contrast, pair-specific variables are unique to the country pair at hand and establish a measure of distance representing (in very broad terms) trade costs between two countries. Next to the actual physical distance, pair-specific variables include for example whether two countries share a colonial history, have a common border, or speak the same language. An interesting sub-question of the project is whether we can make statements about whether good/bad trade facilitation has particular positive/negative impacts on certain product groups. Work of the academic experts in our team provides a good basis to start from (see for example Lankhuizen et al., 2015[11], and Linders et al., 2010[12]). We will use two types of data in the gravity modelling, the main difference being the time dimension in the variables (see Box 1).

Box 1: cross-section versus panel data
As identified above, many of the indicators are only available for a single year. This type of data is called cross-sectional data. Gravity modelling can then only be used to identify the impact of these indicators for a single year, where comparison is made only with other bilateral sets of countries. On the other hand, panel datasets are made of cross-sectional data that is available for multiple years. An analysis of panel data allows for an comparative analysis BETWEEN bilateral country pairs, as well as over time WITHIN the same bilateral country pair. Econometrically, panel data has clear advantages over identification on the basis of differences across countries. Panel data analysis come closer to the ideal situation of a natural experiment in which one can more safely argue that one only identifies the impact of – in this case – customs, keeping everything else constant. Our analysis uses both types of data. As mentioned in section 1.2. we first identify those customs-related indicators that have a robust relationship with international trade (section 2.3). This analysis is based on cross-sectional data. Next, we proceeded with a smaller subset of indicators for which data over time is available. The impacts on the level of income are based on estimates from the panel estimations.

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10   Anderson, James E., and Eric van Wincoop. "Gravity with Gravitas: A Solution to the Border Puzzle", The American Economic Review." March 93.1 (2003): 170.

11   Lankhuizen, M.B.M., Graaff, T. de & Groot, H.L.F. de (2015). Product Heterogeneity, Intangible Barriers and Distance Decay: The effect of multiple dimensions of distance on trade across different product categories. Spatial Economic Analysis, 10(2), 137-159. 10.1080/17421772.2015.1023338

12   Linders, G.J.M., Mohlmann, J.L., Ederveen, S. & Groot, H.L.F. de (2010). Intangible barriers to international trade: A sectoral approach. In P.A.G. van Bergeijk & S. Brakman (Eds.), The gravity model in international trade: Advances and Applications (pp. 224-251). Cambridge: Cambridge University Press.

1.3.5 Growth modelling

To calculate the impact of trade facilitation on income, we follow a two-stage methodology[13]. It is now a rather commonly used strategy in which results from the gravity equation are used to determine impacts on trade openness which are subsequently used in a standard growth equation to assess the impact on the level of income.

Our analysis of the effect of trade openness, defined as the sum of exports and imports over GDP, on economic growth draws on a large empirical literature on the determinants of economic growth (e.g., Barro (1991)[14]; Mankiw et al. (1992)[15]; Islam (1995)[16], Sala-i-Martin (1997) [17]). In these studies, which focus on per capita income, per capita GDP at time *t* is typically linked to initial GDP per capita at a certain moment in the past, the share of GDP used for investments, the rate of population growth *n*, and a number of variables related to total factor productivity (Straathof et al. (2008)[18]). The main advantage of such an equation is that it is well embedded theoretically and that estimates of the equation can be interpreted as structural determinants of steady state per capita GDP levels.[19] Trade openness is among the variables that have a relatively robust positive effect on growth (Van den Berg et al., 2008).

Table 1.1Table 1.1 summarizes a range of estimates of the effect of openness found in a number of studies. The figures represent the estimated effect on *long-run* GDP per capita from a 1 percentage point change in openness. These coefficients will be matched with the openness coefficients estimated in the panel regression.[20]

Table 1.1   Effects of openness on long-run GDP per capita in existing literature, per cent

	Effect
Frankel and Rose (2002)	1.14 – 1.6
Florax et al. (2002)	1.06
Straathof et al. (2008)	0.45 – 1.8

Note: differences in effects within studies are due to the use of different estimation techniques (e.g., OLS or instrumental variable estimation). The figures indicate the estimated effect (in per cent) on long-run GDP for every 1 percentage point change in openness.

1.3.6 Complementary case studies

The modelling exercise looks at macroeconomic situation, linking the efforts of customs to trade and GDP per capita. It is also interesting to take a look at some concrete efforts of Dutch Customs. Therefore, in addition to the quantitative exercise, we undertake three small case studies. These provide more detailed insights of the issues faced by business in the area of customs when transferring goods across borders and the impact of addressing them. The case studies are based

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[13] As was first applied in Frankel and Romer (1999), Does Trade Cause Growth? American Economic Review, 89 (3), 379-399.

[14] Robert J. Barro (1991). "*Economic Growth in a Cross Section of Countries*", The Quarterly Journal of Economics, Vol. 106, No. 2, pp. 407-443.

[15] N. Gregory Mankiw, David Romer & David N. Weil (1992). "*A Contribution to the Empirics of Economic Growth*", Quarterly Journal of Economics, Vol. 107, Issue 2, pp. 407-437.

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[17] Xavier X. Sala-I-Martin (1997). I Just Ran Two Million Regressions. The American Economic Review; Vol. 87 No. 2, pp. 178-183.

[18] Bas Straathof, Gert-Jan Linders, Arjan Lejour, Jan Möhlmann. "The Internal Market and the Dutch Economy; Implications for Trade and Economic Growth" CPB Document. https://www.cpb.nl/sites/default/files/publicaties/download/internal-market-and-dutch-economy-implications-trade-and-economic-growth.pdf

[19] The model is essentially a Solow growth model.

[20] See, e.g., Islam (1995) or Straathof et al. (2008) for details on the transformation of coefficients to long-run parameters. The long-run effect of improvements in customs-related variables relies on the assumption that their effect on openness persists over time. In other words we assume that multilateral declines in trade are by and large absent or cancel out.

on desk study and interviews, and aim to assess the costs and benefits of certain measures for the various stakeholders affected by them. In addition, we try to link the case studies to the quantitative analysis, to get a rough idea on the potential impact based on our economic modelling exercise.

The cases have been put forward by Dutch customs and include the following:

- Case1: Air cargo operations at Schiphol Airport – The impact of SmartGate.
- Case 2: Cargo transport in the Netherlands and further – transit declarations and the revision of re-assessment procedure.
- Case 3:Parcel courier services at Schiphol Airport – The impact of VENUE .

2 Quantitative analysis: trade facilitation, trade and income

2.1 Collecting and organising customs-related variables

The first step of the methodology as explained in the previous chapter consists of collecting and organising indicators on trade facilitation. This resulted in a dataset of more than 280 trade facilitation indicators. Nine of these indicators were available over a time period of 9 years (2006-2014). Facilitation of trade can take place both for import flows and export flows. We therefore organised the customs-related variables in a bilateral format, where indicators of the exporting country were matched with corresponding values of the importing country.

The first section identifies what customs-related indicators have a robust relationship with international trade. The next section proceeds with a smaller subset of indicators for which data over time was available. We then illustrate how improvements in trade can be linked to the four broad policy dimensions identified by Dutch customs. The final section extrapolates the impact from changes in trade due to improvements in trade facilitation indicators on the level of income (section 2.5).

2.2 Linking individual indicators of customs performance to trade flows

This section investigates the relationship between the selected trade facilitation variables (as indicators customs can influence) and international trade. The aim is to establish what variables are worth focusing on in order to increase international trade of the Netherlands. To answer this question, we investigate:

a) In what dimensions of customs (covered by individual indicators) progress can be made. We therefore look at the position of the Netherlands relative to the country with the highest performance in the sample in each of the customs-related variables (this difference is referred to as 'distance to frontier'). We assume that the farther away the Netherlands is from the frontier, the more room for improvement there is.

b) Which customs-related variables have a robust relationship with international trade. In order to determine the robustness of the relationship between the indicators and international trade flows, we focus on three aspects.
   a. Sign of the coefficient: is the relation between (changes in) the indicator and trade flows in line with expectations (e.g. the higher the costs, the lower trade).
   b. Statistical significance of the coefficient: is the relationship between the indicator and trade flows different from zero.
   c. Sensitivity to specific variables: is the relationship that we find conditional on the inclusion of other variables.

The coefficients for each of the selected indicators are estimated through a cross-section gravity model. To test the robustness, we ran over 200,000 regressions (see section 1.3.2), each time with a different combination of four customs-related variables. Through this approach, we will end up with a more limited number of variables which are most relevant for the analysis and all significant predictors of bilateral trade flows. More detailed

results on how we arrive at specific results is presented in Annex B[21]. In this section we only present the main outcomes.

Distance to the frontier

We assume that the farther away the Netherlands is from the frontier, the easier (in theory) it is to improve performance. That is to say, most progress can be made through catching up with peers rather than forging ahead. Naturally, a top-performing country can raise the frontier. However, further improving an already good performance or raising the frontier may require extensive investments (due to decreasing marginal returns on investment). Box A elaborates on the meaning of this concept.

Box A: Distance to frontier

In Table 2.1, the selected variables have been listed in declining order, with the variables with the largest distance to frontier at the top. In the last column we present the standard deviation. The standard deviation is a measure of the variability of the indicator score in the sample, where some two-thirds of the countries have scores that are within 2 standard deviations from the mean. This indicates that a larger distance to frontier is a more pressing issue if the standard deviation is small (as it means that many countries are performing better than the Netherlands) than when the standard deviation is large (as it means that the Netherlands can still be among the top performers).

Gaps vis-à-vis the frontier are relatively big in r*egulation related to logistics, other official clearance procedures,* and the *number of documents to export and import*. On the one hand, this means that there is considerable room for improvement. On the other hand, a change of this size may be difficult to attain. The distance to the frontier is almost twice the standard deviation for regulation related to logistics, other official clearance procedures, and the number of documents to export and import. The standard deviation reflects the natural variation in a variable. For comparison, the distance to the frontier seems also large with respect to (the number of) physical inspections (1.04). However, the natural variation in this variable is higher altogether, so the differences in performance between the Netherlands and the top-performer is smaller than the distance alone would suggest.

The distance to the frontier is small for variables such as, e.g., timeliness, the overall indicator for trading across borders and time to export. We emphasize that this does not imply that improving the position is not costly or difficult to achieve *in practice*. In fact, improving the value of a variable may require substantial investments.

Table 2.1.   Distance of the Netherlands to the frontier in customs-related variables

	Distance to frontier	Absolute position NLD	Standard deviation variable
Physical inspections	1.04	27	1.34
Regulation related to logistics	1.03	21	0.59
Other official clearance procedures	0.92	51	0.45
Cost to import deflated per container	0.91	39	0.61
Cost to export deflated per container	0.81	45	0.55
Number of border agencies imports	0.69	15	0.55
Port/Airport supply chain - Lead time import for port	0.69	29	0.55
Documents to export number	0.69	14	0.37

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[21]   The analysis will also be expanded upon in a possible academic paper that may follow this report.

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	Distance to frontier	Absolute position NLD	Standard deviation variable
Documents to import number	0.69	9	0.40
Pre-shipment inspections	0.55	67	0.79
Incidence of corruption	0.52	51	0.62
Customs Clearance procedures	0.51	49	0.42
Telecommunications and IT infrastructure	0.45	52	0.92
Time to import	0.41	7	1.48
Trade and transport associations	0.31	21	0.53
Time to export	0.15	6	1.16
Expedited customs clearance for traders with high compliance levels	0.14	22	0.42
Trading across border overall indicator	0.08	13	0.50
Warehousing and trans-loading and distribution	0.07	18	0.47
Clearance and delivery of imports	0.07	47	0.41
Ease of shipment	0.04	11	0.17
LPI Customs	0.03	4	0.22
Overall LPI	0.02	2	0.19
Timeliness	0.01	6	0.18
Provision of adequate and timely information on regulatory changes	**0.00**	**1**	**0.49**
Clearance and delivery of exports	**0.00**	**1**	**0.30**
Transparency of customs of customs clearance	**0.00**	**1**	**0.49**
Number of border agencies exports	**0.00**	**1**	**0.57**
Clearance time with physical inspection	**0.00**	**1**	**0.68**
Port/Airport supply chain - Lead time export for port	**0.00**	**1**	**0.64**

Note: data in natural logarithm. A value of 0 indicates that the Netherlands is at par with the frontier. Standard deviation of the customs-related variables. Indicators in bold are excluded from further analysis.

Table 2.1~~Table 2.1~~ provides an overview of the distance to frontier for all of the selected variables. For the six indicators at the bottom of the table, the performance of the Netherlands is (performing equally as) the best performing country. The second column shows the absolute ranking of the Netherlands for each of these variables, vis-à-vis all other countries for which data is available. The table indicates that there is room for improvement for the Netherlands in particular with respect to physical inspections, regulation related to logistics, and other official clearance procedures, but also in terms of the costs (per container) to export/import the Netherlands trails other countries.

Robustness: sign, significance and size

The indicators are subjected to three separate rounds of robustness tests. If an indicator passes these robustness checks, it will increase the reliability of the findings with respect to that indicator. From an econometric perspective, the 'ideal' variable has an effect on trade that is either uniformly positive or uniformly negative (*sign robustness*), is statistically significant from 'zero impact' (*statistical robustness*), and insensitive to the inclusion of other, related variables (*effect robustness*).

Box B: Robustness analyses

As discussed in more depth in the Annex, we ran some 200,000 regressions. Each of these regressions contained a different set of four indicators, and therefore resulted in coefficients for each of the remaining

indicators. In order to test the robustness, the indicator has to pass three tests. Table 2.2Table 2.2 presents the indicators that passed each of these tests.

- Sign robustness;

For each of the indicators, we calculated the number of times the coefficient is positive or negative. It is important that there is consistency in the sign of the coefficients. A uniform sign points in the direction of a stable relationship between the indicator and international trade flows, which can then serve as basis for further analysis. We only selected variables for which 95% of the coefficients are either positive or negative (see column 3 in Table 2.2Table 2.2[22]).

- Statistical robustness;

The second loophole for each of the indicators is statistical significance. The average coefficient should be statistically different from zero, with an applied significance level of 0.05. This is an indication of a direct connection between the indicator and bilateral trade flows, such that improvements in these indicators have an actual impact on bilateral trade flows.

- Effect robustness;

The third robustness test is slightly more technical. Each of the 200,000 regressions contained a set of four different indicators. This means that every indicator was combined with any other indicator in three different regressions. The average coefficient of these three instances (conditional mean) was then compared to the mean coefficient resulting from all regressions (grand mean). This allowed for the calculation of a response surface index calculated as the conditional mean divided by the grand mean. If this index equals one, the indicator is insensitive to the inclusion of this specific other indicator. Larger deviations imply more sensitivity. Only a small number of indicators show average deviations of less than 50% of the grand sample means, these are highlighted in blue in Table 2.2Table 2.2.

Table 2.2.   **Robustness tests of the trade facilitation indicators**

	Mean effect	Fraction Positive	Fraction Significant	Fraction Negative Significant	Fraction Positive Significant
Origin/ exporter indicators					
Cost to export deflated per container	-1.06	0.00	1.00	1.00	0.00
Documents to export number	-0.87	0.03	0.93	0.92	0.01
Ease of shipment	3.93	1.00	0.99	0.00	0.99
Overall LPI	4.36	0.99	0.98	0.00	0.97
Physical inspection	-0.22	0.05	0.91	0.89	0.02
Port/Airport supply chain - Lead time export for port	-0.61	0.00	0.99	0.99	0.00
Clearance and delivery of exports	1.03	1.00	0.98	0.00	0.98
Pre-shipment inspections	-0.41	0.01	0.94	0.94	0.00
Timeliness	2.91	0.98	0.94	0.01	0.94
Trading across border overall indicator	1.16	1.00	1.00	0.00	1.00
Destination/ importer indicators					
Clearance and delivery of imports	0.64	1.00	0.99	0.00	0.99
Cost to import deflated per	-0.50	0.00	0.98	0.98	0.00

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[22]   This means that any value above 0.05 and below 0.95 does not pass this test. A "fraction positive" below 0.05 means that more than 95% of the coefficients are negative.

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	Mean effect	Fraction Positive	Fraction Significant	Fraction Negative Significant	Fraction Positive Significant
container					
Customs Clearance procedures	0.39	0.99	0.89	0.00	0.89
Customs LPI	1.50	0.97	0.91	0.01	0.91
Documents to import number	-0.74	0.00	0.99	0.99	0.00
Ease of shipment	2.03	0.95	0.93	0.02	0.91
Number of border agencies imports	-0.28	0.01	0.91	0.91	0.00
Overall LPI	3.27	1.00	1.00	0.00	1.00
Trading across border overall indicator	0.59	0.99	0.94	0.00	0.94

The robustness analysis leads to a severe reduction in number of viable indicators for further analysis. Only the eight indicators shaded in blue pass all three tests.

It should be noted that these eight indicators may not be equally easy to address by policy. More specifically, *ease of shipment, clearance and delivery of imports, and customs clearance procedures* are based on expert surveys reflecting perceptions or opinions.[23] The degree to which a clear link between investments in customs facilities and these scores exists, is not particularly straightforward. While improvements in the perception regarding clearance procedures may contribute to larger trade flows, it is less clear how actual improvements as a result of additional investments are reflected in these perceptions.

As explained in chapter 1.3.4, panel data analysis is the preferred method of analysis. The next section therefore looks at this approach.

2.3   Linking time-series customs indicators to trade flows

As identified above, data is available for multiple years for nine indicators. This includes the required costs, time and administrative burden associated with the border compliance procedure and other logistical steps. These can all be considered barriers to trade. Streamlining, facilitating or reducing these barriers will make it easier to trade across borders. In the panel data analysis, we will focus on these indicators, three of which have been identified as robust and relevant in the cross-section analysis of sectionr 2.2. The *time to export and import* is another important factor that did not pass all the knock-out criteria in the cross-section analysis of section 2.2. but remains relevant for policy purposes.[24] Investments in areas that streamline customs procedures, for instance, have a direct impact on the time it takes to import or export a container. All nine indicators, as well as their reasons (not) to be included, are introduced in Table 2.3.

Table 2.3   Time-series indicators

Indicator	Included?	Reason to (not) be included
Documents to export	Yes	Relevant for policy purposes
Documents to import	Yes	Identified in cross-section analysis

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[23]   These three indicators are the calculated on the basis of 1000 surveys among international freight forwarders and express carriers.

[24]   More specifically, the *time to export/import* indicator did not show a sufficiently high percentage in the sign robustness test. However, the cross-section analysis of chapter 2.22.3., by its very nature, only looks at one year (2014). When we look at the entire time-period for which this variable is available, this is no longer an issue.

Indicator	Included?	Reason to (not) be included
Time to export	Yes	Relevant for policy purposes
Time to import	Yes	Relevant for policy purposes
Costs to export (deflated)	Yes	Identified in cross-section analysis
Costs to import (deflated)	Yes	Identified in cross-section analysis
Costs to export	NO	Same as deflated costs, but not adjusted for inflation
Costs to import	NO	Same as deflated costs, but not adjusted for inflation
Trading across border overall indicator	NO	This is an aggregated indicator, the inclusion of which will not yield relevant policy advice. It is better to focus on a single indicator.

The definitions of the variables included in this section are provided in Table 2.4Table 2.4. These six indicators are available for the years between 2006 and 2014, such that a panel gravity model can be used to estimate the impact. Unfortunately, in 2015 the methodology to measure these indicators changes significantly, such that it was not possible to adequately include the latest year (and future years, for that matter) in this part of the analysis.

Table 2.4   Indicators included in the panel analysis

Indicator	Description
DOCUMENTS The number of required documents to export/import	Bank documents Customs clearance documents Port and terminal handling documents Transport documents
TIME Time to export/import expressed in number of days	Obtaining all the documents Inland transport and handling Customs clearance and inspections Port and terminal handling *Does not include ocean transport time*
COSTS Costs to export/import per container, expressed in deflated USD.	All documentation Inland transport and handling Customs clearance and inspections Port and terminal handling *Official costs only, no bribes*

Source: World Bank: Trading Across Borders – Doing Business 2012[25]

Table 2.5 summarises the results for the three indicators. The coefficients can be read as elasticities, i.e. the percentage change reaction of trade to a 1 percent increase in the indicator at hand. The signs of the coefficients are as expected. Higher costs to export or import a container have a restrictive effect on trade flows. A 1 percent increase in the costs for the exporting country leads to a reduction of the bilateral trade flow of 0.4 percent. Similarly, a 1 percent increase in the costs to import a container leads to 0.15 percent less trade. Similar explanations can be given for the results for the other two indicators (time and documents).

Table 2.5   Indicator coefficients from panel gravity regression

	Costs	Time	Documents
Exporter	-0.394***	-0.765***	-0.683***
	(0.024)	(0.027)	(0.035)

[25]   Accessible here: http://www.doingbusiness.org/reports/global-reports/~/media/GIAWB/Doing%20Business/Documents/Annual-Reports/English/DB12-Chapters/Trading-Across-Borders.pdf

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	Costs	Time	Documents
Importer	-0.152***	-0.138***	-0.165***
	(0.022)	(0.023)	(0.029)

Note: Robust standard errors in parentheses. *** indicates 0.01 significance level, ** indicates 0.05 significance level, * indicates 0.1 significance level.

In order to calculate the impacts on trade from improvements in trade facilitation areas flows, we use the results from the panel gravity regression (Table 2.5~~Table 2.5~~). As before, we assume a decrease in costs per container, time to export/import and the number of documents with 5 percent. Table 2.6 illustrates what these changes imply for the Netherlands. The table present the scores of the Netherlands in the data sample on each of the indicators. For instance, a 5 percent reduction in the costs to import a 20-foot container entails that the costs drop from USD 989 to USD 939.

Table 2.6   Indicator values Netherlands in data set

	Costs	Time	Documents
Values in sample			
Exporter	$ 937.80	7 days (168 hours)	4.0
Importer	$ 988.50	6 days (144 hours)	4.0
Values with 5% cost decrease			
Exporter	$ 890.9	160 hours	3.8
Importer	$ 939.1	137 hours	3.8

Table 2.7 presents the gains in trade from an improvement in the border-cost variables (costs per container, time to export/import and the number of documents) of 5 percent.[26] The table indicates that a reduction in the cost to export of 5 percent, increases trade on average by 2 percent. Reducing the time to export or the number of documents to export increases international trade by 3.9 and 3.5 per cent, respectively. The gains in trade from lower barriers to import are smaller, approximately 0.7-0.8 percent.

Table 2.7   Economic significance: gains in trade from a 5 per cent improvement in customs-related variables (panel regression), in percent

	Impact on trade from a 5-percent improvement in indicators
Origin/ exporter indicators	
Cost to export deflated per container	2.0%
Time to export	3.9%
Documents to export number	3.5%
Destination/ importer indicators	
Cost to import deflated per container	0.8%
Time to import	0.7%
Documents to import number	0.8%

These results indicate that actions by Dutch customs aimed at (further) reducing the time and number of documents to export are expected to have a relatively high pay-off. Moreover, there is room for improvement in Dutch performance in these dimensions: distance to the frontier (i.e., the best performance) is relatively high.[27]

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26   The percentage change in trade from a 5 per cent improvement in an explanatory variable is calculated as $\frac{dT_{ij}}{T_{ij}} = e^{-0.05*\beta} - 1$, where β is the estimated coefficient. The $\beta's$ are given in Table 2. An excel file has been provided to adjust the percentages and see the implications for trade (and income).

27   See Table 2.1 in section 2.2 for Dutch distance to the frontier in customs-related dimensions.

It is interesting to look at the current performance of the Netherlands, to identify where there may be room for improvement, as achieving improvements in one indicator may be more easy than in the other. By looking at the performance of the Netherlands in each of these relevant variables vis-à-vis other countries, we can identify to what extent the Netherlands can still improve its performance. A general impression of the performance of the Netherlands is presented in Figure 2.1, which displays the 'distance to frontier' for the aggregated Trading Across Borders indicator, as calculated by the World Bank.[28] A score of 100 indicates that a country at the frontier of all of the 6 underlying variables in Table 2.3.[29] With a score of 89, the Netherlands performs relatively well compared to its immediate competitors or partner countries across the world. At the same time, improvements can still be made, such that the calculated economic gains are within reach for the Netherlands.

Figure 2.1   **Distance to frontier of the World Bank Trading Across Borders indicator for selected countries, 2014**
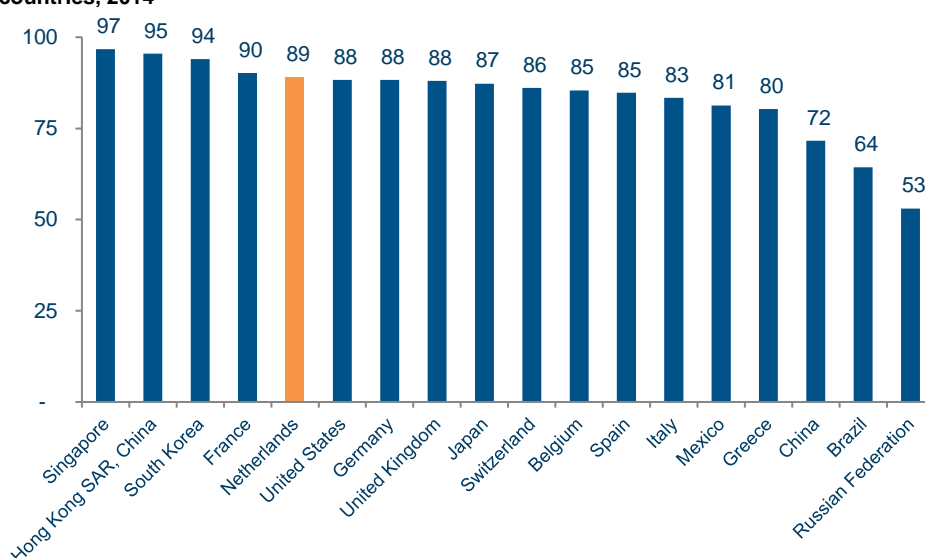
To use the results of our analysis, it is more interesting to look at the performance of the Netherlands for individual indicators. Illustrations for the costs to import/export are provided in Figure 2.2 and Figure 2.3 where the performance of the Netherlands in terms of costs per container are benchmarked against a number of competitors. This could be interpreted as a distance to the frontier, in which case lower costs identify a position closer to the frontier. In deflated US Dollars (correcting for inflation), the average cost to import a 20-foot container in the Netherlands is roughly USD 1,000. This figure is similar to Germany, and lower than Belgium, France and other EU competitors (Spain, Italy and Greece). On the other hand, the costs in Europe tend to be much higher than they are in Asian top performers (which are mentioned as 'international benchmark'). Similar conclusions can be reached for the costs to export a 20-foot container from the Netherlands.

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[28] World Bank Doing Business Indicators. Trading Across Borders – Distance to Frontier methodology.
      http://www.doingbusiness.org/data/exploretopics/trading-across-borders/frontier

[29] Time to import/export, documents to import/export, and costs to import/export.

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Figure 2.2   **Costs to import a 20-foot container expressed in deflated USD, 2006-2014.**
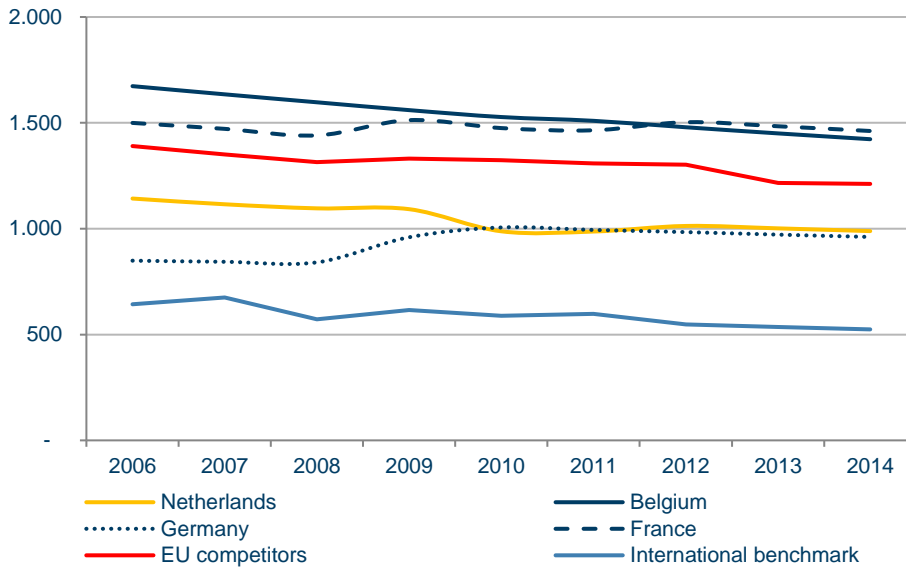
Source: World Bank: Trading Across Borders indicators between 2006 and 2014. EU competitors for the European hinterland are Spain, Italy, and Greece. International benchmark is the average cost for Singapore, South Korea and Hong Kong (data for the USA and China are only available for the last 2 years and hence excluded in this figure).

Figure 2.3   **Costs to export a 20-foot container expressed in deflated USD, 2006-2014.**
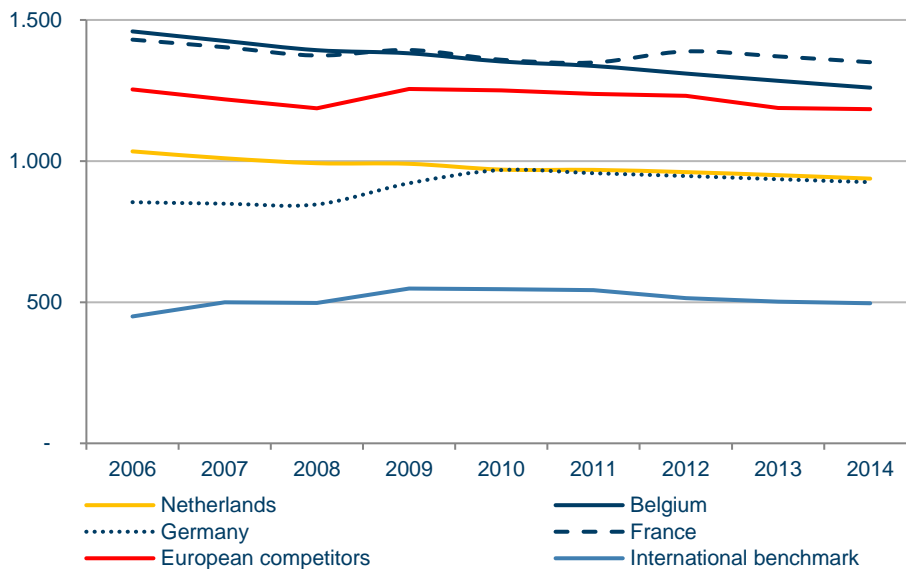
Source: World Bank: Trading Across Borders indicators between 2006 and 2014. EU competitors for the European hinterland are Spain, Italy, and Greece. International benchmark is the average cost for Singapore, South Korea and Hong Kong (data for the USA and China are only available for the last 2 years and hence excluded in this figure).

A more detailed comparison of the position of the Netherlands vis-à-vis competitors and partners is provided in Tables 2.8 and 2.9. For each of the six relevant indicators, the 2014 score is presented, as well as the distance to frontier. Higher values for the distance to frontier indicate that the country is closer to the best performing country as it reflects the percentile score of that indicator. On average, the Netherlands performs better on import indicators (Table 2.9) than it does on export indicators (Table 2.8), as the distance to frontier score is higher for the former category. Regardless of these relatively high scores, 5% improvements remain feasible.

Table 2.8   Export indicators – benchmark scores of NL with important partners and competitors, 2014

	COSTS		DOCUMENTS		TIME	
	Value	DtF	Value	DtF	Value	DtF
Netherlands	938	88,5	4	77,8	7	97,9
Rest of Europe						
Belgium	1.260	81,5	4	77,8	9	93,8
France	1.350	79,5	**2**	**100**	10	91,7
Germany	925	88,8	4	77,8	9	93,8
Greece	1.023	86,6	4	77,8	16	79,2
Italy	1.210	82,6	3	88,9	19	72,9
Spain	1.319	80,2	4	77,8	10	91,7
Switzerland	1.659	72,8	3	88,9	8	95,8
United Kingdom	1.005	86,8	4	77,8	8	95,8
Rest of World						
Brazil	2.588	52,5	6	55,6	13	84,6
China	838	90,7	8	33,3	21	68,8
Hong Kong SAR, China	576	96,4	3	88,9	**6**	**100**
Japan	825	91	3	88,9	11	89,6
Mexico	1.530	75,6	4	77,8	12	87,5
Russian Federation	2.461	55,3	9	22,2	21	68,5
Singapore	**416**	**99,9**	3	88,9	**6**	**100**
South Korea	601	95,8	3	88,9	8	95,8
United States	1.182	83,2	3	88,9	**6**	**100**

Note: DtF is distance to frontier. A score of 100 means that the country is the frontier country, whereas a score of 75 indicates that the country is at the 75th percentile, etc.

Table 2.9   Import indicators – benchmark scores of NL with important partners and competitors, 2014

	COSTS		DOCUMENTS		TIME	
	Value	DtF	Value	DtF	Value	DtF
Netherlands	989	89,0	4	84,6	6	96,8
Rest of Europe						
Belgium	1.423	81,3	4	84,6	8	93,5
France	1.462	80,6	**2**	**100,0**	11	88,7
Germany	961	89,5	4	84,6	7	95,2
Greece	1.116	86,7	6	69,2	15	82,3
Italy	1.160	85,9	3	92,3	18	77,4
Spain	1.359	82,4	4	84,6	9	91,9
Switzerland	1.440	81,0	4	84,6	8	93,5
United Kingdom	1.063	87,7	4	84,6	6	96,8
Rest of World						
Brazil	2.588	60,6	8	53,8	17	79,0
China	815	92,1	5	76,9	24	67,7
Hong Kong SAR, China	551	96,8	3	92,3	5	98,4
Japan	1.016	88,5	5	76,9	11	88,7
Mexico	1.841	73,8	4	84,6	11	88,4
Russian Federation	2.616	60,1	10	38,5	20	73,5
Singapore	**398**	**99,5**	3	92,3	**4**	**100,0**
South Korea	623	95,5	3	92,3	7	95,2

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	COSTS		DOCUMENTS		TIME	
	Value	DtF	Value	DtF	Value	DtF
United States	1.309	83,3	5	76,9	5	97,7

Note: DtF is distance to frontier. A score of 100 means that the country is the frontier country, whereas a score of 75 indicates that the country is at the 75th percentile. Etc.

2.4 Contribution of different policy dimensions

In the ToR, there was also a request to look at the contribution of four different policy dimensions of customs and their contribution to trade, more specifically, to look at the contribution of innovation, ICT performance, inspections and rely on self-regulation. There are however no clear definitions and indicators related to these four dimensions to allow for proper analysis. With the input of the Dutch customs, composite indicators were calculated to reflect these policy dimensions, as many of the trade facilitation indicators used above reflect more than one policy dimension. Additional gravity analysis has been applied to these indicators, which is presented in more detail in Annex C. The next table presents the results of this analysis.

Table 2.10   Coefficients of the confirmatory factor analysis

Policy dimension	Innovation	ICT performance	Inspections	Self-regulation
Exporter	2.658***	4.104***	3.754***	3.900***
Importer	1.547***	2.024***	1.823***	2.057***

Note: *** indicates 0.01 significance level, ** indicates 0.05 significance level, * indicates 0.1 significance level.

The interpretation of the coefficients in this table is as follows: if you improve your export innovation performance vis-à-vis other countries by 0.01 percentage point[30], the bilateral trade flow goes up by 2.66 percent. A similarly sized improvement of 0.01 percentage point on the importer side, leads to a 1.55 percent increase in additional trade.

Because of the composite nature of these indicators, the results are however difficult to interpret (e.g. what does a 0.01 percentage point improvement in ICT performance exactly means), and therefore less useful from a policy perspective. Nevertheless, from these results and from the weight attached to these four policy dimensions for each trade facilitation indicator (see Annex C), we can say that it will take investments in ICT performance first and foremost. But Dutch customs also considers measures to enable firms to rely more on self-regulation important for reducing the time to export. Thus, combining the results from our regressions with the weights given to the different indicators of trade facilitation helps to give leads for further policy actions.

2.5 From trade to income

As explained in section 1.3.5, the link between trade and income runs through an analysis of the contribution of improved trade facilitation on trade openness. Trade openness is defined as the sum of exports and imports, divided by GDP. In 2015, Dutch exports were equal to €557.9 billion, whilst imports amounted to €485.0 billion. Given a GDP of €676.5 billion, initial trade openness of the Netherlands is 154.1 per cent.

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30   Keep in mind that the scale of these variables runs from 0 to 1. A 0.01 increase therefore indicates a 0.01 percentage point improvement in this policy domain.

Applying the changes in Table 2.7[31] to Dutch exports and imports we get the changes in openness presented in Table 2.~~Table 2.~~ 11.[32] The values represent changes in percentage points: the value of 1.8 means that openness increases from 154.1 to 155.9 due to a reduction in the cost to export. Likewise, table 2.12 indicates that reducing the cost and the number of documents to import increases Dutch openness by 0.7 percentage points, i.e., from 154.1 to 154.8.

Table 2.911   Changes in Dutch openness from a 5 percent improvement in customs-related variables, percentage points

	Costs	Time	Documents
Exports	1.8	3.4	3.0
Imports	0.7	0.6	0.7

Note: a value of, e.g., 1.8 means that openness increases from 154.1 to 155.9 due to the improvement in the customs-related variable.

The effects on long-run GDP per capita levels are presented in Table 2.~~Table 2.~~12. The table illustrates that reducing the time to import raises long-run GDP per capita on average by 0.3 percent, whilst a reduction in the time to export raises long-run GDP per capita on average by 1.5 percent. The impacts for the other four dimensions are within this range. To illustrate the meaning consider the following calculation. Dutch GDP per capita in 2014 was €39,300. Assuming that this is the long-run level, an increase of 1.5 percent in GDP per capita due to trade facilitation implies an income gain per capita of €600.

Table 2.12.   Effect on long-run per capita GDP of the Netherlands a 5 percent improvement in customs-related variables

	Costs	Time	Documents
Exporters	0.8	1.5	1.4
Importers	0.3	0.3	0.3

Note: percentage of long-run GDP per capita.

Limitations

In terms of data, the analysis shown above have a number of data constraints that limit the analysis. Chief among these is the fact that only a very limited number of variables are available in proper time series, such that the preferred method of panel data analysis can only be conducted on a small number of indicators. Moreover, the value of the indicators are also affected by other elements than only customs performance, and the exact contribution of customs in each of the indicators is unknown, and even if it was known, it would be impossible to adjust these differences in the quantitative assessment of their impact on trade flows. If international organisations would start collecting custom-specific indicators, for a longer time-period, this would enhance the quality of the analysis and be more relevant from the perspective of customs authorities.

A final issue to note is that the indicators are to a large extent outcome indicators, and measure how customs can change the performance on these indicators is not always straightforward. Therefore, the identification of areas where return on investment in highest is not feasible.

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[31]   From a methodological viewpoint, the results of this analysis are most appropriate to use. Results on the impact of improvements on indicators from the cross-section analysis (2.2) and from the analysis along the four policy dimensions (2.4) have been calculated as well and shared with Dutch customs.

[32]   An important assumption is that GDP remains constant. That is, we assume that the current account balance is unaltered by changes in exports and imports in the short. This may be justified since we only calculate a once-off, short-term change in initial openness. In the long run, however, changes in exports and imports would lead to changes in the current account balance and would consequently also affect Y.

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Quantitative conclusion

All of the results presented in the above section provide an indication of the benefits of customs authorities in general, and Dutch customs in particular, on GDP and value added. Especially the results that follow from the panel analysis provide a number of insights that can be used to enhance trade flows. Investments made in the reduction of time consuming procedures, as well as lower costs that freight transporters incur when they import a standard container all have significant benefits on GDP. While exact policy advice is beyond the scope of an analysis like the one employed here, the effect between trade facilitation and trade flows are clear.

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3 A closer look at the role of customs: further insights from three case studies

3.1 Introduction

The modelling exercise in the previous chapter focused on quantifying the benefits of customs in certain policy areas and in relation to certain facilitations variables. As indicated in the first chapter, this analysis focused on the impact of efforts of customs on trade flows, and how this subsequently impacts Dutch value added. It did not specifically address the costs involved, nor did it analyse potential other benefits. In this chapter, we present three small case studies, in which we look at a specific policy of customs, and assess, to the extent possible, the benefits and costs of a specific measure to different stakeholders. We also try to establish a link with the quantitative analysis to see how certain policies can be expected to affect Dutch trade flows.

The cases have been put forward by Dutch customs and include the following:
- Case1: Air cargo operations at Schiphol Airport – The impact of SmartGate.
- Case 2: Cargo transport in the Netherlands and further – transit declarations and the revision of re-assessment procedure.
- Case 3: Parcel courier services at Schiphol Airport – The impact of VENUE.

3.2 Case study 1: Air cargo operations at Schiphol Airport – The impact of SmartGate

3.2.1 Description of the case study

As of November 2016, Dutch customs will introduce a new mechanism for inspections in air freight logistics, called Schiphol SmartGate Cargo (SSGC). The initiative was set up by Amsterdam Airport Schiphol, Air Cargo Netherlands (ACN), representing for example logistics operators, forwarders and shippers, and Dutch customs. Dutch customs coordinates with the various government bodies involved in air cargo, e.g. tax bodies, customs and agencies[33].

In this new public-private partnership, customs, other government inspection agencies and companies will cooperate closely for arranging combined inspections, which should make the process overall more safe and efficient. Three goals were put forward:
- Maintain a competitive position of the airport: speed, credibility, security and cost effectiveness.
- Ensure predictable procedures for airlines and their collaborators: speed, low costs and efficient procedures.
- Comply with EU directives and regulations regarding safety, health and reliability; while recognising the importance of speed and low costs.

These goals were translated in concrete five topics: Smart, Swift, Safe, Secure and Sustainable.

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[33] Enforcement agencies such as Royal Dutch Military Police, National Coordinator for Security and Counterterrorism, Department of Transport and the Netherlands Food and Consumer Product Safety Authority.

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- Smart: Use smart and innovative methods and means to create logistics efficiency while at the same time contribute to making the enforcement more efficient.
- Swift: Take care of predictable and efficient procedures for green cargo flows (i.e. products that only requires inspection by scanning).
- Safe: keep the cargo flows safe, and also look after the health of citizens and the environment.
- Secure: protect the cargo flows against any form of deliberate distortion.
- Sustainable: contribute to the sustainable growth of Schiphol cargo.

As the trump card of air transport is speed, the bulk of air freight shipments will be composed of so-called "time sensitive" cargo. In this category of goods, we find documents, perishables (flowers, fresh produce etc.), medicines, human organs, as well as so-called operating emergency goods: spare parts of all kinds of machinery urgently needed to avoid production losses. Worldwide operating air freight suppliers also rely on air cargo transport to be smooth, efficient and reliable.

The SSGC required a change in procedures, software and hardware. Most modern technology in scanning and detection equipment is implemented. The goal is to achieve a safer, faster, more efficient and cheaper cargo handling as well as a close collaboration concerning monitoring, speed, safety and reliability within the air cargo chain. The major change is the holistic view on the air cargo sector and the public-private cooperation.

Coordination

Customs is responsible for surveillance and coordination of governmental supervision on air cargo. As such, the Customs office specifies and realises the program from an enforcement perspective. The perspective is seen in eight concrete elements: the customs control centre, the joint inspection centre, ULD scanning, centralized risk analysis, remote scanning, mobile scanning, nuclear detection and SmartGate ICT.

Customs Control Centre | **Joint Inspection Centre** | **ULD Scan** | **Centralized Risk Analysis**

Remote Scan | **Mobile Teams / Scan** | **Nuclear Detection** | **SmartGate ICT Solutions**

The first step was setting up an adequate **IT infrastructure** and digital communication. This allows for a **centralized risk analysis**, with less distortion in the supply chain and more efficiency in the enforcement.

The second step is related to the **enforcement perspective** and is seen in both the scanning operations (Remote, mobile, Unit Load Device (ULD) and nuclear) as the customs control building (comprising the customs control centre and the Joint Inspection Centre):
- Scanning is organised in different ways. A considerable investment budget was earmarked to new mobile scanning equipment, an ULD scanning device and thorough nuclear detection gates. The major breakthrough for logistics actors is the opportunity to invest in a remote scanning device (investment between 100-150,000 EUR). This device saves them the trip of bringing the cargo asked to be checked to a central customs location. The device is installed in

their own warehouse and is connected via the ICT platform to the customs officials. There is also the option of a mobile team visiting the logistics site in case the logistics player does not invest in a remote scan, or when the remote scan is not sufficient for customs.

- In order to perform physical checks, a dedicated facilitation is built: the Joint Inspection Centre (JIC). This Centre will be opened by the end of November. This facilitation will house enforcement and inspection agencies, which will collaboratively work towards a so-called one-stop-shop model: integrating checks that will be performed during off-peak periods in the logistics flow as much as possible. Cargo can be tracked and checked throughout the whole logistical chain, which determines the nature of supervision. In addition, the remote scanning and mobile scanning vehicles will be used.

Objective of the case study

Goal of this case study is to identify the benefits for customs and logistics when the SSGC approach will be fully introduced. Some of the aspects of the broader strategy are implemented already. With stakeholders we categorise the impacts on the logistics chains, also looking at effectiveness and efficiency. Given that SSGC is not fully implemented yet, we will assess both realised and expected costs and benefits.

In a second step, we will link the benefits identified in the qualitative analysis, to the findings of the quantitative analysis, looking at how SSGC affects the indicators that matter in particular for facilitating trade.

3.2.2   Costs and benefits of the measure for different stakeholders

In the framework of this first case study interviews were held with representatives of Dutch customs and logistics agents.[34] The interviews led to a clarification on the concrete implementation aspects of the SmartGate approach. In general, it has been proven difficult to quantify the concrete impacts, costs and benefits, of the policy change. Given the variety of initiatives under the SmartGate umbrella it is difficult to link impacts to one of the changes.

In general, the attitude towards the SmartGate initiative is very positive. Both customs and logistics representatives assess the cooperation between public and private bodies on making Schiphol cargo more competitive as unique and very valuable. By logistics agents the partnership, in which a selection of logistics agents can contribute to customs tasks (e.g. by buying and operating a remote scanner device), is considered a major breakthrough. This perception is shared by Dutch customs.

This mutual trust results in win-win for both. The logistics companies have more reliable and efficient procedures, leading to more reliable and smoother supply chains. The Dutch Customs can focus efforts more on selective flows. It should be noted that the trust given to logistics agents (e.g. by self-scanning) is under strict conditions, customs checks and required AEO certification[35]. This continuous review of compliance is felt by the logistics sector, and is regarded as a positive aspect of the approach.

Before the benefits of SmartGate can be realised, a number of small and large scale investments had to be made. The major investment categories were ICT, scanning equipment (mobile),

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[34] By 31 October 3 interviews were held: with Renate De Vries (Douane), Kester Meijer (KLM CARGO), and Willem Homburg (Rhenus Logistics). An additional interview with Maarten Blasse (KLM CARGO) is pending. Contacts have been provided by the Dutch customs administration.

[35] The AEO concept is based on the Customs-to-Business partnership introduced by the World Customs Organisation (WCO). Traders who voluntarily meet a wide range of criteria work in close cooperation with customs authorities to assure the common objective of supply chain security and are entitled to enjoy benefits throughout the EU. More than half of the Schiphol logistics agents have an AEO certification.

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vehicles, nuclear gates and the buildings (customs control centre and the Joint Inspection Centre). These investments were mainly made at the customs side. Quantitative information is limited however.

The logistics sector had to invest considerably less. To have access to the digital communication (e-freight, e-link) minor investments were made in software and ICT infrastructure. These investments are regarded as a prerequisite to compete in the current supply chain market. Only a minor share of the operators has invested in a remote scanner. It cannot be concluded now if this is related to stringent requirements, heavy investments (100-150,000 EUR per scanner) or lack of awareness. Follow-up is needed to see if more agents invest in an in-house remote scanner or not.

The main impacts on costs and benefits are summarised in the table on the next page. Some more aspects of relevance mentioned during the interview are added in the table.

Table 3.1 : **Costs and benefits case 1 - The impact of SmartGate**

	Actor
	Customs
Costs	Investment categories are: • +++ Hardware: ICT, scanning equipment (mobile), vehicles, nuclear gates and the buildings (customs control centre and the Joint Inspection Centre). • ++ Software: ITC and training of customs officials.
Benefits	Benefits are: • +- More focused inspections on a risk analysis basis is expected to lead to better compliance. Safety and security increased as more targeted risk assessments are made. • +- Efficiency gains in the customs operations are observed, with more predictable and efficient procedures, as less travel is needed. ICT is used at the benefit of efficiency. • +- The investment result in a contribution of customs to sustainable growth of the Schiphol cargo volumes. • +++ Dutch customs is leading in the use of smart and innovative methods and means, and is respected therefore by the air cargo community at Schiphol airport.
Other aspects	The Joint inspection centre will be a big step forward for all government bodies. The customs officials are only one of the government representatives located there. So impacts of this One Stop Shop (OSS) approach are broader than customs-only.
	Logistics agents
Costs	Investment categories are: • +- Hardware: ICT, scanning equipment (100-150,000 EUR per scanner). • +- Software: ITC software for digital communication, for safe sending of remote scanning, and training of staff .
Benefits	• +++ Logistics efficiency: Less chance of disturbed logistics process leads to efficiency gains in the logistics chain. • +++ The closing of an air cargo flight is shorter and shorter to take off (now 2/3 hours before departure). • +- The new approach gives air cargo supply chains to grow volume without equally having to increase the number of staff, leading to enhanced competitiveness. • +- The staff currently present at the logistics side is experiencing less administrative burden and can focus more on service and value added logistics.
Other aspects	• The Joint inspection centre will be a big step forward for all if this also means that the remote scanning images will be read during the night. Currently the remote scanning equipment can only be used optimally till 22h at night. Then, a visual check is still needed as the customs officials at the other side finish their duty at 22h. This still causes delay in the supply chain, especially in peak times. Peak times in air cargo are in the evening and at night. • The logistics sector is sometimes confronted with a lack of understanding of local customs officials of the new approaches.

3.2.3 Link to the quantitative analysis

As noted in the discussion on outcomes, there is very limited quantitative information on the costs and benefits related to SSGC. To make a link to the quantitative analysis as presented in chapter 2, we need to make a link between the observed benefits of this case and the trade facilitation indicators that have been identified as relevant in explaining trade flows.

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The results of the panel analysis are the preferred estimates provide indicators that are useful to work with in the context of this case study. Next to documents to import and costs to import/export, this analysis looked at one additional indicator which seems very relevant in the context of this case study: time to import/export.

The main challenge is again to estimate the extent of improvement as a result of SmartGate in the indicator. No estimates are available. If we assume that roughly half a day is saved as a result of SSGC, then trade is expected to expand by 1.2 percent as demonstrated in the table below. This number significantly overestimates the impact on total Dutch trade flows, as the main time savings are achieved only on those goods that are actually inspected. Based on WB data for the Netherlands, only 2.8 percent of traded products are inspected physically, and 1.6 percent is faced by multiple inspections. In addition, the fact that SSCG only applies to air cargo even further reduces the share of trade which will benefit from this increase. Thus, while the benefits may be significant for the companies active in air cargo, the macro level results are expected to be minor in relative terms, more in the area of 0.01 percent.[36]

Table 3.~~22~~3   Results of a reduction in time (half a day) on Dutch trade flows

Time	
Assumed change	-8.33%
Coefficient of indicator	-0.138
Impact on trade	+1.16%
Corrected impact on trade (relevance for total trade flows)- rough estimate	0.01%

3.3   Case study 2: Cargo transport in the Netherlands and further – transit declarations and the revision of re-assessment procedure

3.3.1 Description of the case study

A transit declaration is needed when goods under customs control (customs goods) have to be transported onwards within the European Union. A transit declaration may be necessary in following situations[37]:

- The goods will be declared not in the country of entry into the EU, but in a different EU Member State (e.g. where the buyer is located). For example, goods destined for Germany are brought in through Rotterdam in the Netherlands to be transported onwards by barge, or goods for Paris are shipped through Rotterdam and are then forwarded by trucking.
- Goods are being transported to a bonded warehouse (i.e. a customs warehouse distributing on an EU or more international scale). So, the final destination of some of the goods that are brought to these warehouses will be an EU member state, but some will be re-exported out of the EU. There are two reasons to store the goods in a bonded warehouse instead of in a regular warehouse.
    i.   Import duties: If the goods were to be imported, import duties would have to be paid. Since duties are not refunded upon export, storing goods in a bonded warehouse obviates the need to pay import duties.
    ii. Payment of import duties is postponed: If goods liable to import duties will be stored for a long time before they are used or resold, the payment of import duties can be postponed until the goods are actually needed.

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[36] Here we assume that air cargo presents one third of total imports in the Netherlands.
[37] Based on: http://www.macocustoms.com/duty-exemptions

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A permit for a bonded warehouse will only be granted if the goods administration is at a very advanced quality level.

- The goods will be subject to inward processing relief (IPR). Manufacturers in the EU can apply for IPR authorization. This gives them the option to declare the goods on import without paying import duties. However, the manufacturer has to prove that the manufactured goods that incorporate the imported goods will be exported again out of the EU.

Dutch customs wants to make sure that the imported goods will reach an EU destination where the logistics operator will declare the import, export, storage, etc. It is needed to ensure that all taxes that are due will be paid. This means a strict check of the value, volume and condition of the imported goods and final declaration when paying duties will be compared with the advance declaration, to ensure none are imported without fulfilling customs duties. For example, when goods being transported under a transit declaration are stolen, damaged or lost, customs can claim all duties on the total volume of goods declared at first when importing, under the assumption that the goods have been brought into free circulation, without paying taxes. To monitor this, Dutch customs has established the New Computerized Transit System (NCTS).

The New Computerized Transit System (NCTS) for tracking transit goods

When goods are imported via Rotterdam's port, an NCTS or transit declaration is made up in Rotterdam. The declaration contains data about the goods so they can be clearly identified if needed. Since the system is fully computerized and the place of destination is mentioned in the declaration, a message is sent to the customs authorities at the final destination. These officials, therefore, "expect" these goods. While in transit, the goods are accompanied by a print-out of the transit declaration. This print-out has a barcode on it, which identifies the Movement Reference Number (MRN number) under which the declaration is known in the NCTS. When goods arrive at the final destination (i.e. in principle the customs office of destination reported into NCTS), both the T-document and the goods concerned should be presented at this customs office of destination. In practice, the logistic services providers report the arrival of the goods and the T-document and thus ending the transit procedure by sending an electronic message to the customs office of destination. This message is relayed to the customs office of departure (in this example the customs office in Rotterdam).

A customs broker who wants to issue a transit document has to give customs a bank guarantee, so Customs can always claim duties, VAT, etc. if necessary. This guarantee will be released once all goods have arrived at their final destination, or revoked when the final number of goods does not match with the declared goods at the import to NCTS.

Implications for customs – revision of re-assessment procedure

Given the digitalisation of the transit documents, via NCTS[38], it has become easier for Dutch Customs to assess the differences between the amount of goods initially declared and the final declaration of import, when the duties are paid. The transparency in the supply chain was used to have more focused enforcement, and assessment procedures.

Re-assessment procedure

The procedure is initiated 7 days after which the transit (T1 and T2) should have been ended and closed. The customs declarant in the Netherlands then receives an electronic message signalling the transit was not closed (IE 140). After this message, the regulation stipulates the declaring party to have 28 days to react in an electronic way (IE 141). The re-assessment procedure is managed by a specialised customs department in Heerlen (NL). When the declaring party does not reply, Customs will raise a customs invoice

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[38] New Computerised Transit System, abbreviated NCTS, and also called Transit, is a customs declaration and communication system

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(UTB) for the amount of import duties and other duties and taxes due on importation of the transported goods into free circulation of the EU. If the customs declarant doesn't pay the customs invoice (UTB), the procedure to revoke the deposit (bank guarantee) is started.

The verification and re-assessment process typically does not affect the physical logistics process, but does raise compliance and administrative issues, both at the side of Dutch Customs and at the side of the importers or their logistics service providers involved, in particular when final declarations deviate from advance declarations. Often, minor issues related to the original and final customs declaration can be perfectly explained by the actors in the supply chain, for instance change in weight of fresh fruit as a result of degradation, or a delayed declaration due to computer downtime.

When significant proof of good intentions is provided, customs would then approve the declaration, and release the guarantee, rather than customs officials *simply* fine the actor without an intention to avoid future conflicts (fines are levied then via the so-called UTB[39]).

The problem faced until recent is, however, that it was difficult to provide documentation accepted as evidence by customs authorities, in particular as, since 2012, Dutch Customs appeared to operate more strictly as a result of the EU instructions that only official documentation could be considered as evidence, while for instance e-mail information sent by the declarant could not. This change resulted in much higher numbers of re-assessments leading to an UTB.

Table 3.4 provides the number of transit declarations. The number of Dutch customs declarations for extra-EU customs transport (T1 via NCTS) and the number of customs declarations for intra-EU customs transport (T2 via NCTS) are shown in the next table. It is observed that, after a strong decline between 2008 and 2012, the number of declarations ex-EU is gradually growing again. The number of internal-EU customs transport fluctuates per year.

Table 3.3 Number of total T1 and T2 declarations Dutch Customs

	Number of declarations extra-EU (=T1)	Number of declarations intra-EU (=T2)
2007	2.777.059	202.100
2008	3.140.482	206.334
2009	2.844.178	202.100
2010	2.496.794	356.259
2011	2.406.538	358.354
2012	2.158.442	201.158
2013	2.182.896	208.926
2014	2.241.939	217.728

Source: Based on FENEX Stemmingsbarometer, 2015 (Data provided by NCTS)

The topic of this case is a change in policy by Dutch customs regarding transit transport. Observing the increasing number of declarations leading to UTB in 2012, and the fact that e-mail evidence could not be considered, from 2014 on, Dutch customs started to collaborate with the agents responsible for the customs T1 and T2 declaration (in almost 90% of the declarations, this is the logistics service provider) in a more cooperative way. The approach does not result in a less strict enforcement, but in a more equal and transparent relationship between customs and that transport sector. In particular, observing repetitive failures made in advance declarations, Dutch customs will

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[39] UTB stands for Uitnodiging Tot Betaling; translation is Invitation To Pay

opt more often for the solution to start up a trajectory where the wrong-doing actor is helped to fulfil his declarations in a correct way in the future.

The effect on the number of declarations ending in a re-assessment procedure is significant: the number dropped from a total of 41 thousand cases in 2012, to 25 thousand cases in 2014. Data is provided in the next table. Even more important is the number of cases solved in the re-assessment procedure, which rose from 90% in 2012 to 94% in 2014. The table below shows that the number of cases ending with UTB is decreasing at a more rapid pace than the total number of T1 and T2 declarations in re-assessment.

Table 3.~~445~~   Data on re-assessment procedure Dutch Customs

	Number of declarations in re-assessment procedure	Re-assessments as % of total T1 declarations **	Number of declarations leading to UTB*	Number of UTB cases solved in re-assessment procedure
2007	62,371	2.2%	9,215	85%
2008	57,501	1.8%	7,785	86%
2009	43,975	1.5%	4,616	90%
2010	46,335	1.9%	6,037	87%
2011	42,845	1.8%	3,757	91%
2012	40,764	1.9%	4,244	90%
2013	28,807	1.3%	2,688	91%
2014	25,054	1.1%	1,405	94%

* Could be UTB, shift to other actor or a fine

** Re-assessments taken as a share of total T1 as those are considered the most relevant for re-assessment efforts

Source: FENEX Stemmingsbarometer, 2015

From the above data, it is thus concluded that the more collaborative approach has resulted in a rise in the number of cases solved, a decrease in the number of 'UTB' and a decrease of total number of re-assessment procedures.

3.3.2   Costs and benefits of the measure for different stakeholders

In the framework of this case study interviews were held with representatives of Dutch customs and logistics agents.[40] The interview with expeditors branch organisation FENEX, provided concrete data on the views of their members on the re-assessment procedure. The next figure shows that the FENEX members have a positive view on the procedure. In the 2015 survey, only 3% had a negative view, which is significantly lower than the 7% in 2012.

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[40] Interviews have been held with Dirk Middelkoop and Jos Peters (both from the Dutch customs administration), Dominique Willems(FENEX)), and Godfried Smit (EVO). Contacts have been provided by the Dutch customs administration.

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Figure 3.1   **Observations of FENEX members on re-assessment procedure Dutch Customs**
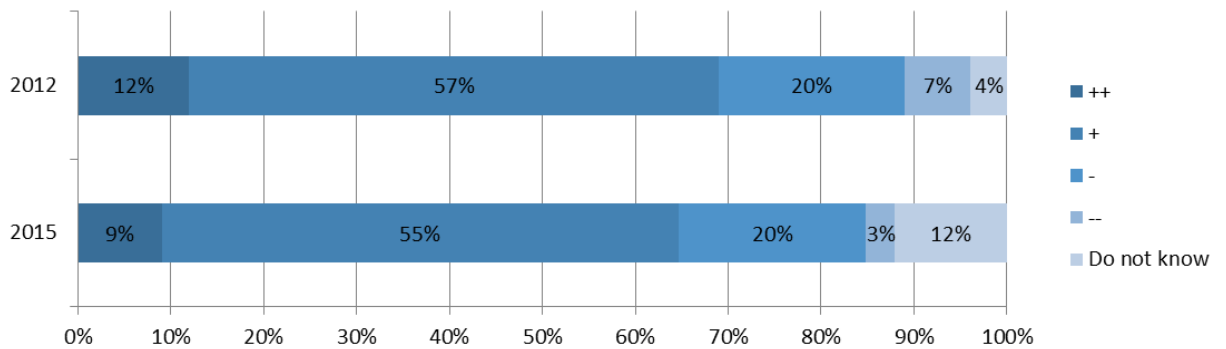
Source: FENEX Stemmingsbarometer, 2015

The change did not only result in a more positive view of FENEX members on the customs service, but lead also to a change in administrative costs. Conclusions are grouped in the next table. From the interviews, the following variables influence the costs and benefits:

- Large vs small companies: large players for whom the international logistics process is their core business (big-4 logistics operators, large multinationals) usually have dedicated units with expertise and may even have AEO status, while smaller companies that only incidentally deal with imports and exports may not have such skills. A growing role of e-trade is expected to contribute to a growing expertise level also among smaller firms;
- Whether the shipment involves excise duties or not. For the majority of shipments, only VAT applies;
- The complexity of the composition of the shipment, which creates larger risks of errors in the information provision.

One of the interviewees referred to a case example of a company that was identified as having a large number of re-assessments, although in relative terms these were considered very low (less than 1%). This suggests that the targeted support to companies could be further refined as to optimise its effectiveness.

Table 3.~~556~~   **The expected impact of the revision of re-assessment procedure**

	Actor
	Customs
Costs	Investment categories are: • +++ Investments in better use of the NCTS system (Klantenbeelden system). • ++ Investment in training of people. • +- Investments in building a relationship with the logistics sector, and giving guidance on avoiding future disputes.
Benefits	Benefits are: • The creation of joint understanding between logistics sector and customs officials. • The approach allows customs to focus efforts based on customer profiles. Less time is lost with following up cases in which additional proof solves the dispute. • The administrative burden of the re-assessment procedure is lower, so customs officials can focus more on the important infringements. • The total number of cases and share of total cases solved increased. • The total tax income collected increases
Other aspects	Customs can offer a more focused and faster procedure, in which the administrative burden for them and also for the logistics sector decreases. This cost saving results in a better performance of customs and a quicker follow op. Quicker follow up results in better collection

	Actor
	Customs
	of duties and UTB's (e.g. long procedures could result in bankruptcy of the agent, resulting in non-collection of the UTBs).
	Logistics agents
Costs	No investments required at the private sector side
Benefits	• Learning how to improve their declarations, leading to less mistakes, resulting in less re-assessment procedures, and thus lower administrative costs. Customs gives feedback on past wrongdoing, resulting in less non-compliance. • A better relationship allows logistics agents to provide additional information to NL customs, avoiding a long dispute, less appeals and less delays.
Other aspects	Customs is providing a better service to the logistics sector, and is rewarded for this effort. The total time on transit is not changed, nonetheless the reliability of the logistics chain increased; which is of equal importance. The logistics sector appreciates the change in relationship, from enforcement to a partnership.

3.3.3 Link to the quantitative analysis

The interviews and available literature on this case study indicate that the largest benefits are to be had through better cooperation between businesses and customs authorities, leading to less (financially costly) mistakes. While the resulting savings in time for follow-up activities of customs could be quantified (data are not available at the moment), there is no clear impact on any of the identified relevant indicators to make a link to the quantitative assessment.

3.4   Case study 3: Parcel courier services at Schiphol Airport – The impact of VENUE

3.4.1 Description of the case study

Background: developments in the CEP market

The market of express parcel services (abbreviated CEP or Courier, Express and Parcel) has grown rapidly over the past decade. The market has been historically segmented on either the destination ('domestic' vs. 'international services'[41]), on the shipper/receiver (B2B, B2C and gradually C2C) or on the time pressure for delivering the shipment (e.g. 'post', 'standard' and 'express').

While initially there were only a handful of players active in the international CEP business (such as DHL, UPS and FedEx), nowadays the number of transport suppliers has expanded significantly. While the CEP market used to be solely oriented to companies (B2B) and to 'express', a large share of its growth is currently realised in the B2C and C2C segments, largely driven by Internet-based trading and commerce. New players entered these B2C and C2C markets, who fiercely compete with the original B2C express players. Still, only a minor number of these new players compete in all of the CEP market segments.

CEP transport is typically organised via hub-and-spoke networks, in which major EU cargo airports and trucking (under airway bill) play a big role. These typical CEP networks concentrate cargo flows in a couple of EU hubs. In the evening or night, cargo is flown in to the air cargo hub from various

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[41] International should be regarded as origin or destination out of the EU. Domestic is encompassing CEP transport within an EU Member state, or between two EU Member states.

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EU origins (or via trucking under airway bill). After crossdocking, the cargo leaves the hub again to the final destination (EU or further), where it is to be delivered to the receiver in the morning. The global air freight supply chain is organized in offering a global door-to-door service. Hence, short transhipment times at the air cargo hubs, and smooth transition at the origin and destination platforms, are crucial for successfully operating a hub-and-spoke network.

Some of the EU Member States capture a large share of the international CEP flows, as they host either an air cargo hub, or a large European distribution centre (EDCs). West-European countries like the Netherlands, Belgium and Germany are known for hosting such EDCs. Air cargo hubs are less numerous. For CEP shipments, Leipzig (DHL hub), Köln (UPS/FedEx hub), Liege (TNT hub) are the most important air cargo hubs. The airports of Frankfurt, Charles de Gaulle/Paris, Schiphol and London Heathrow are the top-4 European air cargo airports. With 1.7 million tonnes, Schiphol is the 3rd largest air cargo hub in the EU (Airport Council International, April 2016[42]). In total, about 14.4 million tonnes of air freight (both national and international) was carried through airports within the EU-28 in 2014.

Volumes by air cargo are growing. The quantity of goods transported by air in the EU-28 was 27.1% higher in 2014 than it had been five years earlier in 2009 (although it should be noted that the level in 2009 was particularly low as the financial and economic crisis was at its strongest that year). Nevertheless, the overall air cargo market grows, and the CEP market is growing at an even more rapid pace. A.T. Kearney's latest study[43] on the current state of the European CEP industry[44], identified following key market trends:

- The 'international' CEP market continues to surpass the 'domestic' CEP markets in number of shipments. Imports from Asia to Europe grow rapidly in number of shipments.
- Both 'domestic' and 'international' markets show stronger growth rates in the 'standard' market segment than in 'express'. During the recent economic downturn, transport solutions with extensive transit times, at less expensive rates, saw greater rise in demand from shippers than the more expensive 'express' market segment.
- The CEP players responded in return with improved service levels for their 'standard' option. Well-established, the major networks have shifted their focus from only 'express' to the growth segments like B2C and standard. Major networks are expanding services but the top-six account still for over 90 % (e.g. DHL, FedEx, UPS) of the 'international express' market. B2C remains a main growth driver for them.
- Weight per shipment (WpS) remains stable. After a rise, this trend did not continue. Weights for overall domestic shipments and international express remain stable at 10 kilograms and 7 kilograms, respectively.

A.T. Kearney's market outlook report sees the CEP market growth to endure. Expectations for the coming years are strong, with +6% p/a growth expectations. Revenues for CEP transport suppliers grow at a slower pace than volumes though. This growth trend can be further substantiated via some growth drivers and trends:

- The main driver is **E-commerce** which will lead to alternative transport demands. EU consumers increasingly look for and resort to online purchases, notably across borders, there is a growing need for a delivery system that meets their expectations and works smoothly. E-commerce sellers enter this B2C market as specialists in segments with high levels of returned shipments, such as textiles and apparel. More returns mean more shipments.

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[42] Based on: http://www.aci.aero/Data-Centre/Monthly-Traffic-Data/Freight-Summary/12-months
[43] AT Kearney Europe's CEP Market: Growth on New Terms; Retrieved via: https://goo.gl/Z9z4kq
[44] Based on more than 500 interviews with industry executives and research on company performance in 16 European countries

- Secondly, the share of **E-commerce from Asia** to Europe is booming. This new flow is mainly consisting of B2C and C2C shipments, characterised by a low value and with a higher risk of being counterfeited products. Examples of these sellers are Alibaba, TaoBao, Mini in the box and Ebay. While International B2C is expected to gain importance for the standard segment, this new trade will also have an influence on domestic EU shipments. The number of service agents active in this market is expected to rise; resulting in a dual market with big networks and niche players.
- While these new CEP players have so far not managed to threaten the dominance of well-established players still dominating the B2B, there appears to be a consolidation in the continually growing volumes of the **B2C-focused** logistics **players**. The B2C market will remain an important CEP segment, but is expected to be outgrown soon by the B2B segment. This segment requires a different logistics and customs organisation, as B2C is accountable for the growth of more but smaller and less-valuable shipments.

Implications for customs – the VENUE application

The growing volumes in the CEP market, combined with the stronger growth in the B2C market, leads to numerous challenges for logistics networks and Dutch customs. The B2C market is known for a low compliance concerning accurate customs declaration documents. Main issues are:

- Incomplete Harmonized System Codes (HS Code). Almost 90% of the -22 EUR value shipments lacks a (correct) HS code. And the -22 EUR segment represents almost 60% of all parcel shipments at Schiphol airport[45].
- Inaccurate value information.
- Missing invoice.
- Wrongfully completed status (e.g. 'gift').

Given the large flow of CEP shipments, it was proven to be impossible to ask logistics agents to complete these inaccurate customs declaration documents as it would severely affect their key performance indicator of delivery speed. To address this, in the past, Dutch customs developed an arrangement for dealing with the customs notification, tailored to the four main CEP players operative at that time (DHL, TNT, UPC and Fedex) and Post NL. This system (named 'Blauwdruk') allowed these operators to pre-announce (through a manifest) shipments, on the basis of which Dutch customs then selects parcels for inspection, while other parcels are at the same time released. The same mechanism applies for export shipments, but then with different value thresholds. The information requirements for the manifest are lower than for traditional cargo (e.g. at first, no HS code is required; a clear description of the product suffices). For imports above EUR 22 and exports above EUR 1000, the remaining information needed to be supplied afterwards (in AGS). For packages with lower values, not additional information is required.

As the market evolved and new entrants providing CEP services emerged, Blauwdruk did not provide a level playing field, as the new players did not have access to this system. Dutch customs was criticized by the EU oversight. In fact, new EU regulation which also require changes, the Union Customs Code (UCC), entered into force in May 2016. Until the new rules apply (UCC has transition periods for implementing new systems until the end of 2020) the Dutch custom administration recently implemented a policy change, i.e. extending the Blauwdruk regime principles to become equally accessible to other CEP players, now under the name VENUE. This change should contribute to accommodate the growth in e-commerce, while removing inequalities in the market, by setting a level playing field. This setup of open access to VENUE for all actors

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[45] In 2015 roughly 3.3 million customs declaration lines were made, of which 1.2 mil. represented a shipment value of less than 22 EUR. Nevertheless, of the 7.5 billion EUR value of the total 2015 Dutch **import**, the less than 22 EUR shipment segment represented only a value of 170 mil. EUR. In 2015, the segment of -1000 EUR value per **export** shipment represented only 360 mil. EUR on a total of 15 billion EUR. (Based on interview, H. Bosch of Dutch Customs).

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was approved by EU regulation of 22/12/2015, but only till the 3rd quarter of 2019. One interviewee remarked, however, that competition between the 'big-4' and smaller players is not really relevant as each new operator typically targets specific niche segments, and e-commerce is seen as a different market than traditional CEP.

The system is currently being implemented and is thus a temporary system. Customs is already making changes into the Dutch customs declaration system AGS in the framework of UCC, and some of the changes expected to be operational from February 2017 onwards provide similar benefits as what VENUE offers.[46] Currently, 12 companies applied for permit applications to use VENUE, of which 5 are the legacy CEP actors.

Goal of this case study is to identify the changes made to the notification arrangements, and to categorise the impacts at logistics chains, the adaptation to the new market dynamics and effectiveness and efficiency.

3.4.2 Costs and benefits of the measure for different stakeholders

In the framework of this first case study interviews were held with representatives of Dutch customs and CEP agents.[47] The VENUE system is not operational yet, and the identification of benefits are therefore mainly based on expectations, not on actual observations. The Dutch customs administration thinks that the number of applications will not increase much further above the current 12. The fact that VENUE will be a temporary system expected to be in place until 2019 and that in February changes will be made to the regular system of declaration (AGS) that will partly offer similar benefits may cause some companies ,not to apply for a permit.

The interviews led to the understanding that whether or not using VENUE provides benefits depends on a range of factors, notably:
- Parties already entitled to using Blauwdruk effectively may not see any changes for their own operations, as the principle functionalities of VENUE are the same as Blauwdruk. This was confirmed in the interview with DHL who is already using Blauwdruk for a long time. Other interviewees, however, see VENUE as a possible (temporary) solution for the risk of unavailability (down time) of the AGS system.
- Whether the CEP operator has AEO status. If so, it can already pre-declare shipments and Dutch Customs can do pre-selection for inspection, so that time savings of Blauwdruk/VENUE are smaller than if the operator does not have AEO status.
- The relative importance of small shipments for CEP companies, as the main benefits are for small shipments.
- Whether the tax exemption for shipments below the value threshold of € 22 will remain in place or not. It is understood that the European Commission is reconsidering this.
- How the operator currently has organised its customs reporting process. In most cases, this is largely automated, so that after integration with VENUE, operating costs will not change very much. If administrative systems will get more automated in the future, the effort of customs declaration will further decrease, thus also reducing the added value of a system like VENUE.

Other factors hampering the smooth use of Blauwdruk / VENUE raised by operators are related to the basis in the value of goods considered. Values of C2C shipments may not be known, or not be

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[46] http://www.nieuwsbladtransport.nl/Nieuws/Article/ArticleID/50742/ArticleName/PakkettenSchipholkrijgensnelledouaneafhandeling

[47] Interviews have been held with Han Bosch (Dutch customs) en Ronald van Engelshoven (DHL Global forwarding). Interviews with DHL Express, ViaChina Europe and Your Cargo Contact are pending.

provided correctly by the sender. In general the limit of € 22 is considered quite low and most shipments are above this amount.

Typically, CEP operators are not owners of the cargo, but are authorised representatives who can deliver customs declaration on behalf of their clients. However under VENUE the direct representation status does not apply, according to an interviewee.

Interviewees indicate that having the Blauwdruk facility – and its extension VENUE provides a competitive advantage of CEP shipping via Schiphol instead of the UK (where a similar system exists, with a higher threshold of about € 40, but where every shipment has to be notified) or Germany (where VAT is to be paid on all imports). For new entrants, VENUE would provide an opportunity to compete with UK based CEP players. One interviewee reports that various UK agents are anxiously awaiting the availability of VENUE so that they can re-route part of their shipments to Schiphol, indicating that the application provides a logistics competitiveness benefit for the Netherlands. Also interest of major shippers from the US and China is reported by interviewees, suggesting that a growth boost could be generated once the application is in use.

Table 3.~~6~~67   Costs and benefits – The expected impact of VENUE

Actor	
Customs	
Costs	Investment categories are: • +- Small investments in setting up and implementing system for providing permits to interested players. • +- Investments in IT infrastructure. • ++ Investment in training of people to use the system.
Benefits	Benefits are: • The creation of a level-playing field. Dutch customs gives all actors in this CEP market access to the VENUE system. • The system allows customs to focus efforts based on risk analysis profiles.
Other aspects	Customs was advised to work more on internal awareness raising on these policy changes. Not all customs officials are always fully aware of the changes.
Logistics agents	
Costs	Investment categories are: • +- Software connection to AGS customs declaration system+ testing. • For the current users of Blauwdruk, investments are really minor.
Benefits	• ++ Shorter time required for providing shipment information to Dutch customs, leading to cost savings. However the size of this saving is argued by some interviewees, as the level of automated declarations is already high and expected to increase further. • ++ Immediate clearance of parcels not selected for inspection. This increases the logistics chain's speed, which has proven to be of high importance to attract CEP volumes to Schiphol airport. • +++ Level playing field – in particular benefiting the new entrants vis-à-vis the big-4 (and postal service) that already worked with Blauwdruk. The viewpoint of the new entrants to the CEP market was not documented yet, interviews will be undertaken at a later stage (see table above). • ++ Strengthened competitive position vis-à-vis neighbouring countries in the CEP market.
Other aspects	Customs was advised to work more on internal awareness raising on these policy changes. Not all customs officials are always fully aware of the changes.

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Actor
Customs
Some companies prefer to work via AGS given they do not wat to disturb their logistics efficiency by using two systems.

3.4.3 Link to the quantitative analysis

Similar to the discussion in case study 1, the main challenge of quantifying the impact of these improvements on trade flows is twofold. Firstly, we have to determine the impact this change has on the relevant indicator (documents necessary to import), the second challenge is to determine the size of the trade flows that are actually affected. We assume that for one of the documents that each importer has to submit (note; four documents are required in the Netherlands in 2014), the workload is reduced by 40%. Therefore, the score attached to the indicator *documents to import* in the Netherlands changes from 4 to 3.6. This is a reduction of 10 percent, leading to a trade flow increase of 1.2 percent if total trade is affected. However, based on interviews, the total value of express parcels with a value below EUR 22 is a mere EUR 14 million. Expressed a share of total imports, this is only 0.0028 percent. Therefore, the impact of VENUE on total trade becomes negligible.

Table 3.~~77~~8 **Estimated impact on trade of a reduction in the documents to import**

Documents to import	
Assumed change	-10%
Coefficient of indicator	-0.165
Impact on trade	1.17%
Corrected impact on trade (relevance for total trade flows)- rough estimate	0.00003 %

4 Summary and conclusions

Link between customs performance and trade

To analyse the link between customs and trade, we applied gravity analysis, which is an econometric method used (among others) to explain trade flows. Trade flows between countries are explained by various factors (e.g. distance, common language, etc.), and for the purpose of this study we also included variables related to the efforts of customs. A large degree of variation within each of these variables is needed to ensure that the relation between customs performance and trade flows is robust, and this implies that data are needed for a large number of countries and/or years. Relative performance of the Netherlands vis-à-vis other countries is of importance, as differences in performance could lead to a diversion of trade flows (e.g. logistic companies will increase activities at the port of Antwerp at the expense of the port of Rotterdam).

The challenge of this study was to identify those indicators related to customs performance. Based on international sources, we compiled a database of over 250 trade facilitation indicators. With the help of Dutch customs, these were filtered and **32 indicators were identified as indicators that the customs administration could (directly) influence.**

We analysed the contribution of these individual trade facilitation indicators to trade flows. The aim of this analysis was to establish what variables are worth focusing on in order to increase international trade of the Netherlands. We therefore assessed a) the extent to which progress can be made in the performance of the indicators (comparing the position of the Netherlands relative to the best score in the sample, the so-called 'distance-to-frontier') and b) the robustness of the relationship between customs-related indicators and trade. The results of this analysis is that seven indicators are of particular importance. On the exporter side, these are cost to export (deflated per container) and ease of shipment. On the import side these are clearance and delivery of imports, customs clearance procedures, cost to import (deflated per container), number of documents to import and ease of shipment.

It should be noted that not all of these variables maybe easy to influence. Notably the indicators ease of shipment, clearance and delivery of imports, and customs clearance procedures are based on expert surveys, reflecting perceptions or opinions. While improvements in the perception regarding clearance procedures may contribute towards larger trade flows, these indicators only capture the perception of such improvements. It is less clear how actual improvements as a result of additional investments are reflected in these perceptions, which makes these indicators less useful from a policy perspective.

For a number of indicators (cost to import/export and documents to import), time series data is available. This allows for panel analysis, which is from a methodological view a preferred method of analysis. [48] Data is available for multiple years for nine indicators, six of which are used in our analysis. This includes the required costs, time and the number of documents, for each indicator both on the import and export side. Table 4.1 presents the results of the analysis. **The results from panel gravity analysis for individual customs-related indicators show that an improvement of five percent in one of the customs-related indicators (i.e. a reduction in the costs, time**

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[48] Econometrically, this has clear advantages over identification on the basis of differences across countries (cross section analysis), which has been used for the other variables. Time series analysis come closer to the ideal situation of a natural experiment in which one can more safely argue that one only identifies the impact of – in this case – customs, keeping everything else constant.

and documents) will increase trade flows by 0.7 to 3.9 percent, depending on the indicator where the improvement takes place.

Table 4.1 **Economic significance: gains in trade from a 5 per cent improvement in customs-related variables (panel regression), in percent**

	Impact on trade from a 5-percent improvement in indicators
Origin/ exporter indicators	
Cost to export deflated per container	2.0%
Time to export	3.9%
Documents to export number	3.5%
Destination/ importer indicators	
Cost to import deflated per container	0.8%
Time to import	0.7%
Documents to import number	0.8%

In the ToR, there was also a request to look at the contribution of four different policy dimensions of customs and their contribution to trade, more specifically, to look at the contribution of innovation, ICT performance, inspections and rely on self-regulation. The relative importance of these four policy dimensions for each of the trade-facilitation indicators has been assessed by Dutch customs. On the basis of this information, ICT performance seems to matter most for nearly all indicators. first and foremost (50 percent). But Dutch Customs also considers measures to enable firms to rely more on self-regulation important for reducing the time to export (30 per cent).

Link between customs-related performance and Dutch income

So far, we have been looking at the relationship between customs performance as reflected by different trade facilitation indicators and trade flows. The aim was also to identify the impact on Dutch income. We assess this on the basis of a link between trade openness and GDP per capita, based on findings in existing literature. Trade openness is defined as the sum of exports and imports, divided by GDP. The effects on long-run GDP per capita levels are presented in Table 4.2. **The table illustrates that reducing the time to import by 5 percent raises long-run GDP per capita on average by 0.3 percent, whilst a reduction in the time to export raises long-run GDP per capita on average by 1.5 percent. The impacts for the other indicators are within this range.**

Table 4.2 Effect on long-run per capita GDP of the Netherlands a 5 percent improvement in customs-related variables

	Costs	Time	Documents
Exporters	0.8	1.5	1.4
Importers	0.3	0.3	0.3

Note: percentage of long-run GDP per capita.

Additional insights from the case studies

We conducted three case studies in which we looked at a specific policy of customs, and assessed to the extent possible, the benefits and costs of a specific measure to different stakeholders. These case studies showed the both the costs and benefits or certain measures are not systematically collected and quantified. Therefore, a detailed analysis was not possible. What did become clear is that Dutch customs is finding ways to improve the situation both for Dutch business and for its own organisation. In addition, it is clear that Dutch customs is bound by EU rules, which means that there are limits to their flexibility in finding solutions.

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We also tried to establish a link with the quantitative analysis to see how certain policies can be expected to affect Dutch trade flows, where we analysed how the policy (change) could lead to a change in one of the indicators identified as relevant for this analysis (notably the costs, time and documents associated with imports or exports). For two out of the three case studies, the policy measure only applied to a very small part of trade (e.g. only for the share of imports that will be inspected, or only for e-commerce imports with a value below EUR 22), and the impacts are therefore much smaller than the above results would suggest. Nevertheless, it would be interesting for the Dutch custom administration to make an assessment of the expected change in the relevant indicators of a certain policy measure, as this will provide some insights into the likely effect on trade.

Policy implications

This study gives an overview of the long-run effects from the performance on customs-related indicators on trade and GDP per capita. Information to assess how investments or actions by Dutch Customs affect performance in these specific customs-related indicators is not available at present as shown in the case studies, and will also depend on the specific investment made. Therefore, we cannot assess how the budget of Dutch Customs should be invested so as to yield the largest increase in trade and/or GDP.

Nevertheless, **the results of this study can help policy makers in assessing different policy options**. For example, in times of budget cuts, different policy options can be compared with respect to their expected impact on trade, by looking at how certain policy measures will change the indicators presented above. But also in times of investments, different policy options can be compared with respect to the extent to which they may lead to increased trade flows. **The current performance of the Netherlands vis-à-vis its competitors on the identified indicators may be an interesting starting point to identify areas for improvement.** Based on our findings in the case studies, more systematic data collection, regarding the costs, but also benefits (notably with respect to the identified indicators in this study) of certain measures, would be useful, in order to facilitate better institutional learning.

In the ToR, there was also a request to look at the contribution of four different policy dimensions of customs and their contribution to trade, more specifically, to look at the contribution of innovation, ICT performance, inspections and rely on self-regulation. The relative importance of these four policy dimensions for each of the trade-facilitation indicators has been assessed by Dutch customs. On the basis of this information, ICT performance seems to matter most for nearly all indicators., suggesting that improving performance in ICT may yield significant increase in trade. Thus, **combining the results from our regressions with the weights given to the different indicators of trade facilitation may also help to give leads for further policy actions.**

Annex A: Trade facilitation indicators

The table below provides an overview of all trade facilitation indicators collected. The ones in bold have been selected for the analysis, as these are the indicators can be directly influenced by customs.

Description	Variable	Scale	Source
Time limit for deciding such appeals	app_time	(0) no; (1) yes.	GEAS
Control delegation at the national level	incoo_control	(0) no delegation of control to customs agency; (1) delegation of control to customs agency.	GEAS
Requirement for clearance by a third-party customs broker	proc_clear_third	(0) yes; (1) sometimes; (2) no.	GEAS
Adjustment of working hours of Customs personnel to commercial needs	proc_work	(0) no adjustment; (1) partially; (2) entirely.	GEAS
Laws and regulations are published in official journal	info_laws	(0) no; (1) yes.	GEAS
New and changes to existing regulations are for comment prior to implementation	info_laws_comment	(0) no; (1) sometimes; (2) yes.	GEAS
Full description of all Customs procedures is available	info_proc_full	(0) no; (1) yes.	GEAS
Customs accepts and processes electronically the data required for release of shipments in advance of their actual arrival so that they can be released either prior to or immediately after arrival	proc_prearr_electr	(0) no; (1) sometimes; (2) yes.	GEAS
Shipments released in time for (electronic advance release): letters and documents	proc_release_docs	(0) not applicable (n.a.); (1) a.m.; (2) same day delivery (s.d.).	GEAS
Shipments released in time for (electronic advance release): non-dutiable items	proc_release_nondut	(0) not applicable (n.a.); (1) a.m.; (2) same day delivery (s.d.).	GEAS
Shipments released in time for (electronic advance release): dutiable items	proc_release_dut	(0) not applicable (n.a.); (1) a.m.; (2) same day delivery (s.d.).	GEAS
Time elapsed between post-arrival data submission and shipment release: letters and documents	proc_postarr_docs	Number of maximum hours	GEAS
Time elapsed between post-arrival data submission and shipment release: non-dutiable items	proc_postarr_nondut	Number of maximum hours	GEAS
Time elapsed between post-arrival data submission and shipment release: dutiable items	proc_postarr_dut	Number of maximum hours	GEAS
For shipments arriving by air, Customs inspects and	proc_air_facility	(1) transfer required;	GEAS

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Description	Variable	Scale	Source
releases goods at the operator's facility or requires their transfer to another facility		(2) both; (3) operator's facility.	
What is the primary basis for physical examinations of shipments?	proc_insp_basis	(1) all or virtually all goods are inspected; (2) inspector discretion; (3) random examinations; (4) automated risk assessment.	GEAS
Multiple inspections (inspections by agencies other than Customs)	proc_insp_other	(0) yes; (1) sometimes; (2) no.	GEAS
Multiple inspections (inspections by agencies other than Customs) - cause of delay in delivery	proc_insp_otherdelay	(0) yes; (1) sometimes; (2) no.	GEAS
Application of a de minimis regime that allows goods the value of which does not exceed a certain amount to be exempted from duties and taxes	proc_mindut	(0) no; (1) yes.	GEAS
Application of a de minimis regime that allows goods the value of which does not exceed a certain amount to be exempted from duties and taxes - amount in USD	proc_mindut_usd	Amount in USD	GEAS
Application of a de minimis regime that allows goods the value of which does not exceed a certain amount to be exempted from duties and taxes - goods subject to simplified procedures e.g. consolidated release/clearance	proc_mindut_simp	(0) no; (1) yes.	GEAS
Application of a de minimis regime that allows dutiable goods the value of which does not exceed a certain amount to be exempted from formal declaration procedures	proc_mindecl	(0) no; (1) sometimes; (2) yes.	GEAS
Application of a de minimis regime that allows dutiable goods the value of which does not exceed a certain amount to be exempted from formal declaration procedures - amount in USD?	proc_mindecl_usd	Amount in USD	GEAS
Limit on the time within which Customs is allowed to demand additional duties or re-delivery of goods	proc_post_add	(0) no; (1) yes.	GEAS
Limit on the time within which Customs is allowed to demand additional duties or re-delivery of goods - number of days	proc_post_addtime	Number of days	GEAS
Regularly use reference prices or other arbitrary uplifts to invoice values	proc_refprice	(0) yes; (1) no.	GEAS
Customs rules or procedures that restrict the operation of express delivery services	proc_express	(0) yes; (1) no.	GEAS
Customs rules or procedures that restrict the	proc_express_clear	(0) yes;	GEAS

Description	Variable	Scale	Source
operation of express delivery services - express clearance		(1) no.	
Customs rules or procedures that restrict the operation of express delivery services - on-site Customs facilities	proc_express_facility	(0) yes; (1) no.	GEAS
Customs rules or procedures that restrict the operation of express delivery services - EDI links	proc_express_EDI	(0) yes; (1) no.	GEAS
Customs rules or procedures that restrict the operation of express delivery services - value added network operators	proc_express_network	(0) yes; (1) no.	GEAS
Customs rules or procedures that restrict the operation of express delivery services - other	proc_express_other	(0) yes; (1) no.	GEAS
Extent of implementation and speed of court rulings in commercial matters (IPD A6020)	app_dur_com	0 = very slow decision-making; 4 = fast decision-making.	IPD
Equality of treatment between national and foreign actors in commercial disputes (IPD A6023)	app_equal	0 = very little equality; 4 = stong equality.	IPD
Cooperation between agencies on the ground (IPD A501)	incoo_agen	0 = no cooperation; 4 = strong cooperation.	IPD
Targeted stakeholders (IPD A5002)	involve_stake	0 = no consultation; 4 = very strong consideration.	IPD
Overall OECD TFI	tfi_total	0 - 22 with 22 being the best	OECD TFI
Advance rulings: Prior statements by the administration to requesting traders concerning the classification, origin, valuation method, etc., applied to specific goods at the time of importation; the rules and process applied to such statements.	adv	0 - 2 with 2 being the best	OECD TFI
Length of time for which the advance ruling is valid (duration)	adv_dur	(0) < 2 years; (1) >= 2 years/none	OECD TFI
Length of time for which the advance ruling is valid (duration) - OECD only	adv_durOECD	Number of years	OECD TFI
Issuance of advance rulings	adv_iss	(0) not issued; (1) issued.	OECD TFI
Percentage of advance rulings issued within the published time period	adv_iss_time	% of rulings	OECD TFI
Number of advance ruling requests (total)	adv_nr	Number of requests	OECD TFI
Publication of Advance Rulings of general interest	adv_pub_interest	(0) not published; (1) publicly available.	OECD TFI
Publication of average issuance time	adv_pub_iss	(0) not published; (1) publicly available.	OECD TFI
Publication of average issuance time - OECD only	adv_pub_issOECD	Number of days	OECD TFI
Refusal to issue or revocation of advance ruling are motivated	adv_ref_mot	(0) not motivated; (1) motivated.	OECD TFI
Number of advance ruling requests on origin	adv_req_origin	Number of requests	OECD TFI

Description	Variable	Scale	Source
Number of advance ruling requests on tariff classification	adv_req_tariff	Number of requests	OECD TFI
Possibility to request a review of an advance ruling or its revocation / modification	adv_rev	(0) not possible; (1) possible.	OECD TFI
Appeal procedures: The possibility and modalities to appeal administrative decisions by border agencies.	app	0 - 2 with 2 being the best	OECD TFI
Administrative appeals per year	app_admin	Number of appeals	OECD TFI
Appeals introduced by traders resolved in favour of Customs or other border agencies	app_cust	% of appeals	OECD TFI
Availability of information on the motives of the administration's decisions	app_info_meet	(0) no info; (1) publicly available.	OECD TFI
Judicial appeals per year	app_jud_nr	Number of appeals	OECD TFI
Appeal procedures	app_proc	(0) no possibility of judical appeal; (1) possibility of a judical appeal.	OECD TFI
Publication of information on procedural rules for appeal - OECD only	app_pub_procOECD	(0) no appeal mechanism for custom matters available; (1) appeal mechanism available and explained in customs code.	OECD TFI
Publication of information on procedural rules for appeal	app_pub_procOTHER	(0) no appeal mechanism explained; (1) only explained in the relevant legislation; (2) info available on website.	OECD TFI
Appeals introduced by Customs or other border agencies resolved in favour of traders	app_trader	% of appeals	OECD TFI
Formalities - Automation: Electronic exchange of data; automated border procedures; use of risk management.	aut	0 - 2 with 2 being the best	OECD TFI
Availability of full-time (24/7) automated processing for Customs agencies	aut_24/7	(0) not available; (1) available.	OECD TFI
Export declarations cleared electronically	aut_decl_exp	(0) < 30 percentile of sample; (1) 30 - 70 percentile of sample; (2) > 70 percentile of sample.	OECD TFI
Import declarations cleared electronically	aut_decl_imp	(0) < 30 percentile of sample; (1) 30 - 70 percentile of sample; (2) > 70 percentile of sample.	OECD TFI
Digital certificates and signatures are in place	aut_dig	(0) no use of electronic signature; (1) use of electronic signature.	OECD TFI

Description	Variable	Scale	Source
IT Systems capable of accepting EDI and exchanging data electronically	aut_it_EDI	(0) systems not ready of EDI; (1) in process of implementation; (2) systems ready for EDI.	OECD TFI
Percentage of procedures that can be done electronically (out of the total number of import/export/transit procedures)	aut_proc_electr	n/a	OECD TFI
Procedures that can be expedited electronically - OECD only	aut_proc_electrOECD	(0) < 30 percentile of sample; (1) 30 - 70 percentile of sample; (2) > 70 percentile of sample.	OECD TFI
Use of Risk Management	aut_risk	(0) none; (1) process of implementation; (2) implemented.	OECD TFI
Formalities - Documents: Simplification of trade documents; harmonisation in accordance with international standards; acceptance of copies.	doc	0 - 2 with 2 being the best	OECD TFI
Use of copies	doc_copy	(0) not accepted; (1) accepted with exceptions; (2) accepted.	OECD TFI
Copies in cases of electronic lodging	doc_copy_lodg	(0) not accepted; (1) accepted with exceptions; (2) accepted.	OECD TFI
Number of documents for import - According to Customs	doc_nrcust_imp	Number of documents	OECD TFI
Percent of procedures that accept copies	doc_proc_copy	% of procedures	OECD TFI
International Standards compliance	doc_stand	(0) None of the 3 Conventions ratified; (1) 1 of the 3 Conventions ratified; (2) At least 2 Conventions ratified.	OECD TFI
International Standards compliance - OECD only	doc_standOECD	(0) Less than 3 of the 5 Conventions ratified; (1) At least 3 of the 5 Conventions ratified; (2) All 5 Conventions ratified.	OECD TFI
External border agency cooperation: Co-operation with neighbouring and third countries.	excoo	0 - 2 with 2 being the best	OECD TFI
Alignment of procedures and formalities with other neighbouring countries at border crossings	excoo_align_proc	(0) not aligned; (1) aligned.	OECD TFI
Alignment of working days and hours with other neighbouring countries at border crossings	excoo_align_work	(0) not aligned; (1) aligned.	OECD TFI
Joint controls with other neighbouring countries at	excoo_control	(0) none;	OECD TFI

Description	Variable	Scale	Source
border crossings		(1) joint controls; (2) shared border post.	
Exchange programmes at the international level (external cooperation)	excoo_exchange	(0) none; (1) neighboring countries; (2) neighboring and third countries.	OECD TFI
International Coordination	excoo_int	(0) low; (1) medium; (2) high.	OECD TFI
Development and sharing of common facilities with other neighbouring countries at border crossings	excoo_share	(0) not developed and shared; (1) developed and shared.	OECD TFI
Fees and charges: Disciplines on the fees and charges imposed on imports and exports.	fee	0 - 2 with 2 being the best	OECD TFI
Fees for Customs services during normal working hours	fee_cust	(0) there are fees; (1) there are no fees.	OECD TFI
Evaluation of fees and charges	fee_eva	(0) there are fees; (1) there are no fees.	OECD TFI
Evaluation of fees and charges - OECD only	fee_evaOECD	(0) calculated on AVE basis; (1) some fees on AVE basis; (2) not calculated on AVE basis.	OECD TFI
Publication of Fees and Charges	fee_pub	(0) not published; (1) published in paper; (2) published digitally.	OECD TFI
Total Fees collected (number - diversity) - OECD only	fee_totalOECD	Number of fees	OECD TFI
Fees Transparency	fee_trans	(0) no info; (1) not all fees or charges are accounted for; (2) info on all fees and charges.	OECD TFI
Governance and impartiality: Customs structures and functions; accountability; ethics policy.	gov	0 - 2 with 2 being the best	OECD TFI
Publication of an Annual Customs Report	gov_ar	(0) no annual report; (1) insufficient publication; (2) suffient annual report.	OECD TFI
Internal systems audit function	gov_audit	(0) no audit system; (1) audit system established and empowered.	OECD TFI
Establishment of a code of conduct	gov_code	(0) no code of conduct; (1) code of conduct published.	OECD TFI
Efficient internal communication about policies and procedures	gov_com_internal	(0) no arrangement; (1) arrangements in place.	OECD TFI
Ethics Policy	gov_ethics	(0) no ethics policy;	OECD TFI

Description	Variable	Scale	Source
		(1) ethics policy in various agencies; (2) ethics policy and helpdesk.	
Clear provisions for the financing of the Customs administration	gov_fin	(0) no info; (1) set out in legal provision and publicly available.	OECD TFI
Effective sanctions against misconduct	gov_sanct	(0) sanctions not published; (1) code of conduct establishes sanctions.	OECD TFI
Clearly established and transparent structures and functions	gov_structure	(0) not publicly described; (1) publicly described.	OECD TFI
Implementation and transparency of sanctions against misconduct	gov_trans	(0) no publicly available info; (1) type and penalty on misconduct available.	OECD TFI
Transparency and proportionality of non-compliance penalties	gov_trans_pen	(0) no publicly available info on non-compliance penalties; (1) systems transparent and balanced.	OECD TFI
Internal border agency cooperation: Co-operation between various border agencies of the country; control delegation to customs authorities.	incoo	0 - 2 with 2 being the best	OECD TFI
Cooperation between agencies on the ground at the national level (internal cooperation) - OECD only	incoo_agen_groundOECD	(0) no cooperation; (1) cooperation on documents or physical controls; (2) cooperation on documents and physical controls.	OECD TFI
Cooperation between agencies at the national level (internal cooperation) - OECD only	incoo_agenOECD	(0) no cooperation; (1) cooperation on documents or physical controls; (2) national legislation encourages cooperation.	OECD TFI
Control delegation at the national level - OECD only	incoo_controlOECD	n/a	OECD TFI
Regular meetings are held (including training seminars)	incoo_meet	(0) no meetings; (1) meetings to improve cooperation; (2) meetings incl. the private sectors.	OECD TFI
Information availability: Publication of trade information, including on internet; enquiry points.	info	0 - 2 with 2 being the best	OECD TFI
Information on Appeal procedures on internet	info_app	(0) no; (1) yes; (2) yes and with guidance documents.	OECD TFI
Possibility to ask questions to Customs	info_cust	(0) no;	OECD TFI

Description	Variable	Scale	Source
		(1) yes.	
Possibility to ask questions to Customs - OECD only	info_custOECD	(0) no; (1) yes; (2) yes, 24/7.	OECD TFI
Publication of rate of duties	info_duties	(0) not on website; (1) info on website.	OECD TFI
Publication of rate of duties - OECD only	info_dutiesOECD	(0) not on website; (1) info on website; (2) info regularly updated.	OECD TFI
Establishment of Enquiry Points	info_enquire	(0) there are no enquiry points; (1) there is at least one.	OECD TFI
Customs online feedback	info_feed	(0) no possibility; (1) telephone and human contact; (2) online means.	OECD TFI
Use of a specific hub for professional users	info_hub	(0) yes; (1) no.	OECD TFI
User manuals	info_man	(0) none; (1) manual available.	OECD TFI
Procedures published at least xx days before entry into force	info_proc	(0) no interval between the publication of new or amended trade related laws and regulations, and their entry into force; (1) interval between the publication of selected trade related laws and regulations, and their entry into force; (2) interval between the publication of new or amended trade related laws and regulations, and their entry into force.	OECD TFI
Procedures of border agencies	info_proc_agen	(0) no download possibility; (1) some forms and documents available.	OECD TFI
Procedures of border agencies - OECD only	info_proc_agenOECD	(0) no download possibility; (1) some forms and documents available; (2) all forms available.	OECD TFI
Information on import and export procedures	info_proc_impexp	(0) not enough info available; (1) enough info available.	OECD TFI
Information on import and export procedures - OECD only	info_proc_impexpOECD	(0) not enough info available; (1) enough info available;	OECD TFI

Description	Variable	Scale	Source
		(2) summaries, guides and other available.	
Procedures published at least xx days before entry into force - OECD only	info_proc_newOECD	Number of days	OECD TFI
Publication of necessary information on advance rulings	info_pub_adv	(0) not displayed on customs website or only available in relevant legislation (Customs Code); (1) specific page on customs website; (2) online request procedure.	OECD TFI
Publication of Agreements with any country or countries relating to the above issues	info_pub_agree	(0) no info; (1) info available on website.	OECD TFI
Publication of agreements with third countries relating to the above issues - OECD only	info_pub_agreeOECD	(0) no info; (1) info available on website; (2) incl. topic-specific annotations.	OECD TFI
Publication of decisions and examples of customs classification	info_pub_class	(0) none; (1) publicly available.	OECD TFI
Publication of decisions and examples of customs classification - OECD only	info_pub_classOECD	(0) none; (1) publicly available; (2) displayed on customs website.	OECD TFI
Publication of judicial decision examples	info_pub_dec	(0) no examples published; (1) examples on websites.	OECD TFI
Internet publication of applicable legislation	info_pub_int	(0) no info; (1) relevant legislation on website; (2) quick reference and user guide.	OECD TFI
Publication of Penalty provisions for breaches of import and export formalities	info_pub_pen	(0) no info; (1) no info but relevant legislation; (2) info on dedicated page.	OECD TFI
Establishment of a national customs website	info_web	(0) none; (1) official website; (2) relevant info in one of the WTO languages.	OECD TFI
Quality/User friendliness of the research/help function of the Customs website (Customs website - search function: number of positive matches to keywords searches: 'appeal', 'import procedures', 'penalty', 'advance ruling', 'classification' and 'fees')	info_web_user	(0) < 2 hits; (1) >= 2 hits; (2) > 4 hits.	OECD TFI

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Description	Variable	Scale	Source
Involvement of the trade community: Consultations with traders.	involve	0 - 2 with 2 being the best	OECD TFI
Adoption of public comments	involve_com	(0) not taken into account; (1) taken into account.	OECD TFI
Consultations between traders and government	involve_cons	(0) no consultations; (1) specific consultations; (2) regular consultations.	OECD TFI
Number of Consultations	involve_cons_nr	Number of consultations	OECD TFI
Publication of drafts	involve_draft	(0) not published; (1) available before entry into force; (2) trade community involved when drafting.	OECD TFI
Targeted stakeholders - OECD only	involve_stakeOECD	(0) < 2 stakeholder groups involved; (1) > 3 stakeholder groups involved; (2) > 4 stakeholder groups involved.	OECD TFI
Formalities - Procedures: Streamlining of border controls; single submission points for all required documentation (single windows); post-clearance audits; authorised economic operators.	proc	0 - 2 with 2 being the best	OECD TFI
Authorized operators' benefits (Benefits considered: deferred payment of duties, taxes, fees and charges; use of comprehensive guarantees or reduced guarantees; low rate of physical inspections; low documentary and data requirements; a single Customs declaration for all imports and exports in a given period; rapid release time; clearance of goods at the premises of the AO)	proc_ao_ben	(0) < 2 positive replies; (1) 2 - 4 positive replies; (2) > 4 positive replies.	OECD TFI
How long it takes to obtain AO certification	proc_ao_cert	Number of days	OECD TFI
Authorized operators as a percentage of total traders	proc_ao_perc	% of operators	OECD TFI
Annual percentage of trade handled by Authorized operators	proc_ao_trade	% of trade	OECD TFI
Implementation of Pre-Arrival Processing	proc_arr	(0) not implemented; (1) implemented.	OECD TFI
Elimination of pre-shipment inspection	proc_elim_preship	(0) required; (1) not required.	OECD TFI
Elimination of Pre-Shipment Inspection - OECD only	proc_elim_preshipOECD	(0) required; (1) none required on tariff classification; (2) not required.	OECD TFI

Description	Variable	Scale	Source
Physical inspections as regards perishable versus non-perishable goods	proc_insp_perish	(0) not allowed for fast track; (1) accelerated controls.	OECD TFI
Percent of physical inspections - OECD only	proc_inspOECD	n/a	OECD TFI
Percentage of Post-Clearance Audits (PCAs) carried out (out of the total of yearly transactions)	proc_pca	n/a	OECD TFI
Percent of Post-clearance Audits (PCAs) carried out - OECD only	proc_pcaOECD	% of PCAs	OECD TFI
Percent of Pre-arrival Processing	proc_prearr	% of pre-arrival processing	OECD TFI
Publication of Average Clearance Time	proc_pub_clear	(0) not in consistent manner; (1) in consistent manner on periodic basis.	OECD TFI
Percent of releases prior to final determination and payment of Customs duties	proc_release_preduties	% of releases	OECD TFI
Separation of release from final determination and payment of Customs duties	proc_sep_duties	(0) none; (1) restricted to AO; (2) yes (with guarantee).	OECD TFI
Treatment of perishable and non-perishable goods concerning the separation of release from clearance	proc_sep_perish	(0) no preferential treatment; (1) preferential treatment.	OECD TFI
Single Window	proc_single	(0) no single window; (1) single window in process; (2) single window.	OECD TFI
Clearance Time - OECD only	proc_time_clearOECD	n/a	OECD TFI
Electronic Submission of Air Cargo Manifests	aut_air	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Electronic submission of Customs declarations	aut_declare	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
E-Payment of Customs Duties and Fees	aut_epay	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Banks and insurers retrieving letters of credit electronically without lodging paper-based documents	aut_letcredit	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Electronic Application and Issuance of Trade Licenses	aut_license	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Electronic Application and Issuance of Preferential Certificate of Origin	aut_pco	(0) not implemented; (1) Pilot stage/partially	UNESCAP

Description	Variable	Scale	Source
		implemented; (2) Fully implemented.	
Electronic Application for Customs Refunds	aut_refund	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Customs Authorities limit the physical inspections of transit goods and use risk assessment	aut_risk_trans	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Electronic Submission of Sea Cargo Manifests	aut_sea	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Transit facilitation agreement(s) with neighbouring country(ies)	excoo_agree_transit	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Engagement in trade-related cross-border electronic data exchange	excoo_exchange_data	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Electronic exchange of Certificate of Origin	excoo_exchange_origin	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Electronic exchange of Sanitary & Phyto-Sanitary Certificate	excoo_exchange_sps	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Recognised certification authority	gov_auth_cert	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
National Trade Facilitation Committee	gov_committee	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Laws and regulations for electronic transactions	gov_elctr	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Advance publication/notification of new regulation before their implementation	info_pub_law	(0) not implemented; (1) Pilot stage/partially	UNESCAP

Description	Variable	Scale	Source
		implemented;	
		(2) Fully implemented.	
Establishment and publication of average release times	info_release	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Internet connection available to Customs and other trade control agencies at border-crossings	proc_agen_int	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Supporting pre-arrival processing for transit facilitation	proc_arr_trans	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Expedited shipments	proc_exped	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Pre-arrival processing	proc_pca_yn	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Post-clearance audit	proc_prearr_yn	(0) not implemented; (1) Pilot stage/partially implemented; (2) Fully implemented.	UNESCAP
Cost to export Border compliance	exp_bord_cost	Cost in USD	WB DB
Time to export Border compliance	**exp_bord_time**	**Number of hours**	**WB DB**
Cost to export per container old methodology	**exp_costcontainer_old**	**Cost in USD**	**WB DB**
Cost to export deflated per container old methodology	**exp_defcostcontainer_old**	**Cost in USD**	**WB DB**
Cost to export Documentary compliance	exp_doc_cost	Cost in USD	WB DB
Documents to export number old methodology	**exp_doc_num_old**	**Number of documents**	**WB DB**
Time to export Documentary compliance	exp_doc_time	Number of hours	WB DB
Time to export old methodology	exp_time_old	Number of days	WB DB
Cost to import Border compliance	imp_bord_cost	Cost in USD	WB DB
Time to import Border compliance	**imp_bord_time**	**Number of hours**	**WB DB**
Cost to import per container old methodology	**imp_costcontainer_old**	**Cost in USD**	**WB DB**
Cost to import deflated per container old methodology	**imp_defcostcontainer_old**	**Cost in USD**	**WB DB**
Cost to import Documentary compliance	imp_doc_cost	Cost in USD	WB DB
Documents to import number old methodology	**imp_doc_dum_old**	**Number of documents**	**WB DB**
Time to import Documentary compliance	imp_doc_time	Number of hours	WB DB

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Description	Variable	Scale	Source
Time to import old methodology	imp_time_old	Number of days	WB DB
Trading across border overall indicator (trend break with changing methodology from 2015 onwards)	**tab_overall**	**0 - 100 with 100 being the best**	**WB DB**
Overall business environment (Changes in the Logistics Environment)	business_env_change	% of respondents answering improved or much improved in the last 3-4 years	WB LPI
Customs clearance procedures (Changes in the Logistics Environment)	**clear_cust_change**	**% of respondents answering improved or much improved in the last 3-4 years**	**WB LPI**
Incidence of corruption (Changes in the Logistics Environment)	**corrupt_change**	**% of respondents answering improved or much improved in the last 3-4 years**	**WB LPI**
Other official clearance procedures (Changes in the Logistics Environment)	**other_gov_change**	**% of respondents answering improved or much improved in the last 3-4 years**	**WB LPI**
Private logistics services (Changes in the Logistics Environment)	priv_services_change	% of respondents answering improved or much improved in the last 3-4 years	WB LPI
Regulation related to logistics (Changes in the Logistics Environment)	**reg_change**	**% of respondents answering improved or much improved in the last 3-4 years**	**WB LPI**
Telecommunications and IT infrastructure (Changes in the Logistics Environment)	telco_infra_change	% of respondents answering improved or much improved in the last 3-4 years	WB LPI
Trade and transport infrastructure (Changes in the Logistics Environment)	transport_infra_change	% of respondents answering improved or much improved in the last 3-4 years	WB LPI
Air transport (Competence and Quality of Services)	air_comp	% of respondents answering high/very high	WB LPI
Consignees or shippers (Competence and Quality of Services)	consign_comp	% of respondents answering high/very high	WB LPI
Customs brokers (Competence and Quality of Services)	customs_bro_comp	% of respondents answering high/very high	WB LPI
Customs agencies (Competence and Quality of Services)	customs_comp	% of respondents answering high/very high	WB LPI
Freight forwarders (Competence and Quality of Services)	freight_for_comp	% of respondents answering high/very high	WB LPI
Health/SPS agencies (Competence and Quality of Services)	health_SPS_comp	% of respondents answering high/very high	WB LPI
Maritime transport (Competence and Quality of Services)	maritime_comp	% of respondents answering high/very high	WB LPI
Other border crossing-related government agencies (Competence and Quality of Services)	other_gov_comp	% of respondents answering high/very high	WB LPI

Description	Variable	Scale	Source
Quality/standards inspection agencies (Competence and Quality of Services)	qual_stand_agen_comp	% of respondents answering high/very high	WB LPI
Rail (Competence and Quality of Services)	rail_comp	% of respondents answering high/very high	WB LPI
Road (Competence and Quality of Services)	road_comp	% of respondents answering high/very high	WB LPI
Trade and transport associations (Competence and Quality of Services)	**trade_trans_assoc_comp**	**% of respondents answering high/very high**	**WB LPI**
Warehousing/transloading and distribution (Competence and Quality of Services)	**warehouse_comp**	**% of respondents answering high/very high**	**WB LPI**
Expedited customs clearance for traders with high compliance levels (Efficiency of Processes)	**clear_cust_exped_eff**	**% of respondents answering often or nearly always**	**WB LPI**
Clearance and delivery of exports (Efficiency of Processes)	**clear_exp_eff**	**% of respondents answering often or nearly always**	**WB LPI**
Clearance and delivery of imports (Efficiency of Processes)	**clear_imp_eff**	**% of respondents answering often or nearly always**	**WB LPI**
Transparency of customs clearance (Efficiency of Processes)	**customs_transparency_eff**	**% of respondents answering often or nearly always**	**WB LPI**
Can customs declarations be submitted and processed electronically? (Efficiency of Processes)	decl_cust_electr_eff	% of respondents answering high/very high	WB LPI
Transparency of other border agencies (Efficiency of Processes)	other_border_transparency_eff	% of respondents answering often or nearly often	WB LPI
Agent fees (Level of Fees and Charges)	agent_char	% of respondents answering high/very high	WB LPI
Airport charges (Level of Fees and Charges)	airport_char	% of respondents answering high/very high	WB LPI
Full truck load rates (Level of Fees and Charges)	full_truck_char	% of respondents answering high/very high	WB LPI
Less than full truck load services rates (Level of Fees and Charges)	Lfull_truck_char	% of respondents answering high/very high	WB LPI
Overall, logistics costs (e.g. port charges, domestic transport, agent fees) (Level of Fees and Charges)	logistics_char	% of respondents answering high/very high	WB LPI
Port/Airport charges (Level of Fees and Charges)	port_airport_char	% of respondents answering high/very high	WB LPI
Port charges (Level of Fees and Charges)	port_char	% of respondents answering high/very high	WB LPI
Rail transport rates (Level of Fees and Charges)	rail_char	% of respondents answering high/very high	WB LPI
Road transport rates (Level of Fees and Charges)	road_char	% of respondents answering high/very high	WB LPI
Warehousing/transloading charges (Level of Fees and Charges)	warehouse_char	% of respondents answering high/very high	WB LPI
Airports (Quality of Infrastructure)	airport_infra	% of respondents answering low/very low	WB LPI

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Description	Variable	Scale	Source
Fixed transport infrastructure (e.g. ports, roads, warehouses) (Quality of Infrastructure)	fixed_infra	% of respondents answering low/very low	WB LPI
Ports (Quality of Infrastructure)	port_infra	% of respondents answering low/very low	WB LPI
Rail (Quality of Infrastructure)	rail_infra	% of respondents answering low/very low	WB LPI
Roads (Quality of Infrastructure)	road_infra	% of respondents answering low/very low	WB LPI
Telecommunications and IT (Quality of Infrastructure)	**telco_infra**	**% of respondents answering low/very low**	**WB LPI**
Warehousing/transloading facilities (Quality of Infrastructure)	warehouse_infra	% of respondents answering low/very low	WB LPI
Criminal activities (e.g., stolen cargo) (Sources of Major Delays)	crime_delay	% of respondents answering often or nearly often	WB LPI
Solicitation of informal payments (Sources of Major Delays)	informal_delay	% of respondents answering often or nearly often	WB LPI
Maritime transshipment (Sources of Major Delays)	maritime_trans_delay	% of respondents answering often or nearly often	WB LPI
Pre-shipment inspection (Sources of Major Delays)	**pre_ship_delay**	**% of respondents answering often or nearly often**	**WB LPI**
Compulsory warehousing/transloading (Sources of Major Delays)	warehouse_delay	% of respondents answering often or nearly often	WB LPI
Number of border agencies exports	**agen_exp**	**Number of agencies**	**WB LPI**
Number of border agencies imports	**agen_imp**	**Number of agencies**	**WB LPI**
Clearance time with physical inspection	**clear_insp**	**Number of days**	**WB LPI**
Clearance time without physical inspection	clear_w_insp	Number of days	WB LPI
Typical charge for a 40-foot export container or a semi-trailer	container_exp	Cost in USD	WB LPI
Typical charge for a 40-foot import container or a semi-trailer	container_imp	Cost in USD	WB LPI
Land supply chain - Cost export	cost_land_exp	Cost in USD	WB LPI
Land supply chain - Cost import	cost_land_imp	Cost in USD	WB LPI
Port/Airport supply chain - Cost export	cost_port_exp	Cost in USD	WB LPI
Port/Airport supply chain - Cost import	cost_port_imp	Cost in USD	WB LPI
Land supply chain - Distance export	dis_land_exp	Distance in km	WB LPI
Land supply chain - Distance import	dis_land_imp	Distance in km	WB LPI
Port/Airport supply chain - Distance export	dis_port_exp	Distance in km	WB LPI
Port/Airport supply chain - Distance import	dis_port_imp	Distance in km	WB LPI
Number of documents - exports	docs_exp	Number of documents	WB LPI
Number of documents - imports	docs_imp	Number of documents	WB LPI
Physical inspection	**insp**	**% of inspections**	**WB LPI**
Multiple inspection	insp_mult	% of inspections	WB LPI

Description	Variable	Scale	Source
Lead time export best case	lead_best_exp	Number of days	WB LPI
Lead time import best case	lead_best_imp	Number of days	WB LPI
Land supply chain - Lead time (days) export	lead_med_land_exp	Number of days	WB LPI
Land supply chain - Lead time (days) import	lead_med_land_imp	Number of days	WB LPI
Port/Airport supply chain - Lead time export for port/airport, median case (days) export	**lead_med_port_exp**	**Number of days**	**WB LPI**
Port/Airport supply chain - Lead time import for port/airport, median case (days) import	**lead_med_port_imp**	**Number of days**	**WB LPI**
Lead time export worst case	lead_worst_exp	Number of days	WB LPI
Lead time import worst case	lead_worst_imp	Number of days	WB LPI
Possibility of a review procedure	rev_proc	% of respondents answering that a simple/inexpensive review procedure is available	WB LPI
Percentage of damaged shipments including pilferage	ship_damage	% of shipments	WB LPI
Shipments meeting quality criteria (%)	ship_qual	% of shipments	WB LPI
Customs (Index)	**LPI_customs**	**1 - 5 with 5 being the best**	**WB LPI**
Domestic Logistics Costs	LPI_dom_logistics_cost	1 - 5 with 5 being the best	WB LPI
Infrastructure (Index)	LPI_infra	1 - 5 with 5 being the best	WB LPI
Logistics Services (Index)	LPI_logistics	1 - 5 with 5 being the best	WB LPI
Overall LPI (Index)	**LPI_overall**	**1 - 5 with 5 being the best**	**WB LPI**
Ease of Shipment (Index)	**LPI_ship**	**1 - 5 with 5 being the best**	**WB LPI**
Timeliness (Index)	**LPI_timeliness**	**1 - 5 with 5 being the best**	**WB LPI**
Ease of Tracking (Index)	LPI_tracking	1 - 5 with 5 being the best	WB LPI
Provision of adequate and timely information on regulatory changes (Efficiency of Processes)	**info_reg_eff**	**% of respondents answering often or nearly always**	**WB LPI**
Efficiency of legal framework in challenging regulations (In your country, how easy is it for private businesses to challenge government actions and/or regulations through the legal system?)	app_eff	1 = extremely difficult; 7 = extremely easy.	WEF GCR
Judicial independence (In your country, to what extent is the judiciary independent from influences of members of government, citizens, or firms?)	app_jud_indep	1 = heavily influenced; 7 = entirely independent.	WEF GCR
Irregular payments and bribes (Average score across the five components of the following Executive Opinion Survey question: In your country, how common is it for firms to make undocumented extra payments or bribes connected with (a) imports and exports; (b) public utilities; (c) annual tax payments; (d) awarding of public contracts and licenses; (e) obtaining favorable	gov_bribes	1 = very common; 7 = never occurs.	WEF GCR

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Description	Variable	Scale	Source
judicial decisions?)			
Transparency of government policymaking (In your country, how easy is it for businesses to obtain information about changes in government policies and regulations affecting their activities?)	info_trans	1 = extremely difficult; 7 = extremely easy.	WEF GCR

Annex B: Robustness Analysis

This annex investigates the relation between customs-related variables and international trade. The aim is to establish what variables are worth focusing on in order to increase international trade of the Netherlands. To answer this question, we investigate

a) In what dimensions of customs progress can be made. We therefore look at the position of the Netherlands relative to the country with the highest score in the sample in each of the customs-related variables. We assume that the farther away the Netherlands is from the frontier, the more room for improvement there is (in theory).[49]

b) What customs-related variables have a robust relation with international trade. We investigate the robustness in terms of 1) sign (is the effect on trade uniformly positive or negative?), 2) statistical significance (can we reasonably renounce the possibility that the effect is actually zero?), and 3) effect size (is the effect (in)sensitive to the inclusion of other variables?). In order to test the robustness of the customs-related variables, we estimated all possible combinations of four customs-related variables.[50] The analysis is once again based on a gravity-model analysis.

The customs-related variables included in the investigation have been selected by the client. The total number of indicators is 48. The indicators are presented in Table B.1 below, along with some descriptive statistics. We distinguish the effect of custom-related variables on trade from an origin (exporter) and destination (importer) point of view. It is important to point out that variables are coded in different ways. That is, for some variables higher scores entail trade facilitation, whilst for other variables higher scores represent higher barriers. Taking into account these differences, Table B.1 indicates whether variables are expected to have a positive or negative effect on international trade.[51]

Column (5) in Table B.1 also gives information on the position of the Netherlands in each of the customs dimensions relative to other countries. In particular, the table shows how far away the Netherlands is from the country with the highest score in the sample.[52] This information serves to assess in what dimensions of customs progress can (in theory) be made. A value of 0 indicates that the Netherlands is at par with the frontier. We find the biggest gap vis-à-vis the frontier in regulation related to logistics. The value of 1.03 is not only relatively high in itself but also in terms of the natural variation in the variable altogether. The latter is reflected by the standard deviation. The distance to the frontier is almost twice the standard deviation. For comparison, the distance to the frontier seems also large with respect to (the number of) physical inspections (1.04). However, there is more natural variation in this variable, making this deviation in fact smaller. We will come back to the issue of standard deviations when we discuss the economic impact of the customs-related variables on trade.

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[49] So we assume that progress is made through catching up with peers rather than forging ahead.

[50] The total number of regressions is 194,580. The formula is 48!/(4!*(48-4)!), where 48 represents the total number of variables under consideration and 4 is the number of variables used in each regression.

[51] Different indicators are coded in different ways. See ** for an overview.

[52] The 'best' score can be a high score as well as a low score (as in the case of the number of documents required for instance).

Table B.1. Descriptive statistics customs variables

	Mean	Standard Deviation	Minimum	Maximum	Distance to frontier NL	Expected sign in regression
Provision of adequate and timely information on regulatory changes_o	4.11	0.49	2.41	4.61	0.00	+
Customs Clearance procedures_o	4.13	0.42	2.90	4.61	0.51	+
Incidence of corruption_o	3.77	0.62	1.97	4.61	0.52	+
Other official clearance procedures_o	3.93	0.45	2.81	4.61	0.92	+
Regulation related to logistics_o	3.82	0.59	2.41	4.61	1.03	+
Trade and transport associations	3.94	0.53	2.35	4.61	0.31	+
Warehousing and trans-loading and distribution_o	4.04	0.47	2.53	4.61	0.07	+
Expedited customs clearance for traders with high compliance levels_o	4.10	0.42	3.22	4.61	0.14	+
Clearance and delivery of exports _o	4.43	0.30	3.00	4.61	0.00	+
Transparency of customs of customs clearance_o	4.18	0.49	2.53	4.61	0.00	+
Telecommunications and IT infrastructure_o	3.19	0.92	1.45	4.61	0.45	-
Pre-shipment inspections_o	3.58	0.79	2.04	4.61	0.55	-
Number of border agencies exports_o	0.95	0.57	0.00	2.30	0.00	-
Clearance time with physical inspection_o	0.69	0.68	0.00	2.48	0.00	-
Physical inspection_o	2.27	1.34	0.00	4.32	1.04	-
Port/Airport supply chain - Lead time export for port_o	0.62	0.64	0.00	2.89	0.00	-
lpi_Customs_o	1.03	0.22	0.41	1.44	0.03	+
Overall LPI_o	1.09	0.19	0.57	1.42	0.02	+
Ease of shipment_o	1.08	0.17	0.53	1.34	0.04	+
Timeliness_o	1.21	0.18	0.63	1.55	0.01	+
Time to export_o	3.67	1.16	0.00	6.70	0.15	-
Cost to export deflated per container_o	7.12	0.55	6.03	9.11	0.81	-
Documents to export number_o	1.70	0.37	0.69	2.48	0.69	-
Trading across border overall indicator_o	4.17	0.50	0.25	4.57	0.08	+

Note: data in natural logarithm. Absolute distance to the best score. '_o' denotes origin, i.e., exporting country.

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Table B.1. Continued

	Mean	Standard Deviation	Minimum	Maximum	Distance to frontier NL	Expected sign in regression
Provision of adequate and timely information on regulatory changes_d	4.10	0.49	2.41	4.61	0.00	+
Customs Clearance procedures_d	4.13	0.42	2.90	4.61	0.51	+
Incidence of corruption_d	3.77	0.62	1.97	4.61	0.52	+
Other official clearance procedures_d	3.94	0.45	2.81	4.61	0.92	+
Regulation related to logistics_d	3.82	0.59	2.41	4.61	1.03	+
Trade and transport associations_d	3.95	0.52	2.35	4.61	0.31	+
Warehousing and trans-loading and distribution_d	4.04	0.47	2.53	4.61	0.07	+
Expedited customs clearance for traders with high compliance levels_d	4.11	0.42	3.22	4.61	0.14	+
Clearance and delivery of imports _d	4.29	0.41	2.53	4.61	0.07	+
Transparency of customs of customs clearance_d	4.18	0.48	2.53	4.61	0.00	+
Telecommunications and IT infrastructure_d	3.20	0.92	1.45	4.61	0.45	-
Pre-shipment inspections_d	3.59	0.78	2.04	4.61	0.55	-
Number of border agencies imports_d	1.06	0.55	0.00	2.30	0.69	-
Clearance time with physical inspection_d	0.71	0.68	0.00	2.48	0.00	-
Physical inspection_d	2.29	1.34	0.00	4.32	1.04	-
Port/Airport supply chain - Lead time import for port_d	0.80	0.65	0.00	2.89	0.69	-
lpi_Customs_d	1.02	0.22	0.41	1.44	0.03	+
Overall LPI_d	1.09	0.19	0.57	1.42	0.02	+
Ease of shipment_d	1.07	0.17	0.53	1.34	0.04	+
Timeliness_d	1.20	0.17	0.63	1.55	0.01	+
Time to import_d	3.80	1.48	0.00	7.19	0.41	-
Cost to import deflated per container_d	7.26	0.61	5.99	9.28	0.91	-
Documents to import number_d	1.86	0.40	0.69	2.83	0.69	-
Trading across border overall indicator_d	4.16	0.50	0.25	4.57	0.08	+

Note: data in natural logarithm. Absolute distance to the best score. '_d' denotes destination, i.e., importing country.

The effects of customs-related variables on international trade are investigated by using a gravity-model analysis. The gravity model is the most widely used spatial interaction model to study a variety of origin–destination flow phenomena, varying from commuting, telecommunication and asset flows, to migration and trade (see, e.g., Fotheringham and O'Kelly, 1989). It is the most commonly used empirical model to study patterns of international trade (see, e.g., Deardorff, 1998; Anderson & van Wincoop, 2003). The basic gravity model postulates that bilateral trade depends on the economic size of the trade partners, which reflects market size and purchasing power, and a variety of measures of economic distance (or proximity) between the countries to reflect trade costs. The gravity equation used in this project includes the following fixed set of control variables: GDP and GDP per capita of the origin and destination countries, the physical distance between two countries, whether they speak the same language, whether they share a common border, and whether they have a colonial history. We use a cross-section of trade flows (exports) for the year 2014.[53]

We test the robustness of the customs-related variables by estimating a wide range of possible regression specifications. More specifically, we estimate all possible combinations of four customs-related variables (see, e.g., Sala-i-Martin, 1997, and Florax et al., 2002). With 48 variables, the total number of regressions is 194,580.[54]
Table B.2 presents the results from the robustness analysis in terms of sign and significance of the customs-related variables as well as the standard gravity variables. The table gives the mean and standard deviation of the estimated coefficients for a given variable across all regression specifications, as well the number of times (in percentages) that coefficients were positive and statistically significant. With respect to the percentage positive, the closer to 1 (or 0) the more uniformly positive (or negative) the estimated coefficients are. For instance, the coefficient of GDP of both the origin and destination is positive in all regressions. It is statistically significantly different from zero each time as well. Hence, we conclude that the effect of GDP on trade is robust in terms of sign and significance.
With respect to the customs-related variables, Table B.2 indicates that some variables have coefficients that are (on average) contrary to what we would expect (in red font). For some of these variables (e.g., provision of adequate and timely information on regulatory changes, and transparency of customs of customs clearance, both on the exporter side, and time to import) the 'wrong' estimates are often statistically significant as well. On the other hand, the indicators in bold font appear to be highly robust in terms of the (correct) sign and the statistical significance of the coefficient.

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[53] The number of observations is 23,010.

[54] The formula is 48!/(4!*(48-4)!), where 48 represents the total number of variables under consideration and 4 is the number of variables used in each regression.

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Table B.2. Robustness sign and statistical significance

	Mean effect	Percent Positive	Percent Significant	Percent Negative Significant	Percent Positive Significant
GDP_o	1.23	1	1	0	1
GDP per capita_o	0.04	0.58	0.69	0.24	0.45
GDP_d	1.06	1	1	0	1
GDP per capita _d	-0.01	0.50	0.58	0.30	0.28
Distance	-1.19	0	1	1	0
Adjacency	0.77	1	0.92	0	0.92
Common language	0.80	1	1	0	1
Colony	0.26	0.96	0.24	0	0.24
Provision of adequate and timely information on regulatory changes_o	-0.52	0.04	0.93	0.92	0.02
Customs Clearance procedures_o	-0.25	0.12	0.71	0.67	0.03
Incidence of corruption_o	-0.04	0.31	0.25	0.17	0.07
Other official clearance procedures_o	0.11	0.71	0.46	0.09	0.37
Regulation related to logistics_o	-0.15	0.18	0.65	0.59	0.07
Trade and transport associations_o	-0.20	0.05	0.76	0.75	0.01
Warehousing and trans-loading and distribution_o	-0.01	0.55	0.44	0.21	0.23
Expedited customs clearance for traders with high compliance levels_o	-0.09	0.30	0.66	0.48	0.17
Clearance and delivery of exports _o	1.03	1.00	0.98	0	0.98
Transparency of customs of customs clearance_o	-0.48	0.01	0.92	0.92	0.00
Telecomunications and IT infrastructure_o	-0.20	0.12	0.67	0.65	0.02
Pre-shipment inspections_o	-0.41	0.01	0.94	0.94	0.00
Number of border agencies exports_o	-0.17	0.18	0.61	0.57	0.04
Clearance time with physical inspection_o	-0.26	0.10	0.84	0.79	0.05
Physical inspection_o	-0.22	0.05	0.91	0.89	0.02
Port/Airport supply chain - Lead time export for port_o	-0.61	0.00	0.99	0.99	0
lpi_Customs_o	1.23	0.87	0.89	0.09	0.80
Overall LPI_o	4.36	0.99	0.98	0	0.97
Ease of shipment_o	3.93	1.00	0.99	0	0.99
Timeliness_o	2.91	0.98	0.94	0.01	0.94

Table B.2. Continued

	Mean effect	Percent Positive	Percent Significant	Percent Negative Significant	Percent Positive Significant
Provision of adequate and timely information on regulatory changes_d	-0.02	0.53	0.19	0.14	0.05
Time to export_o	-0.11	0.15	0.67	0.64	0.03
Cost to export deflated per container_o	-1.06	0.00	1	1	0
Documents to export number_o	-0.87	0.03	0.93	0.92	0.01
Trading across border overall indicator_o	1.16	1	1	0	1
Customs Clearance procedures_d	0.39	0.99	0.89	0	0.89
Incidence of corruption_d	0.07	0.85	0.35	0.04	0.31
Other official clearance procedures_d	0.39	0.97	0.89	0.00	0.89
Regulation related to logistics_d	0.12	0.86	0.49	0.03	0.46
Trade and transport associations_d	0.16	0.89	0.59	0.00	0.58
Warehousing and transloading and distribution_d	0.25	0.91	0.69	0.00	0.69
Expedited customs clearance for traders with high compliance levels_d	0.23	0.90	0.62	0.01	0.61
Clearance and delivery of imports _d	0.64	1	0.99	0	0.99
Transparency of customs of customs clearance_d	0.13	0.80	0.55	0.05	0.51
Telecomunications and IT infrastructure_d	-0.21	0.03	0.74	0.74	0.00
Pre-shipment inspections_d	-0.18	0.04	0.72	0.71	0.00
Number of border agencies imports_d	-0.28	0.01	0.91	0.91	0.00
Clearance time with physical inspection_d	-0.12	0.22	0.49	0.46	0.04
Physical inspection_d	-0.09	0.15	0.70	0.67	0.03
Port/Airport supply chain - Lead time import for port_d	-0.01	0.38	0.31	0.17	0.13
lpi_Customs_d	1.50	0.97	0.91	0.01	0.91
Overall LPI_d	3.27	1	1	0	1
Ease of shipment_d	2.03	0.95	0.93	0.02	0.91
Timeliness_d	1.15	0.90	0.79	0.06	0.73
Time to import_d	0.08	0.94	0.79	0.01	0.78
Cost to import deflated per container_d	-0.50	0.00	0.98	0.98	0.00
Documents to import number_d	-0.74	0.00	0.99	0.99	0
Trading across border overall indicator_d	0.59	0.99	0.94	0.00	0.94

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Next, we investigate the robustness in terms of coefficient size using so-called response surface analysis: for each variable we calculated the conditional mean of the effect size, i.e., conditional upon the inclusion of a particular conditioning variable, relative to the mean of the effect size in the full sample of regressions containing the variable (Florax et al., 2002). The transformation of effect sizes into an index that is entailed in this manner facilitates comparison among different variables. When the index equals one, the conditional mean is equal to the grand mean, implying that the variable is insensitive to the inclusion of a particular conditioning variable. The more the index deviates from one, the more sensitive the key variable is to the inclusion of a particular conditioning variable. The index is negative when the conditional mean has a sign opposite to the sign of the grand mean.

Table B.3 gives the minimum and maximum value of the index for the customs-related variables, as well as the range. For reference, the mean effect size (Table B.2) is included as well. The table indicates that most variables are in fact relatively sensitive to the inclusion of particular conditioning variables. Only eight out of 48 custom-related variables show deviations of less than 50% of the grand sample means (blue font).

Of these eight robust variables, the Netherlands is at the frontier in lead time export for port already. Hence, (additional) progress in this area is limited. Then, our robustness analysis turns out seven customs-related variables that policy could focus on in order to increase international trade. These are the variables in which progress by the Netherlands can be made and which show up as robust variables in our empirical analysis.

Table B.3. Robustness size: response surface results for effect sizes

	Minimum [a]	Maximum [a]	Range [a]	Mean effect size	
Provision of adequate and timely information on regulatory changes_o	-0.04	1.34	1.38	-0.52	
Customs Clearance procedures_o	-0.15	3.41	3.56	-0.25	
Incidence of corruption_o	-3.05	6.77	9.82	-0.04	
Other official clearance procedures_o	-2.20	4.60	6.80	0.11	
Regulation related to logistics_o	-0.18	3.66	3.84	-0.15	
Trade and transport associations_o	0.31	2.73	2.43	-0.20	
Warehousing and trans-loading and distribution_o	-28.37	49.71	78.07	-0.01	
Expedited customs clearance for traders with high compliance levels_o	-4.62	3.63	8.26	-0.09	
Clearance and delivery of exports _o	0.59	1.97	1.38	1.03	
Transparency of customs of customs clearance_o	0.50	2.46	1.96	-0.48	
Telecomunications and IT infrastructure_o	0.00	2.66	2.65	-0.20	
Pre-shipment inspections_o	0.34	1.35	1.00	-0.41	
Number of border agencies exports_o	-0.11	2.91	3.02	-0.17	
Clearance time with physical inspection_o	-0.43	2.08	2.51	-0.26	
Physical inspection_o	0.19	1.38	1.19	-0.22	
Port/Airport supply chain - Lead time export for port_o	0.62	1.36	0.74	-0.61	
lpi_Customs_o	-1.95	1.72	3.68	1.23	
Overall LPI_o	0.54	1.79	1.26	4.36	
Ease of shipment_o	0.62	1.18	0.56	3.93	
Timeliness_o	0.22	1.21	0.99	2.91	
Time to export_o	-0.50	2.32	2.81	-0.11	
Cost to export deflated per container_o	0.74	1.13	0.39	-1.06	
Documents to export number_o	0.32	1.34	1.02	-0.87	
Trading across border overall indicator_o	0.46	1.81	1.34	1.16	

a) Index: deviation of conditional mean effect sizes from the grand mean (=1).

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Table B.3. Continued

	Minimum [a]	Maximum [a]	Range [a]	Mean effect size	
Provision of adequate and timely information on regulatory changes_d	-3.95	12.37	16.32	-0.02	
Customs Clearance procedures_d	0.54	1.35	0.81	0.39	
Incidence of corruption_d	-2.21	2.41	4.62	0.07	
Other official clearance procedures_d	0.12	1.50	1.38	0.39	
Regulation related to logistics_d	-1.90	1.88	3.77	0.12	
Trade and transport associations_d	-0.03	1.53	1.56	0.16	
Warehousing and transloading and distribution_d	0.07	1.60	1.53	0.25	
Expedited customs clearance for traders with high compliance levels_d	-0.10	2.48	2.58	0.23	
Clearance and delivery of imports _d	0.63	1.26	0.63	0.64	
Transparency of customs of customs clearance_d	-1.58	1.78	3.36	0.13	
Telecomunications and IT infrastructure_d	0.35	2.12	1.77	-0.21	
Pre-shipment inspections_d	0.30	1.63	1.33	-0.18	
Number of border agencies imports_d	0.60	2.28	1.69	-0.28	
Clearance time with physical inspection_d	0.00	2.72	2.72	-0.12	
Physical inspection_d	-0.75	1.95	2.70	-0.09	
Port/Airport supply chain - Lead time import for port_d	-16.75	8.04	24.79	-0.01	
lpi_Customs_d	-0.06	1.33	1.39	1.50	
Overall LPI_d	0.71	1.49	0.78	3.27	
Ease of shipment_d	-0.14	1.63	1.77	2.03	
Timeliness_d	-1.54	2.04	3.58	1.15	
Time to import_d	0.19	1.45	1.26	0.08	
Cost to import deflated per container_d	0.56	1.21	0.65	-0.50	
Documents to import number_d	0.71	1.40	0.69	-0.74	
Trading across border overall indicator_d	0.39	2.02	1.62	0.59	

a) Index: deviation of conditional mean effect sizes from the grand mean (=1).

Annex C: Linking innovation, self-regulation, ICT and inspection to trade flows

The ToR distinguishes four channels through which Dutch Customs seeks to improve trade facilitation performance: 1) innovation, 2) rely on self-regulation, 3) ICT and 4) inspection performance. This annex analyses how performance in these four composite dimensions is related to trade. Similar to the analysis in Chapter 2, we use the gravity model for this quantification.

We would ideally have one single trade facilitation indicator for each of these four policy dimensions (innovation, rely on self-regulation, ICT and inspection performance). A commonly agreed definition of these policy dimension and associated indicator is not available in international databases, and many of the 280 identified trade facilitation indicators are difficult to link to only one of the four policy areas, as they often relate to more than one area (e.g. *Clearance and delivery of imports*). Dutch customs has indicated for each of the selected indicators to what extent they relate to each of their four broad policy dimensions (see Table C.1). On the basis of this table, we have constructed indicators reflecting the four policy dimensions, applying a confirmatory factor analysis (CFA) approach as explained in chapter 1.3.2. This way, we have a single indicator for each of the four policy areas that can be used in the gravity analysis.

Table C.1   **Trade facilitation indicators and link to four policy areas of Dutch customs Netherlands**

Variable name	Innovation	ICT performance	Inspections	Rely on self regulation
Clearance and delivery of exports	15	50	15	20
Clearance and delivery of imports	15	50	15	20
Clearance time with physical inspection	10	50	10	30
Cost to export deflated per container - old methodology	10	50	10	30
Cost to import deflated per container - old methodology	15	50	15	20
Customs	25	25	25	25
Customs Clearance procedures	15	50	15	20
Documents to export number	35	5	10	50
Documents to import number	35	5	10	50
Ease of shipment	10	50	20	20
Expedited customs clearance for traders with high compliance levels	0	0	0	100
Incidence of corruption	40	20	40	0
Number of border agencies exports	34	33	33	0
Number of border agencies imports	34	33	33	0
Other official clearance procedures	30	20	30	20
Overall LPI	0	0	0	100
Physical inspection	10	30	50	10
Port/Airport supply chain - Lead time export for port	10	50	10	30
Port/Airport supply chain - Lead time import for port	10	50	10	30
Pre-shipment inspections	20	40	30	10
Provision of adequate and timely information on regulatory changes	100	0	0	0
Regulation related to logistics	50	50	0	0

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Variable name	Innovation	ICT performance	Inspections	Rely on self regulation
Telecommunications and IT infrastructure	50	50	0	0
Time to export	10	50	10	30
Time to import	10	50	10	30
Timeliness	10	50	10	30
Trade and transport associations	75	25	0	0
Trading across border overall indicator	10	50	10	30
Transparency of customs of customs clearance	10	50	20	20
Warehousing and transloading and distribution	15	50	15	20

Note: *Cost to export per container old methodology* and *Cost to import per container old methodology* were removed from this list, due to their limited available for a number of countries. Moreover, these variables are heavily related to the variables that measure the same, but in deflated terms.

Before we use these constructed indicators in the gravity analysis, we look at the performance of the Netherlands on these four policy dimensions vis-a-vis its competitors. Figure C.1 shows the position of the Netherlands within each of these four policy dimensions, benchmarked against a number of country groups (peer groups):

- Hamburg – Le Havre range countries (Belgium, Germany, France)
- Competitors for the EU hinterland (Spain, Greece, Italy)
- International benchmarks (USA, Japan, Korea, Hong Kong, Singapore, China)

This figure shows the relative position of the Netherlands vis-à-vis its peers. From this basket of peers, the best performing three countries (25%) are located on the line above the box for each indicator. The six countries with an average score are located in the box, while the bottom three countries have scores along the line below the box. This method therefore shows the spread of the performance of the basket of peers. The position of the Netherlands is indicated with the Dutch flag, and Dutch Customs consistently ranks in the centre of the distribution, thus having an average performance on these indicators.[55]

Figure C.1   Position of the Netherlands vis-à-vis a number of peer competitors for the four policy dimensions

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[55]   It should be noted that the Dutch performance is relative to peers, most of these countries have a high score on these trade facilitation indicators if compared to the world average. The Dutch performance, if benchmarked against the world average, would come out much better.
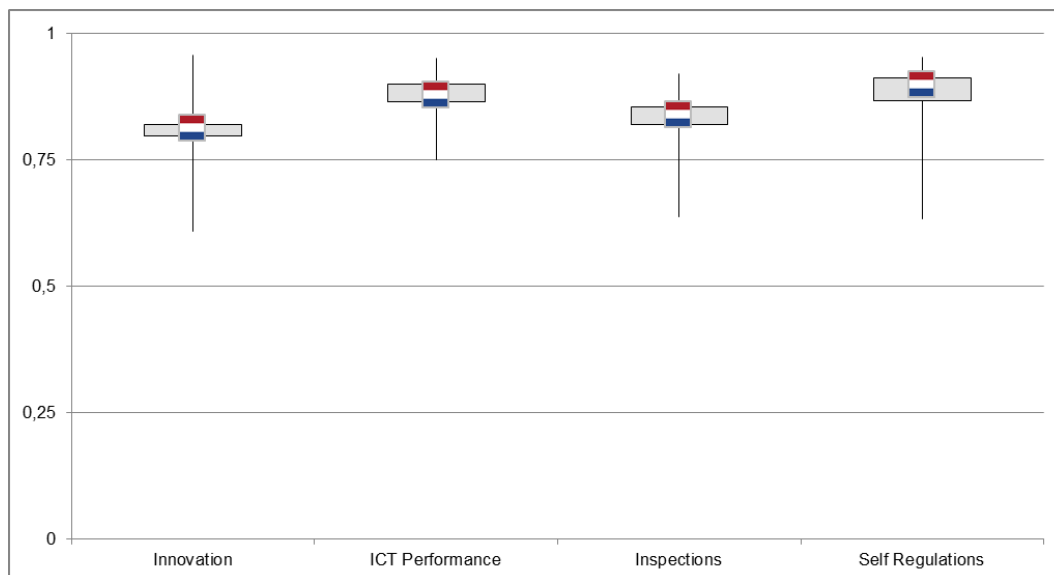
Source: Ecorys calculations

The calculated composite indicators have been applied in a cross-section gravity analysis. The results of these estimations are presented in Table C.2. All coefficients are positive, which means that an improvement of performance on these policy dimensions increases trade.

Table C.2   **Coefficients of the confirmatory factor analysis**

Policy dimension	Innovation	ICT performance	Inspections	Self-regulation
Exporter	2.658***	4.104***	3.754***	3.900***
	(0.177)	(0.218)	(0.201)	(0.183)
Importer	1.547***	2.024***	1.823***	2.057***
	(0.157)	(0.196)	(0.176)	(0.182)

Note: Robust standard errors in parentheses. *** indicates 0.01 significance level, ** indicates 0.05 significance level, * indicates 0.1 significance level.

The interpretation of the coefficients in Table C.2 is in itself straightforward: if you improve your export innovation performance vis-à-vis other countries by 0.01 percentage point[56], the bilateral trade flow goes up by 2.66 percent. A similarly sized improvement of 0.01 percentage point on the importer side, however, only leads to a 1.55 percent increase in additional trade. How easy it is to increase performance on one of the indicators and what it requires, is less straight-forward to establish. It is, however, of great importance to assess the most promising areas for investment in the improvement of performance of customs.

In analysing what it means to increase performance in one of the four policy dimensions, the problem is that there are various indicators underlying the four composite indicators that capture the four policy dimensions. Some of these underlying indicators may be driving these results to a larger extent than others. Therefore it is also important to know which of the underlying indicators are relatively more important in explaining trade. The direct implementation of these underlying variables is therefore more useful, and presented in section 2.2 of the main report.

Contribution to income

As presented in section 2.4, we can also make a link from increased trade to income.

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[56]   Keep in mind that the scale of these variables runs from 0 to 1. A 0.01 increase therefore indicates a 0.01 percentage point improvement in this policy domain.

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Given the results of the cross-section analysis with the composite indicators that reflect the four policy dimensions (see **Fout! Verwijzingsbron niet gevonden.**Table C.2), the gains in trade of a 1 percentage point improvement are given in **Fout! Verwijzingsbron niet gevonden.**Table C.3. These are then directly translated to gains in trade openness.

Table C.3   **Changes in Dutch openness from a 1 percentage point improvement in the policy dimensions, in percentage points**

	Innovation	ICT performance	Inspections	Self-regulation
Change in gains in trade				
Exporter	2.69	4.19	3.83	3.98
Importer	1.56	2.04	1.84	2.08
Change in gains in trade openness				
Exporter	2.22	3.45	3.15	3.28
Importer	1.12	1.47	1.32	1.49

Note: a value of, e.g., 2.22 means that openness increases from 154.1 to 156.3 due to the improvement in the customs-related variable.

The changes in openness in Table 2.Table C. .3 are subsequently used to calculate the effect on long-term income. The long-run effect of improvements in customs-related variables relies on the assumption that their effect on openness persists over time. In other words we assume that developments in customs services of other countries remain equal. Hence, we use the lower estimate of 0.45 for the effect on long-term GDP per capita, as identified in section 1.3.5 We then get the effects on long-run GDP per capita of the Netherlands as presented in Table 2.Table C.4. On the importing side, self-regulation and ICT performance are policy domains with the largest gains, while on the exporting side, ICT performance can make the greatest contribution.

Table C.4.   **Effect on long-run per capita GDP of the Netherlands from 1 percentage point improvement in the policy dimensions, in percentage points**

	Innovation	ICT performance	Inspections	Self-regulation
Exporter	1.00	1.55	1.42	1.48
Importer	0.50	0.66	0.59	0.67

Note: percentage of long-run GDP per capita.

Figure C.2   **Time to import one 20-foot container, in days**
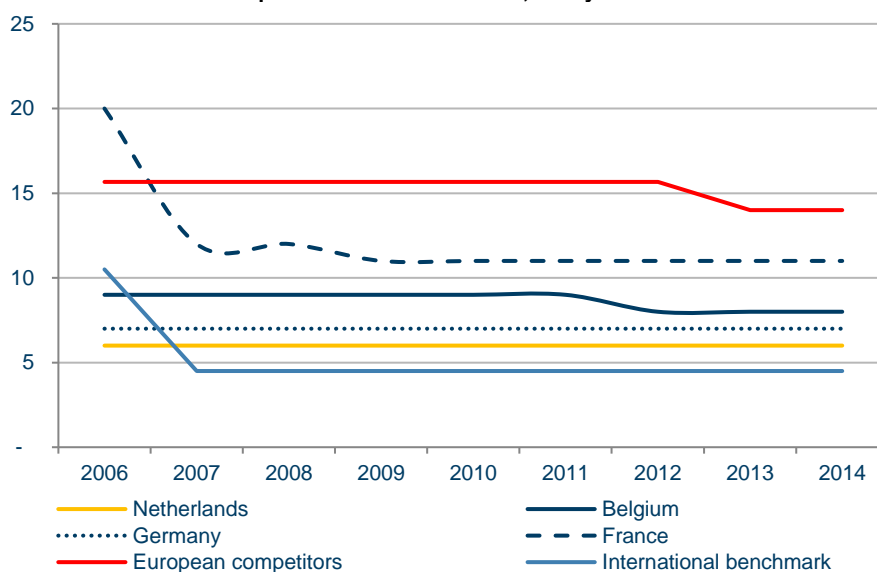
Figure C.3   **Documents to import one 20-foot container**
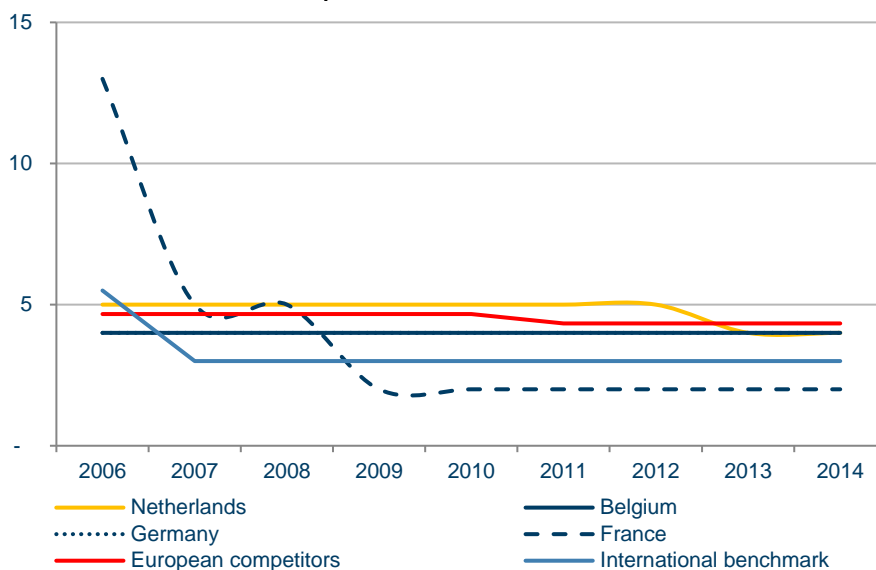
Figure C.4   **Time to export one 20-foot container, in days**

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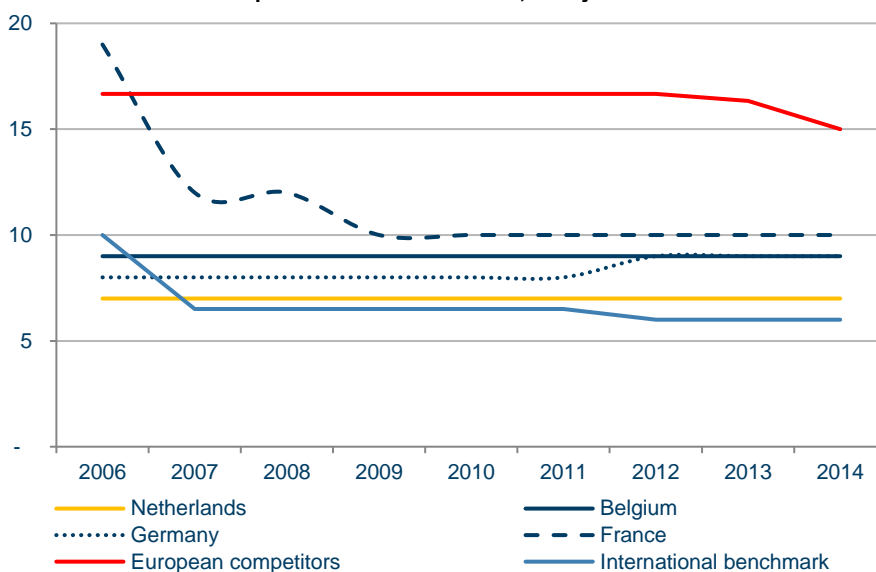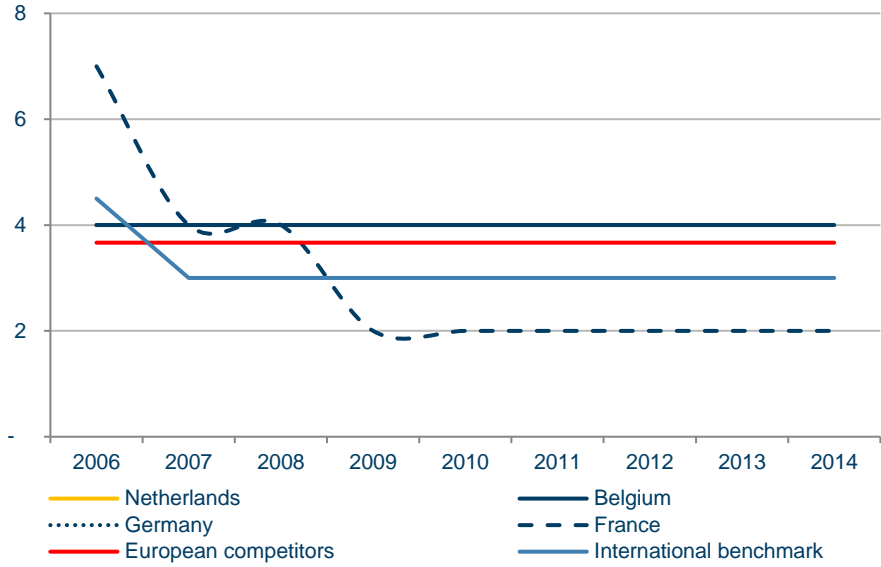**Figure C.5   Documents to export one 20-foot container**

Source: World Bank: Trading Across Borders indicators between 2006 and 2014. EU competitors for the European hinterland are Spain, Italy, and Greece. International benchmark is the average cost for Singapore, South Korea and Hong Kong (data for the USA and China are only available for the last 2 years).

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