Do AEO Programs Facilitate Trade? An Empirical Assessment of the OIC Member States*

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Abstract

The Authorized Economic Operator (AEO) Program comprises of comprehensive trade facilitation and security improvement measures that also serve the overarching objective of institutional development. Therefore, it bears importance for the developing countries as a tool to build institutional capacity. The aim of the current paper is to analyze the impact of AEO program adoption on trade of the members of the Organization of Islamic Countries (OIC) for the period of 2000-2017, by using descriptive analysis, convergence analysis, gravity model and case studies. *Convergence analysis* performed by using a comparator matrix is based on the data collected via a comprehensive survey. The results suggest that Morocco and Jordan exhibit 83 and 81 percent total convergence in terms of the existence of all sub-variables in their associated AEO program, respectively. The lowest amount of convergence is observed in Oman (66 percent). *Gravity analysis* spans the period of 2000-2017 for 132 countries of which 57 are the OIC Member States. Even though, there is a positive and significant impact of AEO adoption on bilateral trade flows of the OIC Member States in the cross-section of 2017, this effect disappears when the newest developments in the gravity literature is incorporated to the analysis using the panel data of 2000-2017. *Case study analysis* was conducted to understand the underlying reasons for the absence of the impact of the OIC AEO programs on trade volumes implied by the gravity analysis. Comprehensive policy implications are provided based on the findings of the various analysis employed in the study.

Keywords: Authorized Economic Operator, trade facilitation, Organization of Islamic Countries, structural gravity, survey

JEL Codes: F14, F13, O53, O57

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1. Introduction

In the last three decades, the world has witnessed a whirlwind of technological progress in information and communication technologies, globalization of the supply chains and an ever-increasing number of stakeholders in international trade. Meanwhile, the resulting new ways of doing business came under increasing threats and risks that require more resources, knowledge, experience, skills and technology than a private company can alone possess (Campos et al, 2017). As a result, along with these companies, Customs Authorities started to search for ways to improve their processes and technologies to develop and sustain quicker, smoother and safer movement of goods across borders.

Trade facilitation has come up as the answer to the problem of increasing levels of uncertainty in global supply chains. The principal objective of any trade facilitation measure is to increase the flow of goods, services and people across countries without abandoning the security of these flows or the ability of governments to collect border taxes (Moïsé, 2013).

There is a broad literature on the impact of trade facilitation on trade flows. Most of the existing studies analyze the impact on trade of increased efficiency in Customs procedures for both rich and poor countries by using gravity or computable general equilibrium models. The majority of the findings suggest that gains from trade would be higher in developing countries than in developed countries, in relative terms, due to less efficiency of Customs administrations of less developed countries. (e.g. Hummels, 2001; Kim et al., 2004; Clarke, 2005; Francois and Manchin, 2006; Nordas et al., 2006; Djankov et al., 2010; Hoekman and Nicita, 2008; Kim et al., 2013).

The aim of the current paper is to analyze the impact of a specific trade facilitation measure, namely AEO program adoption, on trade of the members of the Organization of Islamic Countries (OIC) for the period of 2000-2017, by using descriptive analysis, convergence analysis, gravity model and case studies.

The AEO concept was introduced by the World Customs Organization (WCO) SAFE Framework in 2005 and built on the Customs-to-Business partnership model. Accordingly, to guarantee the common objectives of trade facilitation and supply chain security, traders *voluntarily* meet a broad range of criteria and cooperate with Customs Authorities. In return, these firms are granted various benefits in their dealings with the Customs Authorities.

The success of an AEO program, consequently, depends on the nature of the relationship between Customs and the AEO certificate holder which should be based on the principles of mutual transparency, impartiality and accountability. In other words, the AEO program has the distinct feature of enhancing the institutional structure of both the Customs and the company, which goes above and beyond the purpose of trade facilitation. This makes AEO adoption a more comprehensive trade facilitation and security improvement measure that also serves the overarching objective of institutional development. Therefore, it bears more importance for the developing countries as a tool to build institutional capacity.

Around the World, 77 countries have already initiated an AEO program and 17 countries are in the stage of developing their programs (WCO, 2018). Many of the operational AEO programs in the world are in developed countries, whereas less

developed countries face difficulties both before and after the adoption of the program. The recognition of the AEO status by other Customs Authorities is possible through the use of mutual recognition agreements (MRAs). In other words, with MRAs, both Customs Authorities agree to provide substantial, comparable and reciprocal benefits/facilitation to the mutually recognized AEOs. There exist 61 MRAs around the World and 39 are being negotiated (WCO, 2018).

The studies analyzing the effects of an AEO program on trade have been very limited. There are few descriptive studies that discuss the characteristics of the AEO program such as application procedures, benefits and mutual recognition agreements between Customs that utilize an AEO program (e.g. Aigner, 2010; APEC, 2016; Butter, Liu and Tan, 2012; Urcioli and Ekwall, 2015). C de Sa Porta and Marini (2017) analyze the impact of trade facilitation programs including AEO for 75 countries using the gravity approach. They find a positive and significant effect for AEO program to foster trade. Martincus (2016) studies the impact of Mexico's AEO Program, the NEEC, on firms' trade flows. He finds that the NEEC has a positive contribution to the AEO firms' trade, through lower rates of physical inspections and thereby shorter times in Customs for shipments. However, he does not provide an analysis for the impact of the AEO program at the country-level.

The contribution of our paper to this literature is to provide an extensive analysis of the impact of AEO programs on trade flows for the set of the OIC Member States, which are mainly composed of low income developing countries. To the best of our knowledge, this is the first paper that establishes the country level trade facilitation effect of an AEO program for a set of countries that particularly need to build an institutional capacity to achieve their long-term development goals.

The OIC is an alliance initiated in 1969 and has 57 members mainly located in Western Asia and Western Africa. While the Member States comprise the one-fourth of the world population, their share in world trade amounts only to 9 percent. Although many of the rich, oil-exporters of the world belong to this group of countries, low and lower-middle income countries constitute 63 percent of the OIC. Therefore, development is an important issue for the alliance and enhancing trade is a viable tool to achieve this objective.

The institutional shortcomings indicated by the indicators such as democracy and control of corruption and increasing conflict in the region are the main barriers to trade for most of the OIC countries. Therefore, the AEO program stands as a natural candidate for the OIC countries to improve safety and security at the Customs while facilitating trade. However, the main drawback is that it is a voluntary program and it is costly to implement both for Customs and for the companies.

By 2018, 12 OIC Member States has initiated an AEO program, namely, Azerbaijan, Brunei Darussalam, Egypt, Indonesia, Jordan, Malaysia, Morocco, Oman, Saudi Arabia, Tunisia, Turkey and Uganda.

Descriptive analysis suggests that there are mixed results for these countries in terms of time to and cost of trade when compared to countries without an AEO program.

Convergence analysis performed by using a comparator matrix is based on the data we collected via a comprehensive survey. The results suggest that Morocco and Jordan exhibit 83 and 81 percent total convergence in terms of the existence of all sub-variables in their associated AEO program, respectively. These countries are followed by Egypt

and Turkey (76 percent), Uganda (74 percent), Indonesia (72 percent) and Tunisia (70 percent). The lowest amount of convergence is observed in Oman (66 percent).

Gravity analysis spans the period of 2000-2017 for 132 countries of which 57 are the OIC Member States. Even though, there is a positive and significant impact of AEO adoption on bilateral trade flows of the OIC Member States in the cross-section of 2017, this effect disappears when the newest developments in the gravity literature is incorporated to the analysis using the panel data of 2000-2017. In other words, neither the OIC AEO programs nor MRAs signed by these countries have an impact on the bilateral trade of the 57 OIC Member States with each other and the rest of the world when exporter-time, importer-time and directional country pair fixed effects are included in the analysis.

Case study analysis was conducted to understand the underlying reasons for the absence of the impact of the OIC AEO programs on trade volumes implied by the gravity analysis. Semi-structured interviews with Customs Authorities and the AEO companies in Jordan, Turkey and Uganda were performed to reveal the challenges of the AEO programs in these countries.

Finally, concrete policy recommendations are provided based on a synthesis of various analyses that are conducted in this paper: (i) designing an attractive package where benefits outnumber costs; (ii) expanding the types of operators participating in the program and supporting the participation of SMEs; (iii) increasing the number of MRAs; (iv) regional AEO design and implementation to align the programs from their inauguration.

The outline of the paper is as follows: Section 2 presents the descriptive analysis. Section 3 summarizes our OIC AEO survey and results of the convergence analysis. Section 4 explains the gravity framework followed by a presentation of estimation results. Results of the case study analysis are discussed in Section 5 followed by Sections 6 and 7, which offer a conclusion and relevant policy recommendations, respectively.

2. Descriptives

The OIC is an alliance initiated in 1969 and has 57 members mainly located in Western Asia and Western Africa. All Member States comprise 24 percent of the world population. However, the collective GDP of the OIC Member States amounts only to 8.3 percent of the World GDP in current dollars in 2016. Moreover, the shares of exports and imports of the OIC countries in the World is limited to around 9.5 percent and 9 percent in 2016, respectively.

Although the OIC covers a group of countries with diverse income, the number of low-income countries in the OIC is 20[1] and lower-middle income countries is 16[2]. While the number of upper-middle income countries is 14[3], only 7[4] members of the OIC are high income countries.

[1] Afghanistan, Benin, Burkina Faso, Chad, Comoros, Gambia, Guinea, Guinea-Bissau, Mali, Mozambique, Niger, Senegal, Sierra Leone, Somalia, Sudan, Syrian Arab Republic, Tajikistan, Togo, Uganda and Yemen.
[2] Bangladesh, Cameroon, Côte d'Ivoire, Djibouti, Egypt, Indonesia, Iran, Iraq, Kyrgyz Republic, Mauritania, Morocco, Nigeria, Pakistan, Tunisia, Uzbekistan, West Bank and Gaza.
[3] Albania, Algeria, Azerbaijan, Gabon, Guyana, Jordan, Kazakhstan, Lebanon, Libya, Malaysia, Maldives, Suriname, Turkey, Turkmenistan.
[4] Bahrain, Brunei Darussalam, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

High income countries in the OIC are the major oil exporters in the World. However, the share of exports of the OIC in the World exports is still only 9 percent suggesting that goods and services exports other than oil are very limited in the OIC countries.

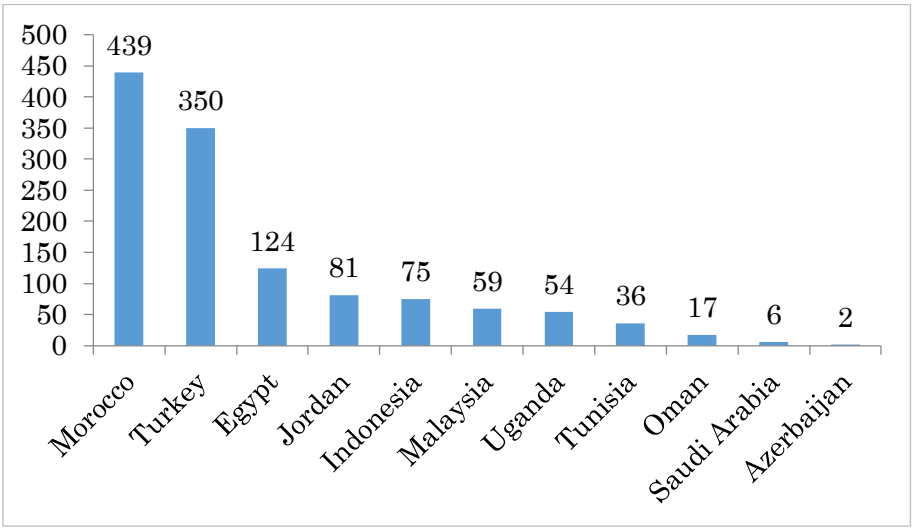
Concerning the high number of countries with low income and lower-middle income, it is apparent that development is an important issue for the alliance. Therefore, enhancing trade is a viable tool for this aim. Although there are various trade facilitation tools that may be used within the alliance, adoption of an AEO program appears to be an appropriate choice as institutional improvement is the backbone of this program.

2.1. AEO Programs in the OIC Member States

According to WCO (2018), among the OIC Member States, 12 countries out of 57 have initiated authorized economic operator programs. The names and years of launching of these AEO Programs are presented in Appendix 1.

Jordan is the first country in the alliance that introduced the AEO program, named as the Golden List. Considering that the SAFE Framework was introduced in 2005, the initiation of the AEO program in the same year made Jordan a leading country both in the OIC and in the World. Morocco has followed Jordan and initiated the AEO program in 2006. There was a pause in AEO adoption of the OIC Member States until 2010. Malaysia and Tunisia started their AEO programs in 2010 that would be dubbed as the second wave in the AEO program adoption among the OIC countries. Starting from 2013 there has been a steady increase in AEO program initiations. In 2013, Azerbaijan, Turkey and Uganda; in 2014, Egypt; in 2015, Indonesia launched their AEO programs. Brunei Darussalam, Oman and Saudi Arabia are the countries with the most recent AEO programs.

Figure 1. The Number of AEO Holders in the OIC Countries



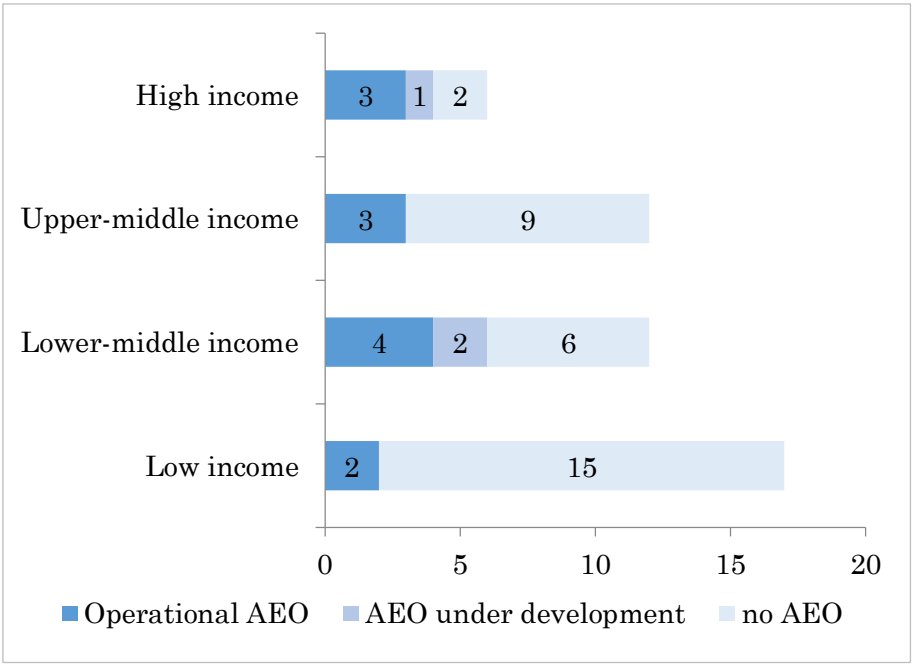
Source: Authors' compilation using WCO (2018) data and survey responses. Brunei Darussalam has also an active AEO program. However, there is no information in WCO (2018). Also, the survey has not filled out by them.

Number of operators in the OIC countries' AEO programs as of 2018 is presented in Figure 1. The variation is significantly large between the countries. The size, income,

trade volume, number of transactions, design of the AEO program, MRAs and political status are some of the determinants of the number of AEO operators in a country. Morocco is the leading country among the OIC with 439 AEO companies registered. By launching the AEO program in 2006, Morocco has also the first mover advantage. Turkey is the second country having the highest number of AEO status holders. Note that some countries initiated the program as late as 2017. AEO program in Egypt has also more than 100 enrollments by the companies. Despite the early initiation of the AEO program, the enrollment is lower in Jordan. Although Azerbaijan has an active AEO program since 2010, there are only 2 companies registered, which needs special attention.

AEO programs are distributed almost evenly among different income groups among the OIC Member States. However, the number of countries without an AEO program is the highest in low income countries (Figure 2). Moreover, compared to lower-middle income countries, the likelihood of adopting an AEO program is lower in upper-middle income countries.

Figure 2. Number of AEO Programs in the OIC Countries: Income Category



Source: Authors' compilation using WCO (2018) data.

2.2. AEO Programs and Effectiveness of Customs

There are two pillars of the AEO programs: safe/secure trade and trade facilitation. In other words, by implementing an AEO program Customs Authorities aim to divert their resources to high risk transactions and become more efficient organizations. In this respect, by using trade cost and efficiency data from the World Development Indicators of the World Bank, Table 1 provides a comparison of trade costs and efficiency among countries with AEO programs and without AEO programs as well as the World average. All the figures are the averages of 2016-2017 (except Iran, where 2017 data are not available; no data for Turkmenistan and Yemen).

Table 1. Comparison of Trade Costs among Countries with and without AEO Programs

		Cost to export		Cost to import		Time to export		Time to import	
	Efficiency	Border	Documentary	Border	Documentary	Border	Documentary	Border	Documentary
World	**4.1**	**399**	**142**	**465**	**167**	**59**	**58**	**79**	**69**
OIC Region									
AEO	**4.2**	**277**	**118**	**431**	**226**	**50**	**46**	**104**	**81**
Azerbaijan	3.8	214	300	300	200	29	33	30	38
Brunei	4.0	340	90	395	50	117	159	48	136
Egypt, Arab Rep.	3.9	258	100	554	1000	48	88	240	265
Indonesia	4.1	254	154	383	164	53	61	99	126
Jordan	4.7	131	16	181	30	38	6	79	55
Malaysia	5.2	321	45	321	60	47	10	71	10
Morocco	4.4	156	107	228	116	19	26	106	26
Oman	4.5	233	107	374	124	52	15	70	15
Saudi Arabia	4.6	338	105	779	390	69	86	228	127
Tunisia	3.1	469	200	596	144	50	3	80	27
Turkey	3.9	376	87	655	142	16	5	41	11
Uganda	4.1	229	102	412	296	68	58	154	138
No AEO	**2.0**	**476**	**212**	**597**	**273**	**69**	**81**	**98**	**98**

Note: Time is expressed in hours and cost is presented in current dollars.
Source: Authors' own calculation from World Development Indicators of the World Bank. All the indicators are the average between 2016-2017.

The first column presents the burden of Customs procedure indicator (from 1=extremely inefficient to 7=extremely efficient). The average efficiency of Customs in the World is 4.1. In the Table, the most efficient Customs among the OIC Member States is Malaysia.

The salient point here is that among the OIC Member States, the Customs Authorities implementing an AEO program are much more efficient compared to countries where there are no AEO programs. Moreover, the efficiency of the Customs in the OIC countries with an AEO program is almost at the World average. Due to limited time dimension, before and after comparisons are not possible to conduct. Hence, it is hard to say that AEO brings efficiency as the causality may run in two ways.

Columns 2-5 of Table 1 present cost of and time to export and import. In the OIC Member States, the average time and cost to export for 2016-2017 is much lower for the countries implementing an AEO program compared to the OIC countries without an

AEO program as well as the World average. Nonetheless, documentary costs of import and time to import on average for the AEO programs in the OIC Member States are much higher than the World average. Moreover, cost of and time to import at the border for the OIC countries implementing an AEO program are even higher than the OIC countries without an AEO program. Indeed, Egypt and Saudi Arabia are the outlier countries that impose much higher costs and have longer times to import at the border, pulling up the average of AEO-implementing countries among the OIC Member States.

Table 2. Logistic Performance Index in 2016

	LPI Score	Customs	Infra-structure	Int. shipments	Logistics competence	Tracking & tracing	Timeliness
AEO	***3.04***	***2.70***	***2.95***	***3.10***	***2.97***	***3.04***	***3.45***
Brunei	2.87	2.78	2.75	3.00	2.57	2.91	3.19
Egypt	3.18	2.75	3.07	3.27	3.20	3.15	3.63
Indonesia	2.98	2.69	2.65	2.90	3.00	3.19	3.46
Jordan	2.96	2.55	2.77	3.17	2.89	2.96	3.34
Malaysia	3.43	3.17	3.45	3.48	3.34	3.46	3.65
Morocco	2.67	2.22	2.46	3.09	2.59	2.34	3.20
Oman	3.23	2.76	3.44	3.35	3.26	3.09	3.50
Saudi	3.16	2.69	3.24	3.23	3.00	3.25	3.53
Tunisia	2.50	1.96	2.44	2.33	2.59	2.67	3.00
Turkey	3.42	3.18	3.49	3.41	3.31	3.39	3.75
Uganda	3.04	2.97	2.74	2.88	2.93	3.01	3.70
Others	**2.45**	**2.31**	**2.26**	**2.51**	**2.40**	**2.36**	**2.82**

Source: Authors' own calculation from Logistic Performance Indicators of the World Bank.

Table 2 presents the logistic performance indicators of the World Bank in 2016 for the OIC countries. Similar to trade costs, logistic performance indicators related to the AEO programs, namely, Customs (Column 3), Tracking & tracing (Column 7) and Timeliness (Column 8) are higher for the OIC countries with an AEO program, compared to the OIC countries without an AEO program.

3. Convergence Analysis

The OIC Member States exhibit a great degree of heterogeneity in terms of AEO adoption and implementation as discussed in Section 2. In order to document and analyze the current status of the operational AEO programs in the OIC Member States a detailed survey is created.

3.1. Survey Design

The main survey questionnaire is adopted from APEC (2016). The motivation for using a very similar survey is to create the possibility of meaningful comparisons with APEC Member States. Among the OIC Member States with an AEO program, 8 out of 12 countries (Egypt, Indonesia, Jordan, Morocco, Oman, Tunisia, Turkey and Uganda) have responded to the survey.

Identification of Themes and Variables

Together with survey design and distribution, as in APEC (2016), a qualitative comparator matrix is created using 7 major themes and 15 variables for operational AEO programs:

1. General information on the AEO program
    a. Sectors of AEOs
    b. Types of operators
2. Application, verification, and authorization
    a. Application, verification, and authorization procedures
    b. Self-assessment procedures
3. Security and compliance requirements
    a. Compliance requirements
    b. Physical security requirements
4. Post-authorization
    a. Post-authorization audit
    b. Suspension, revocation and cancellation procedures
5. Customs organizational structure for AEO programs
    a. Customs organizational structure for AEO programs
    b. Training provided to Customs officers
6. Partnership between Customs Authority and the private sector
    a. Partnership initiatives
    b. Benefits of AEOs
    c. MRAs
    d. SMEs
7. Accessibility of information on Customs Authority's website about the AEO program
    a. Electronic promotion of the AEO program

These 15 variables are supported by 92 questions that are defined as sub-variables.

3.2. Comparator Matrix

The convergence analysis involves the construction of a comparator matrix, which is a simple tool to compare different approaches to the AEO concept within the OIC Member States.

First, AEO programs are compared based on the survey responses through a determination of whether each feature is identified by the respondent country as being present in their program. If the feature is present, one point is assigned in the respected

cell of the matrix. If not, no points are assigned. This procedure is repeated for each AEO program within the OIC.

Next, a "convergence percentage" is calculated for each sub-variable. This calculation is undertaken by dividing the total number of AEO programs with that particular sub-variable by the total number of OIC member economies with AEO programs. In addition, a "total convergence percentage by variable" is calculated by taking the mean of each sub-variable under a variable. Finally, a "total convergence percentage by country" is calculated by summing identified sub-variables each AEO program has, and comparing the percentage against the maximum possible score (where a country has all sub-variables).

Finally, once the convergence percentages are calculated, sub-variables that are the most (100 percent convergence) and least (less than 50 percent convergence) commonly incorporated into member economy AEO programs are identified.

3.3. Convergence Results

This section is based on the findings from responses of 8 out of 12 countries with operational AEO programs among the OIC member countries: Egypt, Indonesia, Jordan, Morocco, Oman, Tunisia, Turkey and Uganda.

3.3.1. Variable Level Convergence

After the design and the deployment of the survey described above, the survey responses are analyzed by using the comparator matrix presented in Appendix 2.

Before going into the details of the results of convergence analysis, it is important to understand the economic diversity of countries with operational AEO programs in terms of their size, trade openness and trade intensity at their border check points as these three may have been important in the AEO adoption.

Table 3. General Overview of Survey Respondents, 2017

	GDP (in billions of USD)	Trade Openness	Average Trade Intensity at Border Checkpoints (in billions of USD)
Egypt	237	32%	-
Indonesia	1,011	30%	-
Jordan	40.5	62%	2.3
Morocco	111	53%	1.2
Oman	71.9	76%	2.1
Tunisia	39.9	85%	1.3
Turkey	841	42%	1.9
Uganda	26.4	30%	0.4

Source: Authors' compilation using survey data and WDI.

Table 3 shows that there is a great degree of variability in terms of economic size (proxied by *GDP*), trade openness (proxied by *[Exports+Imports]/GDP*) and trade intensity at the borders (proxied by *[Exports+Imports]/#Border Checkpoints*) across the

group of the OIC members that adopted AEO programs. Economic size ranges between $26.4 million to $1 billion while trade openness ranges from 30 percent to 85 percent. With the exception of Uganda, AEO holders in the OIC have average trade intensities ranging across $1.2 million to $2.3 million.

Next, the survey results are presented under 7 themes. This can be considered as a horizontal reading of the comparator matrix.

Theme 1: General information on the AEO program

The general information about the AEO program has two counterparts: sectors and types of operators. The convergence percentage for the *sectors of the AEO* program variable is 55 percent. The variable in regards to *types of operators* has a 66 percent convergence across the OIC.

A diverse set of sectors are represented in the various AEO programs within OIC. First of all, every AEO program includes the manufacturing sector. Energy is the least represented sector while Transportation/Storage are present in 63 percent of the programs.

Rather low levels of convergence in terms of Theme 1 may be caused by different priorities in each OIC member from a security standpoint. Having all types of operators may be deemed as inconvenient for security reasons; however, for the operators to benefit from the AEO programs to their full extent, it is important to involve the entire supply chain in the program as in the EU case.

Theme 2: Application, verification and authorization

There is 100 percent convergence in terms of all sub-variables of *self-assessment procedures* across the OIC AEO programs. Next, there is again 100 percent convergence in terms of all but two sub-variables of *application, verification and authorization procedures* across the OIC AEO programs. Total convergence for this variable is quite high (88 percent). The two sub-variables that have lower convergence ratios are consultation with Customs prior to application (50 percent) and risk checks with other ministries or databases (63 percent). The latter is expected to get better due to increased focus on other government agencies (OGA) coordination in the SAFE Framework (June 2015 version).

Theme 3: Security and compliance requirements

All 8 programs that responded to the survey have extensive *compliance* and *physical security requirements*. Among all themes researched in this survey, only Theme 3 exhibit perfect convergence among all the OIC AEO programs with a score of 100 percent. The highest level of convergence in this area is important and underline how closely the OIC AEO programs observe the principles of the WCO SAFE Framework.

Theme 4: Post-authorization

Post-authorization theme in the survey is composed of two main parts: *Post-authorization audit* (with 68 percent convergence) and *suspension, revocation and cancellation procedures* (with 71 percent convergence).

Among all sub-variables in the entire survey, regular re-validation mechanisms have one of the lowest convergence rates, 38 percent. All AEO programs in the survey have

the feature that AEO status can be changed, suspended or cancelled. However, only 3 out of 8 programs have a formal appeals process.

Theme 5: Customs organizational structure for AEO programs

There exists an average 75 percent convergence within the OIC *Customs organizational structure* variable. It appears that the development of AEO programs in the OIC happen to involve consultations with stakeholders.

There is a high degree of convergence in terms of AEO programs being open to foreign companies (88 percent). This is particularly important because many OIC members demonstrate willingness and effort to attract more foreign direct investment to their countries. Being able to grant AEO status to the subsidiaries of foreign enterprises may play a notable role in appealing multinationals that are particularly active in global value chains.

There are also sub-variables where there is a very low degree of convergence and requires the OIC members to devise solutions to overcome these difficulties. Firstly, communication with other government agencies within the OIC AEO programs is low (38 percent convergence). This is notable considering the fact that the WCO SAFE Framework started focusing on other border agency cooperation recently. Secondly, there is no convergence in terms of new Customs technical specialty positions established. This is due to the fact that all programs in the survey respondents' group were established using the existing human resources of the Customs.

The survey results also show that among the OIC member economies, some Customs Authorities prefer to centralize their AEO program in the headquarters while others delegate AEO authority to regional and field offices (with continued guidance by AEO specialists at headquarters). The variety of Customs organizational structures is foreseeable due to the fact that each country is unique in terms of its economic, social and cultural environment.

Training provided to Customs officials variable among survey respondents exhibit a 79 percent convergence. While all Customs Authorities have training and capacity building initiatives for the development and implementation of their AEO programs, regular training programs are missing in general (38 percent convergence). Formalized and 'regular' training is particularly important if the AEO program in OIC will start requiring AEO technical specialists from the inauguration of their programs.

Theme 6: Partnership between Customs Authority and the private sector

Theme 6 can be considered as one of the core parts of the entire survey. It is composed of partnership initiatives, benefits of AEO programs, mutual recognition agreements and the SME involvement in the program.

Considering the fact that AEO programs are voluntary, partnership between the Customs Authority and private sector is unavoidable. The results of the survey in terms of the variable partnership initiatives point to a 77 percent convergence among the OIC AEO programs. Survey responses show that there is a high degree of harmonization amongst OIC AEO programs in terms of benefits of AEOs with a convergence rate of 84 percent.

In terms of MRAs there is a low degree of convergence among the OIC AEO programs (52 percent) even though 5 out of 8 survey respondents belong in the Agadir Agreement.

This is due to the fact that Indonesia, Oman and Uganda do not have MRAs yet and this causes a decline in the convergence ratios. Indeed, all countries with MRAs (Egypt, Jordan, Morocco, Tunisia and Turkey) require domestic legislation or OGA/working group approval, joint validation/observation visits conducted prior to MRA, operational data exchanged electronically and periodic/regular consultations with partner Customs.

The final variable under this theme is related to the status of small and medium sized enterprises in the AEO programs. It is not surprising that there is low degree of convergence (44 percent) in this variable among OIC AEO programs. Specific benefits for SMEs exist only in 2 of the 8 survey respondents while 5 out of 8 countries do have SME outreach plans.

There is an ongoing discussion about the participation of SMEs in AEO programs. Note that the WCO has the position that the AEO concept is envisioned to involve and secure all elements in the international supply chains. A low degree of SMEs participation in AEO programs reduces the potential gains as the vast majority of a supply chain is composed of SMEs in many countries. Therefore, provided that security concerns are addressed, the barriers that prevent SMEs to participate in AEO programs can be reduced by employing different policy options to guarantee maximum trade-facilitation gains from an AEO program.

Theme 7: Accessibility of information on Customs Authority's website about the AEO program

Utilizing a website is the best way to provide consolidated, easily accessible and all-inclusive knowledge about an AEO program. The overall convergence in *electronic promotion of the AEO program* is 66 percent. Among the survey respondents, all AEO programs have websites in their local language. However, information in English is either missing or very limited, which need to be improved for the access of multinational corporations. All programs are missing fully online application capability and only 25 percent have frequently asked questions about AEO programs on their websites. Online application capability and FAQ are important tools to make the application procedure much easier and smoother in terms of the applicant and the Customs Authority and thus must be improved upon.

3.3.2. Country-Level Convergence

Country-level convergence indicates what percentage of all sub-variables is present in a particular AEO program. If a country possesses all the sub-variables, then its score would be 100 percent. This can be considered as a vertical reading of the comparator matrix.

Table 4 shows the results of country-level convergence analysis for 8 OIC survey respondents. The OIC AEO programs on average show a 75 percent convergence. Accordingly, Morocco and Jordan exhibit 83 and 81 percent total convergence, respectively. These countries are followed by Egypt and Turkey (76 percent), Uganda (74 percent), Indonesia (72 percent) and Tunisia (70 percent). The lowest amount of convergence is observed in Oman (66 percent).

Table 4. Country Level Convergence

	AEO Launch	#AEOs as of 2018	Convergence
Egypt	2014	119	76%
Indonesia	2015	80	72%
Jordan	2005	88	81%
Morocco	2006	439	83%
Oman	2017	17	67%
Tunisia	2010	35	70%
Turkey	2013	332	76%
Uganda	2013	51	74%
OIC			**75%**

Source: Authors' compilation using survey data and APEC (2016)

This result can be explained by two factors: (i) The age of the program-The correlation coefficient between the launch year of the AEO program and the country-convergence percentage is -0.778 indicating that as the AEO program matures, it embodies a more diverse set of characteristics. (ii) The number of AEO companies-The correlation coefficient between the number of AEO status holders and the country-convergence percentage is 0.710 signifying the fact that a higher number of AEO companies is translated into higher convergence probably through demands of these companies to be more involved in international supply chains coupled with an increasing need for further advancements in the program for security purposes.

4. Gravity Analysis

Due to its widespread acceptance in the literature and its ability to deliver a tractable framework for trade policy analysis in a multi-country environment (Arkolakis et al., 2012 and references therein), a gravity framework is employed in this paper to estimate the impact of authorized economic operator programs on bilateral trade flows.

The following is a brief discussion of the structural gravity model and is largely borrowed from Yotov et al. (2016):

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma} \qquad \forall i,j; \tag{1}$$

where

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} \frac{E_j}{Y} \qquad \forall i; \tag{2}$$

$$\mathrm{P}_j^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma} \frac{Y_i}{Y} \qquad \forall j. \tag{3}$$

Let X_{ij} denote expenditure in country j on goods from source country i. E_j signifies the expenditure on goods and services in country j originated from all countries. Y_i and Y denote the sales of goods and services at destination prices from country i to all countries and world output at those prices, respectively. Next, t_{ij} denotes the bilateral trade costs

between countries i and j. The trade elasticity of substitution across different varieties is represented by σ. Π_i and P_j are price indices of exporting and importing countries, respectively. These price indices, which are called as outward and inward multilateral resistance by Anderson and van Wincoop (2003), include trade costs with all other partners and can be interpreted as average trade costs.

The traditional gravity estimates are obtained after the log-linearization of equation (1) –assuming it holds in each time period t- with an additive error term $\varepsilon_{ij,t}$:

$$lnX_{ij,t} = lnE_{j,t} + lnY_{i,t} - lnY_t + (1-\sigma)lnt_{ij,t} - (1-\sigma)lnP_{j,t} - (1-\sigma)ln\Pi_{i,t} + \varepsilon_{ij,t} \quad (4)$$

Due to the fact that multilateral resistance terms are unobservable, until recently an overwhelming majority of the trade literature has used the following specification with standard gravity variables:

$$lnX_{ij,t} = \beta_0 + \beta_1 \ln DIST_{ij} + \beta_2 CNTG_{ij} + \beta_3 LANG_{ij} + \beta_4 CLNY_{ij} + \beta_5 lnE_{j,t} + \beta_6 lnY_{i,t} + \varepsilon_{ij,t} \quad (5)$$

In line with the standards in the literature, $lnX_{ij,t}$ denotes the logarithm of nominal bilateral international trade flows from exporter i to importer j at time t. β_0 is the constant term interpreted as the world output. Trade costs are represented by $\ln DIST_{ij}$, the logarithm of bilateral distance between trading partners i and j, $CNTG_{ij}$, an indicator variable to show the presence of borders between trading partners i and j, $LANG_{ij}$, an indicator variable for the existence of common official language between trading partners i and j and $CLNY_{ij}$, an indicator variable to capture the presence of colonial ties between trading partners i and j. The variables $lnE_{j,t}$ and $lnY_{i,t}$ are the logarithms of the importer expenditure and exporter output, respectively.

However, the heavily used specification in equation (5) suffers from many biases and inconsistencies due to ignorance of multilateral resistance terms and zero trade flows, heteroscedasticity of trade data, insufficient treatment of bilateral trade costs, endogeneity of trade policy, mistreatment of non-discriminatory trade policy and adjustment to trade policy changes. In this paper, as explained in detail in Yotov et al. (2016), to overcome these challenges we use the following theoretically-consistent structural gravity estimating equation:

$$X_{ij,t} = exp\left[\pi_{i,t} + \chi_{j,t} + \gamma GRAV_{ij} + \eta_1 AEO_{j,t} \times INTL_{ij} + \eta_2 MRA_{ij,t}\right] \times \varepsilon_{ij,t} \quad (6)$$

In equation (6) the variable $X_{ij,t}$ is the nominal trade flows. In order to be general in our treatment, we set up the estimating equation under the assumption of a panel data setting. However, in order to demonstrate the representativeness of our sample of countries in the gravity framework, we use equation (6) in a cross-section setting in year 2017. One of the most important differences of equation (6) from equation (5) is that it includes not only international trade flows ($X_{ij,t}, i \neq j$) but also intranational flows ($X_{ii,t}$) as suggested by Heid et al. (2017). Therefore, we will be able to identify the impact of

adoption of an AEO program by an importer country (a non-discriminatory trade facilitation measure towards exporting countries) on bilateral trade flows even in the existence of importer-year fixed effects.

Equation (6) is exponential following Santos Silva and Tenreyro (2006) to estimate the gravity model with the Poisson Pseudo Maximum Likelihood (PPML) estimator. Due to the large degree of heteroscedasticity in trade flows, estimating a log-linearized version of (6) leads to inconsistent parameter estimates as shown in Santos Silva and Tenreyro (2006). Therefore, the use of PPML as an alternative overcomes the challenges of the standard OLS estimator. Furthermore, due to the multiplicative form of the estimating equation in (6), PPML enables the researchers to make use of the information embedded in the zero trade flows.

$GRAV_{ij}$ is a vector of co-variates which includes all standard time-invariant gravity variables in equation (5). We also experiment by replacing $GRAV_{ij}$ with a full set of pair fixed effects, μ_{ij}. The term μ_{ij} encompasses the set of country-pair fixed effects (i) to absorb all time-invariant gravity covariates from equation (5) and any other unobservable time-invariant bilateral determinants of trade costs and (ii) to absorb most of the linkages between the endogenous trade policy variables and the remainder error term $\varepsilon_{ij,t}$. Furthermore, whether the error term $\varepsilon_{ij,t}$ in equation (6) is introduced as additive or multiplicative does not affect the PPML estimator (Santos Silva and Tenreyro, 2006).

The term $\pi_{i,t}$ denotes the set of time-varying exporting-country dummies, which account for observable and unobservable exporter-specific factors that may influence bilateral trade as well as the outward multilateral resistances and countries' output shares. The term $\chi_{j,t}$ involves the set of time-varying importing-country dummy variables that control for observable and unobservable importer-specific characteristics that may influence trade as well as the inward multilateral resistances and total expenditure in the importing country.

The expression $AEO_{j,t} \times INTL_{ij}$ is the interaction of $AEO_{j,t}$ and $INTL_{ij}$. The term $AEO_{j,t}$ denotes the vector of dummies if the importing country has an operational authorized economic operator program in year t, while $INTL_{ij}$ is a dummy variable taking the value of one for international trade between countries i and j, and zero otherwise. Note that, this interaction term results in a new bilateral term that enables us to identify the effects of this non-discriminatory trade policy measure, even in the presence of importer-time fixed effects. Finally, the term $MRA_{ij,t}$ represents the vector of mutual recognition agreements of OIC Member States.

4.1. Data

The data used in the structural gravity analysis of the current paper cover the period of 2000-2017. Since the first AEO program among the OIC Member States was adopted in 2005 by Jordan, we start in 2000 to have a reasonable number of years before that. Our data set includes 132 countries of which 57 are OIC Member States[5].

[5] Due to lack of data on many micro states and a variety of Sub-Sharan African states, only 132 of current 229 states of the World are included in the dataset. A list of these countries is provided in Appendix 3.

Our data are composed of four main elements: (i) International trade flows; (ii) intranational trade flows, (iii) presence of AEO programs and MRAs, and (iv) gravity variables.

The international trade flows are obtained from the 2017 update of the Direction of Trade Statistics (DOTS) provided by the IMF. The DOTS database publishes bilateral trade flows for 229 countries. Our justification for using the IMF DOTS is twofold: (i) The current version of the IMF DOTS uses many data sources including the UN COMTRADE database to have the most extensive coverage. (ii) A new methodology[6] is used to estimate the missing observations, which is the case for many of the OIC Member States.

Only the export and imports of 57 OIC Member States with each other and with the remaining 75 countries in the dataset are considered to identify the impact of OIC AEO programs and MRAs on bilateral trade of these countries.

The intra-national trade flows are ideally constructed as the difference between the gross value of domestic production and the gross value of total exports. In this paper, we obtain the intra-national trade flows as the difference between GDP and total exports. We recognize the inconsistency between the measure of GDP as value added and the measure of total exports as gross value. However, it is not possible for us to use gross values for both, due to the unavailability of cross-country gross-production data (from the UNIDO's Industrial Statistics Database) for many of the OIC Member States.

The *OIC AEO programs and MRAs* data come from the WCO (2018). The former is a time-varying non-discriminatory policy measure and takes the value of one if the importing country has an AEO program and zero otherwise. The latter is a country-pair variable that varies in time and takes the value of 1 if two countries have a mutual recognition agreement and zero otherwise.

The gravity variables are either constructed or obtained from different sources. For the panel data analysis, bilateral fixed effects are used to absorb all time-invariant bilateral determinants of trade. However, due to the impossibility of using directional bilateral fixed effects in our cross-section regressions, we have to rely on a standard set of standard gravity variables. The data on bilateral distance, common language, contiguity, and colonial ties are taken from CEPII's Distances Database (Mayer and Zignago, 2011). The current GDP data to proxy for exporting country output and importing country expenditure are obtained from WDI.

4.2. Estimation Results

We begin our estimations with a cross-section specification and then extend it to a panel setting where standard gravity variables and bilateral fixed effects are used as in equation (6). Table 5 reports the results.

Column (1) of Table 5 reports the cross-section results for 2017 using a standard OLS estimating method. The estimates of the standard gravity variables are in line with a voluminous gravity literature that is extensively surveyed by Head and Mayer (2014). The results from Column (1) suggest that the existence of AEO programs in the OIC Member States increases the bilateral trade of these countries in a significant manner. Moreover, the coefficient of *MRA* (which is more than the double of the coefficient of

[6] Marini et al. (2018) explain the mew methodology used in the preparation of the 2017 of IMF DOTS.

*AEO*x*INTL*) shows that mutual recognition of AEO holders across MRA partners has a significant trade facilitation effect.

Table 5. Gravity Estimations

Variables	(1) 2017 Cross-section	(2) 2000-2017 Panel	(3) 2000-2017 Pair FEs	(4) 2000-2017 Missing
INTL	-9.336***	-4.768***		
	(0.938)	(0.399)		
ln*DIST*	-2.179***	-0.622***		
	(0.098)	(0.130)		
CNTG	-0.086	0.306		
	(0.611)	(0.315)		
LANG	2.146***	0.231		
	(0.222)	(0.235)		
CLNY	2.238***	0.683***		
	(0.509)	(0.225)		
ln$Y$	2.544***			
	(0.028)			
ln$E$	1.844***			
	(0.030)			
AEO x *INTL*	1.029***	0.843	-0.142	-0.111
	(0.176)	(0.561)	(0.116)	(0.124)
MRA	2.525***	0.606**	-0.076	-0.060
	(0.531)	(0.286)	(0.054)	(0.055)
Observations	10,269	195,097	198,691	155,835
Exporter-time FEs		X	X	X
Exporter-time FEs		X	X	X
Bilateral FEs			X	X
Missing set to 0	X	X	X	

Note: The dependent variable is the bilateral nominal trade flows ($X_{ij,t}$) including domestic trade ($X_{ii,t}$) and it is used in logarithms only in Column (1). Except for Column (1) all regressions include exporter-time and importer-time fixed effects. Except for Column (4), in all regressions non-reported international trade flows are set to zero. Column (1) reports OLS estimates of gravity model for the cross-section of 2017. Column (2) presents gravity estimates using PPML for the period 2000-2017. Columns (3) and (4) report structural gravity estimates using PPML for the period 2000-2017 with directional country-pair fixed effects.

Column (2) of Table 5 reports the results of the PPML regression from a panel of 132 countries from 2000 to 2017. Here, ln$Y$ and ln$E$ are dropped out due to the inclusion of exporter-time and importer-time fixed effects in accordance with the requirements of gravity theory in terms of the need for proper control of multilateral resistance terms. The important result here is that in the existence of exporter-time and importer-time fixed effects, the parameter *AEO* x *INTL* continues to be positive but ceases to be statistically significant. MRAs still exert a positive and significant influence on bilateral trade of OIC Member States.

As trade policy tools the AEO program adoption or MRAs are potentially endogenous due to the fact that these policy measures are not randomly assigned across countries and affected by the level of bilateral trade. Owing to the difficulty of finding

instrumental variables that satisfy the essential exclusion restrictions at the country level, we follow Baier and Bergstrand (2007) and include directional country pair fixed effects to control for endogeneity in the regressions from this point on.

Column (3) reports the results with pair fixed effects along with exporter-time and importer-time fixed effects. Naturally, all standard gravity variables are dropped. The most noteworthy result of the structural gravity analysis of this paper is that neither OIC AEO programs nor MRAs signed by these countries have an impact on the bilateral trade of the 57 OIC Member States with each other and the rest of the world. In other words, the expected trade facilitation impact of the authorized economic operator programs in the OIC is absent.

As a robustness check, rather than treating missing trade observations as zeros we let them stay as missing and rerun the regression in Column (3) of Table 5 and we report the results in Column (4). The results are qualitatively the same with the previous.

5. Case Study Analysis

In the previous section, the results indicate that the AEO program adoption does not contribute to higher trade in the OIC Member States, although one of its main aims is to facilitate trade. In order to understand the reasons behind this, field visits were conducted, and interviews were performed with government officials as well as with 3 of the AEO companies in 3 case study countries, namely Jordan, Turkey and Uganda (representative of Arab region, Asian region and Sub-Saharan Africa region within the OIC).

5.1. Jordan

Jordan Customs initiated an authorized economic operators program, known as the Golden List (GL) program in 2005. The very first step of the GL design of Jordan can be traced back to September 2003 when Jordan Customs and USAID agreed to design an AEO program. In other words, Jordan leveraged donor assistance to develop its GL program and succeeded in achieving recognition from U.S. Customs and Border Protection.

The WCO SAFE Framework Standards, which were developed simultaneously, were integrated to the program. The design of the GL program in terms of compliance has benefited from the EU's program as a benchmark.

The GL program grants preferential treatment to companies that exhibit a low degree of risk and an excellent compliance history in Customs. The program is based on voluntary compliance by supply chain companies to Jordanian regulations and legislations as well as international security requirements.

Currently 88 companies in Jordan holds GL status covering 7.5 percent of imports and 22 percent of exports. The major increase in the number of GL companies was realized in 2017 after Jordan Customs started to invite eligible companies to apply for the program.

There are several lessons learnt from the Jordanian experience: (i) designing the AEO program in cooperation with a developed country enables smooth implementation, fewer alterations of the program and increases the credibility of the program for the third countries; (ii) Client Relations Management helps the companies communicate more

efficiently with the Customs and increases the sense of belonging to the program; (iii) prior consultation to the Customs before applying to the program reduces unnecessary mistakes and provides time and cost savings; (iv) promotion of the AEO program to the private sector is key for the program's success.

Although GL is one of the oldest AEO program in the World, there are still challenges that Jordan Customs face. First challenge of the GL program execution in Jordan is related to the level of awareness of the private sector regarding the GL program benefits. This may be due to insufficient promotion of the program or underutilization of benefits by the existing GL operators.

Second challenge faced by the Jordan Customs in terms of implementation of GL program is the insufficiency of the number of staff coupled with a continued need for skills updating of the existing staff.

Third challenge is the lower level of institutions in Jordan which stand as an impediment behind the smooth working of the program.

5.2. Turkey

Turkey has launched its Authorized Economic Operator (AEO) Program in 2013. The Ministry of Trade developed the AEO Program of Turkey in compliance with the WCO SAFE Framework. The design of the AEO is in general based on the EU program. However, some of the aspects of C-TPAT (the AEO program of USA) and South Korean AEO program were also incorporated to the Turkish AEO Program design.

The AEO program in Turkey involves both export and import regimes. AEO status was obtained by exporters, importers and international freight carriers. Currently, other operators of the supply chain are not eligible for the AEO status.

As of August 2018, there are 350 authorized economic operators in Turkey, second highest number of operators in the region. In the implementation of the AEO program there is no pre-determined sector preference.

The AEO implementation is a fast-developing area due to improvements in information and communication technologies. The challenge for Turkish Customs here is that adaptation of new technologies requires the government to respond immediately in order to prevent additional problems or difficulties that would emerge otherwise. Moreover, large volumes of data are collected by the government from the AEOs, which create added data safety and security concerns on the side of the government.

From the private sector perspective, expectations of private companies from the AEO program vary in accordance with their conception of the system. Companies are of the view that the application procedure takes a long time, there are many detailed criteria to comply with but there are no standards, sector-specific measures to be taken. Evaluation process is subject to the perception of different experts in the headquarters of Customs administration.

Turkish case study suggests that existing trade facilitation measures can be obstacles in the implementation to the AEO programs as the participation becomes limited. Moreover, AEO certificates given to limited type of operators creates loopholes in the supply chain in terms of security and safety. Finally, more requirements for the application increase the cost of the certificate significantly, thereby reducing the number of AEO holders.

5.3. Uganda

In the midst of many economic and supply chain security challenges, Uganda became a part of the East African Countries (EAC) Regional Authorized Economic Operator Program Protocol[7] that was conceived by the Commissioners of Customs of Burundi, Kenya, Rwanda, Tanzania and Uganda in 2005.

Uganda's experience amongst OIC members is unique in the sense that the country has established its AEO program under the EAC umbrella and became a part of a regional AEO program from its inauguration. In other words, national and regional AEO programs of Uganda were established simultaneously. Moreover, the overarching objective in involvement in a regional AEO program for Uganda was to facilitate trade to its fullest extent and secure the supply chain to realize gains for all stakeholders ranging from traders to Customs.

Firstly, the design of AEO program has involved a wide set of stakeholders. Next, the AEO programs of other countries such as the US, the EU, Canada and Sweden were examined. Finally, Japan was chosen as the benchmark country in the AEO design of Uganda.

In its design, the AEO program in Uganda targeted importers and Customs agents first. Later, exporters and bonded warehouses were included in the program. There are plans to involve transporters and freight-forwarders.

Currently, 51 companies in Uganda hold AEO status of which 23 are EAC Regional AEOs. These AEO companies account for 22 percent of trade volume in Uganda. Current number of companies that hold a regional AEO certificate in EAC region is 82 of which 23 are Ugandan companies.

The main challenges that were faced in the design process of the AEO program in Uganda were the high degree of informality experienced in the country coupled with the disbelief of firms about the merits of the program. Second challenge is the lack of staff at the Customs; one Customs official manages many traders and bonded warehouses, which reduces the required speed of operations. Third, the AEO companies are not identified by the Customs officers on the border, which prevents the companies to ensure preferential treatment. Moreover, the benefits are not fully utilized by the private sector: (i) Bond guarantee waiver is not available at the moment. (ii) Uganda is a transit hub for the EAC region. There are very few Ugandan Customs officials in port cities in Kenya or Tanzania. The resulting congestion is a barrier to fully recognize the AEO benefits. (iii) AEO benefits are not available in dealings with other URA Departments and government agencies on the border such as Bureau of Standards, National Drug Authority or Immigrations.

[7] The EAC Regional AEO program operates under a common set of criteria, instruments, authorization process, benefits and monitoring system in all the Partner States. An applicant for AEO Status, irrespective of the Partner State as a result goes through the same set of criteria like her/his counterparts in other Partner States. The Customs experts who administer these criteria are trained together to ensure harmonization and uniformity in process.

6. Conclusion

This paper investigated the impact of AEO program adoption on the trade of the members of the Organization of Islamic Countries for the period of 2000-2017, by using descriptive analysis, convergence analysis, gravity model and case studies.

Firstly, the results of the descriptive analysis suggest that the countries that adopted the AEO program among the OIC Member States have lower cost of and time to trade and higher efficiency, in general. However, there are outlier countries that impose much higher costs and have longer times to import at the border.

Secondly, convergence analysis based on the survey conducted with countries in the OIC countries concludes that there is a high level of convergence in terms of AEO implementation among the OIC Member States. While evaluating the survey results, two points should be taken into consideration: (i) Survey results may have the usual biases; (ii) The AEO programs on paper and their application could be different due to the insufficient institutional background of some of the OIC Member States.

Thirdly, the empirical analysis conducted with 132 countries for the period 2000-2017 by using the gravity analysis suggests that bilateral trade of the OIC Member States with their partner countries does not increase significantly with the adoption of the AEO program. In other words, trade facilitation objective of the program has not been achieved in the OIC.

Finally, we conducted field visits to get insights regarding the challenges and success factors of the program in the design and implementation phase. The common challenges of the program could be summarized as follows: (i) The companies are not able to utilize all the benefits provided by the associated AEO program for various reasons; (ii) Customs Authorities struggle with resource constraints that prevent them from employing a sufficient number of qualified personnel solely working for the AEO program; (iii) Costs of the program for the private sector are quite high; (iv) AEO programs do not encompass the supply chain as a whole; (v) The number of MRAs are very limited. The main consequence of these challenges is the limited participation of the companies to the program. Moreover, these companies do not fully realize trade facilitation offered by the program. Therefore, increase in the trade at the country level would not be observed, though increases in trade at the firm-level would be possible.

The analysis in this paper suggest that, although AEO is a well-designed program comprising safety and security of the supply chain as well as trade facilitation with the requirement of institutional improvement for the companies and Customs, it does not serve its purpose of increasing trade at the country level for the OIC Member States. Considering the fact that these countries are mostly developing, lower income countries; success in the AEO implementation would bring both increase in trade and improvement in institutions. In other words, an AEO program may serve as a viable tool for achieving their long-term development goal. Therefore, strong support from international organizations such as the WCO and the World Bank in the form of capacity building may increase the success of the program for lower income developing countries.

Based on our comprehensive analysis, we provide some policy recommendations to the countries for improving their programs in the next Section.

7. Policy Recommendations

This final section provides concrete policy recommendations based on a synthesis of various analyses that are conducted in this paper.

Policy Recommendation 1: Designing an attractive package where benefits provided by the AEO program to the private sector outnumber costs borne by firms and traders to obtain authorization, in order to attract companies to participate in the program

AEO programs aim to provide trade facilitation as well as safe and secure trade. Considering the fact that AEO is a voluntary program, attracting companies to participate for the program has vital importance. Therefore, the benefits provided by the AEO program to the private sector should be evaluated against the costs borne by firms and traders to obtain authorization. Such costs include application and procedure-related fees, but also the costs of carrying out necessary changes in order to become eligible for authorization. The EU AEO program provides a good example for package design, where AEO guidelines are published and updated by the Taxation and Customs Unit[8]. The guidelines provide a clear demonstration of benefits, procedures, legal texts and contact offices for agents wishing to obtain authorization.

The following benefits are suggested to be satisfied at a minimum: (i) immediate release of cargo upon arrival by Customs and other government agencies; (ii) deferred payment of duties and taxes; (iii) relief from guarantee/bond requirements.

Policy Recommendation 2: Expanding the types of operators participating in the program and supporting the participation of SMEs in order to involve the entire supply chain for the operators to benefit from the AEO programs to its fullest extent

In the OIC countries types of operators involved in the AEO program are rather limited. This may be caused by different priorities in each OIC Member State from a security standpoint. Having all types of operators may be deemed as inconvenient for security reasons; however, for the facilitation of trade, it is important to involve the entire supply chain in the program.

The OIC AEO programs seem to favor large businesses. This is due to the fact that costs involved in upgrading security systems to meet AEO requirements seem astronomical for SMEs. Requiring all-over fencing for all AEOs, 24-hour security services and constant tracking technology for cargo may become prohibitive barriers for the SMEs. Therefore, inflexibility and prescriptive nature of security requirements may become insurmountable barriers for SMEs and prohibit their participation in the program.

The way Japan addresses the difficulty of SMEs' participation to the AEO program is to utilize Customs brokers[9]. Hence, SMEs can enjoy almost all procedural benefits of AEO status while diminishing the cost of further investment.

Among the OIC countries Jordan offers an AEO-like program called the Silver List to incentivize SMEs to participate in trade practices that are compliant and safe by offering

[8] See https://ec.europa.eu/taxation_customs/general-information-customs/customs-security/authorised-economic-operator-aeo/authorised-economic-operator-aeo_en

[9] See http://www.customs.go.jp/english/aeo/index.htm

some of the trade facilitations in the Golden List program. Furthermore, successful Silver List participants are invited to apply for the Golden List program.

As discussed in Dincer and Tekin-Koru (2018), the governments can choose to subsidize large firms to pull up the SMEs that are in their supply chain to be more compliant and secure in their transactions. That way, the bottleneck of SMEs' participation in AEO programs can be addressed by prepping SMEs to be eligible to apply to the program.

Policy Recommendation 3: Increasing the number of MRAs to increase the benefits to the AEO certificate holders as MRAs make it possible for AEO holders to enjoy the trade facilitation benefits provided by the partner countries

One of the precursors of obtaining maximum gains from holding an AEO certificate is mutual recognition agreements. MRAs make it possible for AEO holders to enjoy the trade facilitation benefits provided by the partner countries. Furthermore, these agreements guarantee the security of the supply chain due to recognition of AEO status across partner countries.

Standardization and harmonization of security assessment, and implementation processes take time for the Customs to sign MRAs. However, once Customs start to sign MRAs, maintaining compliance and risk management will become more effective and will lead to new MRAs.

For the participation of developed countries in the MRAs with the OIC countries, the quality of AEO implementation is important, which crucially depends on institutions such as rule of law and control of corruption.

Policy Recommendation 4: Regional AEO design and implementation to align the programs from their inauguration by minimizing the inconsistencies among programs in terms of application, verification and evaluation processes along with operating under the same legal framework.

The share of many OIC member countries in the world trade is miniscule and their international trade involves only a few significant trade partners. Therefore, it might be hard to justify the costs attached to an AEO program design. These costs vary from capacity building to technology adoption, from training existing personnel to hiring new staff. Canada, for example, revised and improved its program in 2008 which costed the country 11.6 million CAD[10]. Moreover, a regional AEO program increases the likelihood of MRAs for the involved countries as the total trade volume becomes significant.

The main benefit of getting involved in a regional AEO is the minimization of the inconsistencies among programs in terms of application, verification and evaluation processes along with operating under the same legal framework.

The best international practice in this regard can be considered as the EU; however, one should note that the EU is an economic and political union and the common AEO program across 28 countries is a direct result of the status quo.

[10] See http://www.pcb.ca

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Appendix 1. AEO Programs in the OIC Member States

Country	Launch Year	AEO Program Name
Azerbaijan	2013	Authorized Economic Operator
Brunei	2017	Sutera Lane Merchant Scheme
Egypt	2014	Authorized Economic Operator
Indonesia	2015	Authorized Economic Operator
Jordan	2005	Golden List Program
Malaysia	2010	Authorized Economic Operator
Morocco	2006	Authorized Economic Operator
Oman	2017	Authorized Economic Operator
Saudi Arabia	2017	Saudi Authorized Economic Operator
Tunisia	2010	Authorized Economic Operator
Turkey	2013	Authorized Economic Operator
Uganda	2013	Authorized Economic Operator

Source: Authors' compilation using WCO (2018) data.

Appendix 2. The Comparator Matrix

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
General information on the AEO program										
Sector of AEOs										**55%**
Agriculture, Forestry, & Fishing			1	1		1	1		**50%**	
Mining & Quarrying	1		1	1		1			**50%**	
Manufacturing	1	1	1	1	1	1	1	1	**100%**	
Energy			1	1			1		**38%**	
Wholesale & Retail Trade	1		1	1			1		**50%**	
Transportation & Storage		1	1	1	1		1		**63%**	
Other Services		1	1	1	1	1			**63%**	
Other			1	1					**25%**	
Types of operators										**66%**
Importer	1	1	1		1	1	1	1	**88%**	
Exporter	1	1			1	1	1	1	**75%**	
Customs Broker	1	1	1	1	1			1	**75%**	
Warehouse Operator	1	1	1	1	1			1	**75%**	
Logistics Operator		1	1	1	1		1		**63%**	
Manufacturer	1	1		1	1	1	1	1	**88%**	
Port/Terminal Operators				1					**13%**	
Other			1	1	1	1			**50%**	

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
Application, verification, and authorization										
Application, verification, and authorization procedures										**88%**
Consultation with Customs prior to Application	1		1		1			1	**50%**	
Application (with security profile/Self-Assessment)	1	1	1	1	1	1	1	1	**100%**	
Risk Checks/Assessment with other Ministries/databases	1		1	1			1	1	**63%**	
Review of Security Procedures	1	1	1	1	1	1	1	1	**100%**	
Onsite Validation/Verification audit	1	1	1	1	1	1	1	1	**100%**	
Comprehensive Compliance Assessment	1	1	1	1	1	1	1	1	**100%**	
Company Background and Operating Environment	1	1	1	1	1	1	1	1	**100%**	
Self-assessment procedures										**100%**
Operator-Submitted Accounting Information	1	1	1	1	1	1	1	1	**100%**	
Customs Provided Self-Assessment Checklists for Operators	1	1	1	1	1	1	1	1	**100%**	
Customs Examination of Self-Assessment during Validation	1	1	1	1	1	1	1	1	**100%**	

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
Security and compliance requirements										
Compliance requirements										**100%**
Positive Customs Compliance Record	1	1	1	1	1	1	1	1	**100%**	
Financial Viability	1	1	1	1	1	1	1	1	**100%**	
Audited Financial Statements	1	1	1	1	1	1	1	1	**100%**	
Internal Controls (including System for Management of Commercial Records)	1	1	1	1	1	1	1	1	**100%**	
Meet Security/Safety Requirements	1	1	1	1	1	1	1	1	**100%**	
Physical security requirements										**100%**
Physical Site Security	1	1	1	1	1	1	1	1	**100%**	
Access Control	1	1	1	1	1	1	1	1	**100%**	
Procedural Security	1	1	1	1	1	1	1	1	**100%**	
Container, Trailer, and Rail Car Security	1	1	1	1	1	1	1	1	**100%**	
Data and Document Security	1	1	1	1	1	1	1	1	**100%**	
Personnel Security	1	1	1	1	1	1	1	1	**100%**	
Goods (including Storage) Security	1	1	1	1	1	1	1	1	**100%**	
Transportation/Conveyance Security	1	1	1	1	1	1	1	1	**100%**	
Business Partner Requirements	1	1	1	1	1	1	1	1	**100%**	

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
Post-authorization										
Post-authorization audit										**68%**
Regular Re-validation Mechanism	1			1				1	**38%**	
AEO submits statements to Customs on a regular basis/any changes in their situation	1	1	1	1	1		1	1	**88%**	
Field/Site Audit	1	1	1	1	1		1	1	**88%**	
AEO Internal Audit		1		1	1		1	1	**63%**	
Risk Profiling/Assessment	1			1	1		1	1	**63%**	
Suspension, revocation and cancellation procedures										**71%**
AEO status can be changed/suspended/cancelled	1	1	1	1	1	1	1	1	**100%**	
Customs can issue Administrative Orders for Improvement		1	1	1		1	1	1	**75%**	
Appeals Process Exists		1		1				1	**38%**	

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
Customs organizational structure for AEO programs										
Customs organizational structure for AEO programs										**75%**
Dedicated Office for AEO Program Administration	1	1	1		1	1	1	1	**88%**	
Internal Checks/Controls	1	1	1	1	1	1	1	1	**100%**	
Formal Reporting Systems	1	1	1	1	1	1	1	1	**100%**	
Risk Management Department assists with AEO Program Management/Oversight	1		1		1		1	1	**63%**	
Communication with Other Government Agencies about AEO Program	1		1					1	**38%**	
AEO Program Standard Operating Procedures or Guidelines Exist	1	1	1	1	1	1	1	1	**100%**	
New Customs Technical Specialty Positions Established									**0%**	
AEO Program Implemented Through Administrative Initiative	1	1	1	1	1	1	1	1	**100%**	
AEO Program Implemented Through Passed Legislation	1	1		1		1	1	1	**75%**	
AEO Program Open to Foreign Companies or MNCs	1	1		1	1	1	1	1	**88%**	

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
Training provided to Customs officers										**79%**
Academic Training	1	1	1	1		1	1	1	**88%**	
Skill Training	1	1	1	1		1	1	1	**88%**	
Regular Training Programs	1	1				1			**38%**	
AEO-specific Training	1	1	1	1		1	1	1	**88%**	
Supply Chain Security Training	1	1	1	1		1	1	1	**88%**	
Audit Training	1	1	1	1		1	1	1	**88%**	
Partnership between Customs Authority and the private sector										
Partnership initiatives										**77%**
Formal or Informal Consultation with Industry and Stakeholders on AEO Program Design	1	1	1	1	1	1	1	1	**100%**	
Formal or Informal Consultation with Industry and Stakeholders on AEO Program Implementation	1	1	1	1	1	1	1	1	**100%**	
Promotion of AEO program by Customs	1	1	1	1	1	1	1	1	**100%**	
Applicant/AEO assigned an Account Manager	1	1	1		1	1		1	**75%**	
Dedicated AEO Enquiry Phone Number/Email	1	1		1	1	1		1	**75%**	
Survey of Trader Satisfaction					1				**14%**	

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
					Benefits of AEOs					**84%**
Different Benefits for Different Types of Operators		1	1	1	1	1		1	**75%**	
Mutual Recognition of AEO Status by Other Customs	1		1	1		1	1	1	**75%**	
Lead Time and Predictability	1	1	1	1	1	1	1	1	**100%**	
Simplified Data Requirements and Data Submission	1	1	1	1	1	1	1	1	**100%**	
Access to Customs Assistance for AEOs	1	1	1		1	1		1	**75%**	
Measures to Expedite Cargo Release, Reduce Transit Time, and Lower Storage Costs	1	1	1	1	1	1	1	1	**100%**	
AEO Program Logo Exists		1	1		1		1	1	**63%**	
					MRAs					**52%**
MRAs require Domestic Legislation or OGA/Working Group Approval	1		1	1		1	1		**63%**	
Joint validation/observation visits conducted prior to MRA	1		1	1		1	1		**63%**	
Operational Data Exchanged Electronically	1		1	1		1	1		**63%**	
Different Trader Identification			1				1		**25%**	
Common Trader Identification	1			1		1			**38%**	
Periodic/Regular Consults with Partner Customs	1		1	1		1	1		**63%**	

	Egypt	Indonesia	Jordan	Morocco	Oman	Tunisia	Turkey	Uganda	Convergence Percentage by Sub-Variable	Total Convergence Percentage by Variable
					SMEs					**44%**
Specific Benefits for SMEs (including at Application Stage)			1	1					**25%**	
SME Outreach Plan			1	1	1		1	1	**63%**	
Accessibility of information on Customs Authority's website about the AEO program										
					Electronic promotion of the AEO program					**66%**
Explanatory information of AEO Program on Website	1	1	1	1	1	1	1	1	**100%**	
Contact information	1	1	1	1	1	1	1	1	**100%**	
Online forms		1			1		1		**38%**	
Online Application Capability									**0%**	
FAQ		1					1		**25%**	
Requirements to Join	1	1	1	1	1	1	1	1	**100%**	
Benefits of Joining	1	1	1	1	1	1	1	1	**100%**	
Total Convergence Percentage by Country	**76%**	**81%**	**72%**	**83%**	**67%**	**70%**	**76%**	**74%**		**75%**

TOTAL CONVERGENCE

Appendix 3. List of Countries in the Structural Gravity Analysis

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belarus, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Cameroon, Canada, Chad, Chile China, Colombia, Comoros, Costa Rica, Côte d'Ivoire, Croatia, Czech Republic, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea Bissau, Guyana, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya Korea, Kuwait, Kyrgyz Republic, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Netherlands, New Zealand, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovak Republic, Slovenia, Somalia, South Africa, South Sudan, Spain, Sri Lanka, Suriname, Sweden, Switzerland, Syria, Tajikistan, Thailand, Togo, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, Vietnam, West Bank and Gaza, Yemen, Zambia