THE ROLE OF EXTERNAL ECONOMIC FACTORS IN THE IMPLEMENTATION OF THE AEO PROGRAMME

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Abstract

The World Customs Organization (WCO) introduced the SAFE Framework of Standards to Secure and Facilitate Global Trade to increase security and facilitate international trade simultaneously. By raising standards and a common methodology, the Standards System would allow Authorized Economic Operators (AEO) to enter and operate more quickly in the global supply chain via cooperation with the customs authorities. Using binary logistic regression, it was found that the most significant factor for a nation to decide whether to introduce the AEO programme is the value of imports, suggesting that import security is the primary factor. Since the publication of the Standards System, the AEO programme has become the number one tool for the safe and smooth conduct of international trade. Strong corruption and high border crossing costs have a negative impact, resulting in countries needing a transparent and structured AEO programme to refrain from adopting it.

Keywords: AEO, security, trade facilitation

JEL Classification: F40, F42, F68

Introduction and theoretical background

After the terrorist attack on the USA on September 11, 2001, ensuring the security of international supply chains became a priority issue. Several regimes have been introduced to deal with the problem, among which the AEO program ensures the cooperation of authorities and business actors as partners. (Grainger, 2007) In June 2005, the World Customs Organization (WCO) published the SAFE Framework of Standards to Secure and Facilitate Global Trade to counter the threat of terrorism. According to the objectives set out in its foreword, there is a need for a strategy

approved by the World Customs Organization that ensures the security of international trade in goods in a way that facilitates the conditions for international trade (World Customs Organization, 2005; Nagy et al., 2018).

Objectives of the framework, among others, are:

- *„Establish standards that provide supply chain security and facilitation at a global level to promote certainty and predictability.*
- *Enable integrated and harmonized supply chain management for all modes of transport.*
- *Enhance the role of strengthening cooperation between Customs administrations, for example, through exchanging information, mutual recognition of controls, mutual recognition of Authorized Economic Operators (AEOs), and mutual administrative assistance.*
- *Strengthen cooperation between Customs administrations and other Government agencies involved in international trade and security, such as through Single Window.*
- *Strengthen Customs/Business cooperation.*
- *Promote the seamless movement of goods through secure international trade supply chains." (World Customs Organization, 2018)*

The WCO Standards System consists of four essential elements:

1. The Standards System shall standardize the prior electronic reporting requirements for incoming, outgoing and transit shipments.
2. Each country joining the Standards System should commit to a common risk management strategy to address the security threat.
3. The System of Standards mandates that, at the receiving State's reasoned request, the sending State's customs authorities shall examine high-risk out-going consignments and containers based on an appropriate risk assessment methodology, preferably with so-called non-intrusive detection devices such as industrial X-ray equipment or radiation detectors.
4. The System of Standards defines the benefits to the companies that meet minimum standards and best practices for supply chain security by the respective customs authority.

The SAFE Standards System, based on the four essential elements described above, relies on the pillars of network agreements between customs authorities and partnerships between customs authorities and businesses. (World Customs Organization, 2005)

Several countries have established AEO programs within the framework of the Standards System. The Authorized Economic Operator (AEO) programmes transpose the objectives and essential elements of the system of standards into national law and thus operationalize it. An Authorized Economic Operator is an economic operator with a special status who, based on his special status, is considered by the customs authorities to be a reliable partner and, therefore, receives several benefits from the customs authorities.

The application of AEO programmes per the international standard allows the countries operating AEO or equivalent programmes to recognize each other's programmes and to sign Mutual Recognition Agreements (MRAs), which enable supply chain security on a global scale while facilitating trade. (World Customs Organization, 2018; Altemöller, 2011; Pratama & Everett, 2017; Kozák et al., 2020)

Since the publication of the Standards System, the AEO programme has become the number one tool for the safe and smooth conduct of international trade. (Karlsson, 2017)

This paper explores the factors that motivate countries to introduce an AEO programme.

Material and methods

The research question is: What are the most significant factors in countries' decision to establish an AEO programme?

To answer the research question, this study uses binary logistic regression. Binary logistic regression is closely related to OLS. It can be utilized similarly, i.e., evaluate the value of the coefficients of the independent variables as to their effect on the dependent variable. This is used over OLS due to the binary nature of the dependent variable. Using this method, a model was developed to examine the impact of external economic factors on the launch of AEO programmes using macroeconomic indicators.

Indicators consistent with the essence of the AEO programme were included in the study based on the following considerations:

- GTI 2018 - Global Terror Index annually ranks countries based on the number of terrorist acts committed on their territory, fatalities and injuries and the material damage caused. The ranking does not differentiate between domestic and international terrorism or the perpetrator and the victim. However, the decision to introduce AEO is unlikely to be materially influenced by these simplifications. The Global Terrorism Index (GTI) ranking published by the Institute for Economics & Peace is used to measure the terrorist threat for each country. (Institute for Economics & Peace, 2018)
- GDP / capita ranking - The GDP per capita fundamentally impacts an economy's processes and opportunities, so it is necessary to examine its impact. Data is sourced from (The World Bank, 2020).
- Trade Openness ranking - A country's openness to international trade indicates the country's total international trade (exports and imports) and GDP. It reflects a country's dependence on international trade well. The security of cross-border traffic has become an essential issue in countries ranking high on trade openness, thus further justifying the inclusion of this dataset. (World Bank, 2018)
- Export Ranking - The AEO programme increases export security, reducing the risks of shipments for the importing country, thereby increasing the need and duration of security inspections and, inadvertently, the cost to the importer. The competitiveness of exporters is enhanced by being part of the AEO programme, and in turn, a country's competitiveness is also enhanced. This, however, also results in losing a competitive edge for countries and their exporters where no AEO programme is introduced. The data come from the World Bank's database. (The World Bank, 2019)
- Import Ranking - The primary goal of developing the AEO programme was to increase the security of global supply chains. Consequently, ensuring a high level of security of shipments with the lowest possible level of control is in the fundamental interest of high-value importing countries, thus providing a strong incentive to implement the programme. The source of the data is the World Bank's database. (The World Bank, 2019)

- Tariff ranking - Besides the market protection role of import duties, their fiscal role is not negligible. However, it is not in countries' interest to make the import process more expensive by other costs, as it does not generate revenue for their budgets but makes imported goods unnecessarily expensive. Data is sourced from the World Bank. (The World Bank Data, 2018; Késmárki-Gally & Fenyvesi, 2004).
- Trading across Border Ranking - Measures the costs of logistics processes and administration related to the export and import of goods. The data include the time spent and costs incurred crossing the border, excluding customs duties, broken down into two: obtaining the necessary documents and the administrative procedure for crossing the border. The database ranks countries based on four data points, a simple arithmetic average of time and cost expenditure on exports and imports, in ranking "administrative expenditure on cross-border trade". (Doing Business, 2018)
- Perceived Corruption Ranking - The propensity to corruption hampers efforts to simplify the operation of systems, as transparent systems do not leave much room for corruption. International trade is characterized by increased regulation and control, making it an area at high risk of corruption. (Kumanayake, 2022) With the introduction of the AEO programme, there is no possibility to claim bribes for shipments of certified economic entities. This factor may play a more significant role in countries where central power often conflicts with the interests of local potentates. According to previous research on the topic, to avoid further deepening corruption, it is advisable to introduce complete programs; partial reforms do not promise success. (Michael, 2012) The data source is the Corruption Perception Index ranking published by Transparency International. (Transparency International, 2019)

The examined sample includes the countries ranked in the GTI for which the examined parameter data are included in the World Bank database.

The AEO Compendium of the World Customs Organization provided information on the date of launch of the AEO programmes (World Customs Organisation, 2018)

The model was regressed on 157 countries and their data, including countries that either already introduced and operated an AEO or similar programme or have officially proclaimed their decision to adopt such programme to the WCO and began preparations by 2018.

Data for all potential explanatory variables are ranked 1 to 157 in the study, so significantly higher data for more extensive and more developed economies do not skew the result. Standardization was also considered a method to reduce the scale sensitivity of the variables but was not applied due to increased hardships of interpreting the results. Due to the reliable sources of the datasets used, there were no missing or suspicious data points. All countries that were not present in one of the datasets were excluded. All data are from 2018 – the year was chosen to be free of the influence of the COVID-19 pandemic, and the dataset is from one singular year because this research aims to explore the different factors and not their temporal and spatial development.

Results and discussion

Global Terror Index

As the primary goal of creating the AEO programme was to establish and maintain global supply chain security, it could be assumed that the place of countries in the terrorist rankings will impact the decision regarding implementing the AEO programme.

Terrorism is generally rooted in extremist ideas and ideologies which can rapidly spread in societies of countries and regions of the world where the education system is underdeveloped, livelihood and job opportunities for the young generation have no perspective and the underdeveloped housing, the increasing problems of food security, the scarcity of water (Koudela, 2019; Kozár & Neszmélyi, 2014; Neszmélyi, 2014).

For countries that are victims of international terrorism, their security is a priority, while for countries where international terrorism originates, the possible loss of their place in the international division of labour is at stake.

However, the analysis shows that, based on the ranking of countries in the GTI, the chances of a correct estimate for introducing the AEO programme would only improve by four percentage points, but not significantly. It is clear, therefore, that the number and severity of terrorist acts in the country do not have a statistically demonstrable effect on the government's decision to introduce the AEO programme.

The explanation for this phenomenon probably lies in the widespread international publicity of terrorist acts. The events of recent years have shown that there is no safe place and that the number of countries in which no terrorist attack has taken place is shrinking dangerously. (Institute for Economics & Peace, 2018)

On the issue of security, national governments are willing to learn from the misfortune of others (see the case of Nigeria in Neszmélyi, 2012). Terror threats and terror acts have a much higher impact on government policy than other, possibly more fatal atrocities. Terror is so effective that it affects significantly more than the country it manifests in. Nations are willing to introduce pre-emptive policies and regulatory frameworks, such as AEO, to prevent barbarities. This argument is supported by the fact that the development of the SAFE Framework and the introduction of AEO programmes took place due to the events of 11 September 2001 in the USA.

Security concerns will undoubtedly play a significant role in introducing a programme such as AEO, but not only for the direct victims of terrorist acts.

GDP/capita

GDP per capita is one of the explanatory factors for most economic research. It resulted in a correct estimation probability of 73.9% in 2018, with an acceptable degree (Nagelkerke R^2 0.381)[1] as the only explanatory variable. The correlation is positive.

However, among the countries that already introduced the AEO programme by 2012, the probability of a correct estimation is 80.9%, and the explanatory power of the variable is also higher. (Nagelkerke R^2 0.398)

The explanation for this phenomenon is that countries with high GDP per capita have already introduced the AEO programme around 2008, while countries with lower numbers have begun adaptation since 2012. As perpetrators of international

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[1] Although Nagelkerke R^2 cannot be interpreted as a percentage of the explained variance, the increase in the indicator shows an improvement in the fit of the model.

terrorist acts usually operate with the support and on behalf of terrorist organizations based in countries with lower gross domestic product and the targets tend to be in developed countries, the relatively explanatory solid power of GDP shows that the AEO programme has primarily been introduced by victims so far, not the countries of the perpetrators. Other impacts are likely, such as the impact of surveys on the programme's success and the desire to maintain a place in the international division of labour. It can also be assumed that there is a domino effect in place – the more AEO programmes become the norm in the international supply chain, the more likely the next adopter will decide to join. It is also understood that higher GDP highly correlates with the wealth and development of a country. More prosperous nations can better afford to introduce programmes such as the AEO, which demands expertise and pecuniary resources. Fiscally less fortunate countries will not just suffer on a governmental level, as it is also likely that their respective businesses will have less monetary funding for the necessary changes for compliance and the audit for an AEO programme.

It is also argued that more prosperous nations are more likely to follow a well-defined structure for their business life, both in government and the private sector, making adopting significantly easier. However, developing nations usually need more or more structured business cultures and practices, which would reduce the practical success of an AEO programme. In other words, the programme's primary goal is not achieved if businesses do not wish to adopt the changes to their business. Demonstrating these requires further research.

However, the GDP indicator should be separate from the final model, as its inclusion would cause multicollinearity due to its medium or strong correlation with other indicators.

Trade Openness

This indicator is high for small and advanced economies, while it is low for countries with large internal markets and low-income developing countries (for developing countries, see the case of Nigeria: Neszmélyi, 2012; while for a transition country, see the case of Ukraine: Sokil et al., 2018), which play a minimal role in the international division of labour. The studied sample was largely devoid of extremes, such as states set up for re-export, e.g. Singapore, or small island states set up for tourism, e.g. Bahamas.

However, the indicator built into the logistic regression model degrades the estimation result by one percentage point. It is insignificant and cannot be considered an explanatory factor for AEO.

This result is unexpected, as this indicator expresses the weight of international trade in countries' economies and suggests that the ratio of international shipments to GDP is not the determining factor in the decision. A more significant factor may be the number of shipments crossing the border.

Export

The export ranking as the only explanatory variable produces a correct estimation rate of 75.2% with an acceptable fit, and the result indicates a weak positive correlation but is not significant when included in the model with the other variables. This suggests that countries are less concerned about the possibility of losing their export markets and do not introduce the AEO programme primarily to guarantee the security of their export shipments to their customers or reduce their costs.

Customs duty

The ranking of trade-weighted applied duties explains 68.8% of the variability in the data, with a relatively low fit (0.251) as a singular variable. The relationship is negative, which means that as the applied duties increase, the chances of a country introducing the AEO programme decrease. This indicates that countries with protectionist policies do not want to simplify imports by introducing the programme.

The demonstrable effect is unsurprising, as tariffs show a stronger-than-average negative correlation with GDP but do not show any additional impact on introducing the AEO programme.

Import

The optimal binary logistic regression model includes the import ranking, significantly impacting the decision to implement the AEO programme. It alone provides a higher explanatory power than GDP (77.7%, Nagelkerke R^2 0.435)

The more significant role of imports than exports suggests that the decision is more influenced by the pursuit of security than facilitating trade, reducing administrative costs and maintaining market position.

Corruption

Incorporating corruption into the model increases the chances of a correct forecast only by 1.9 percentage points but significantly increases the model's fit. (Nagelkerke R^2 0,546)

The negative impact of corruption as a variable indicates that solid corruption is counterproductive to launching the AEO programme. High levels of corruption result in high complexity of systems and processes, the need for more transparency and the scarcity of capacity. Central and local power holders are beneficiaries of corruption, so making processes simple and transparent is outside their interest. As a result, high-corruption countries cannot take advantage of the AEO programme's ability to narrow corruption opportunities.

Administrative costs of trading across borders

As the AEO programme aims to promote international trade and reduce costs while guaranteeing security, it offers an excellent opportunity to reduce high border crossing costs.

By including the indicator, the forecasting reliability of the model increases to 80.9%, and its fit also improves (Nagelkerke R^2 0.578). However, the impact is negative. Countries with high administrative border crossing costs are less inclined to introduce the AEO programme.

Optimal model

The import ranking positively impacts the external economic indicators included in the study. In contrast, corruption and high administrative border crossing costs harm the implementation of the AEO programme, as shown in Table 1 and Table 2.

Table 1   Classification Table

Observed		Predicted AEO			Percentage Correct
		0	1		
Step 1	AEO	0	53	18	74.6
		1	17	69	80.2
	Overall Percentage			77.7	
Step 2	AEO	0	57	14	80.3
		1	18	68	79.1
	Overall Percentage			79.6	
Step 3	AEO	0	57	14	80.3
		1	16	70	81.4
	Overall Percentage			80.9	

a. The cut value is,500
Source: Author´s editing

Table 2 Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Import rank	.035	.005	40.498	1	.000	1.035	1.024	1.046
	Constant	-2,431	.446	29.722	1	.000	.088		
Step 2[b]	Import rank	.029	.006	24.139	1	.000	1.029	1.017	1.041
	Corruption rank 2018	-.021	.005	17.348	1	.000	.979	.969	.989
	Constant	.081	.698	.013	1	.908	1.084		
Step 3[c]	Import rank	.029	.006	22.963	1	.000	1.030	1.018	1.042
	Corruption rank 2018	-.015	.006	7.231	1	.007	.985	.974	.996
	TaB korr	-.015	.006	6.259	1	.012	.985	.973	.997
	Constant	.722	.761	.900	1	.343	2.059		

a. Variable(s) entered on step 1: Import rank.
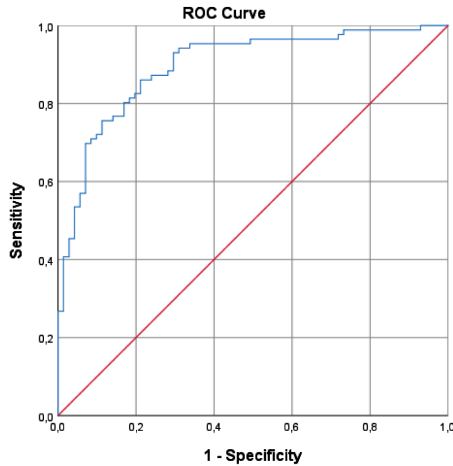b. Variable(s) entered on step 2: Corruption rank 2018.
c. Variable(s) entered on step 3: TaB korr.
Source: Author´s editing

The model's predictive power is high, as illustrated by the ROC graph in Figure 1.

Figure 1 ROC Graph

Source: Author´s editing

The regression with the same model was run on three groups of the primary dataset – once on the 43 countries that had a working AEO programme by 2012, then extended by 29 countries (total of 72) who introduced the programme by 2018 and finally, all countries who established or expressed interest (to the WCO) in the AEO programme (86 countries).

However, the explanatory power of the models (Nagelkerke R^2 0.647 - 0.600 - 0.578) and their predictive power (87.3% - 82.2% - 80.9%) are decreasing, which indicates that other decision factors become more influential with the increase in the number of countries operating the programme. Such a factor could be peer pressure, which could have an increasingly positive effect as the number of countries already operating the programme increases. In addition, it is also possible that the positive experiences of other nations help nudge the government towards adaptation. It is also worth mentioning that smaller nations could benefit from borrowing ideas from other countries, making it a faster and easier process to introduce an AEO programme.

Conclusion

Based on the logistic regression model in this paper, the decision to introduce the AEO programme is positively influenced by the value of the country's imports among the examined macroeconomic indicators. The openness of economies does not affect the introduction of the AEO programme, so the size of the value of imports is the decisive factor and not its share concerning the total gross domestic product. This suggests that import security is the primary consideration. However, no direct link can be established with the terrorist attacks in the country.

Strong corruption and high border crossing costs have a negative impact, suggesting that it is precisely the countries most in need of the trade facilitation effect of the AEO programme that has so far refrained from introducing it.

Further research could explore how the increasing number of MRAs impacts the likelihood of adopting an AEO programme and how regional free trade agreements affect the probability of chain adoption within the participatory countries.

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