TRADE COSTS AND HUMAN DEVELOPMENT: MEDIATOR ROLE OF CUSTOMS EFFICIENCY TOWARDS A RECOVERY PATH OF POST PANDEMIC CRISIS

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Ümit Çelebi[1]

Abstract

Growth in trade and gross domestic product has long been one of the main priorities of nations, however it does not guarantee long-term and more inclusive human development. On the other hand, human development index by including education and health dimensions makes up for this deficiency. There are various factors influencing human development. Amongst them, the role of trade costs and customs efficiency is significant. Countries with lower costs of trade and efficient customs are more likely to reach faster and more sustainable human development. Current pandemic crisis is a stark reminder of the critical importance of health and interdependence for well being of human lives. The literature highlights the roles of customs efficiency and facilitation as important determinants of trade costs and economic indicators. This study however aims to explore whether similar effects exist on human development dimension comprising monetary as well as non-monetary components. By utilizing hierarchical regression analysis with Baron and Kenny mediation method, we analyzed the data set of eighty partner countries of Turkey for the years 2007, 2010, 2012, 2014 and 2016. The result of the mediation analysis and the Sobel test shows that customs efficiency partially mediates trade costs and human development index.

Key Words: Customs Efficiency · Trade Costs · Human Development · Mediating Analysis

JEL Codes: *F14, F63, O15, C39*

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1. Introduction

This research aims to explore how customs efficiency index (CEI) mediates trade costs (TCs) and human development index (HDI).

HDI focuses on the long term and more inclusive growth. Besides the higher standard of living, it takes account of growth of healthier and more educated human beings. Nations - by ensuring equal access to growth opportunities in all these aspects - aim to reach higher level of human development. There are various factors that are at interplay preventing nations from reaching this objective. One of the most prominent ones is the high cost of trading internationally, inhibiting people from having an access to global resources in easier and more equitable manner.

TCs have important repercussions on countries' long-term economic and human developments. There are various elements in building up of the costs of trade. Transportation, border-related trade barriers and distribution channels are the main ones. In the developed world, TCs go up as much as 170 per cent tax on ad valorem-goods value. The effects of tariffs - as a classical barrier to trade – have been diminishing over the years and now stay as low as 5 per cent of goods value. TCs in contrast remain one of the major impediments to further development of national economies (Anderson and Van Wincoop, 2004). TCs are bilateral and vary by the type of goods traded as well as by each set of country pairs. While the trade costs of United States with Germany is 70 per cent, with Canada is 25 per cent on average. Differences in the distances, quotas, freight costs and cultures are all at interplay between various trade partners (Novy, 2011). But amongst these differences, the role of customs is significant.

Customs are one of the prime actors in international trade and supply chain. It can be an enabler or a disabler: the processes put in place by customs play a vital role in achieving higher efficiency in the international supply chain. Many information and documents requested by customs[2] may cause high burden on stakeholders. As customs and trade processes become more complex, the cost increases and competitiveness suffers. And this varies widely depending on the level of economic development as well as geography: the time until the exit of the products are finalized and loaded on

[2] Customs is defined broadly in this paper. It consists of all other local athority and ministerial approvals that are necessary before goods are released from the borders.

the transport vehicle in Vietnam takes 24 days at a cost of 669 USD, while in Rwanda delays double and the costs quadrupled (Korinek and Sourdin, 2011). By contrast, simplification and facilitation in customs processes increase efficiency and provide more favorable environment to trade and economic development (Saslavsky and Sheperd, 2014).

These positive effects may not be limited to trade and economic development only. Current pandemic crisis is a stark reminder of the critical importance of health and education dimensions that are directly related to human development. Countries - by having efficient customs processes - are more able to maintain their global connectivity. To be open to cross border e-commerce and ready uplift of air cargo facilitated by express customs clearance has been saving many lives during the crisis. While passenger flow came to a complete standstill, customs have enabled goods flowing cross borders ensuring the emergency and life critical materials to reach the most needy ones. By continuing to facilitate an access to high technology goods for medical and education, efficient customs around the world have been determinant to keep the disruption at a minimum (Livingston, 2021).

Previous studies analyze customs efficiency and trade facilitations as one of the main drivers behind the reduction of trade costs on trade and economic developments. This study however aims to see whether similar effects take place on human development dimension. To do this, it explores the role of CEI as a mediator variable in the relationships between TCs and HDI. By extending to explore this role on non-monetary but critical quality of life dimensions, this study therefore has the objective of further contributing to the field. To explore and analyze these effects, we develop hypotheses. To test the hypotheses we extract the data from secondary sources. To analyze and validate the results we make use of hierarchical regression and mediating analyses.

Against this background, our study will begin with the descriptions of the concepts. The second part will establish the hypotheses. The third part will explain the methodology. The fourth part will show the results and the analyses of the test. Last part will display conclusion and implications.

2. Background

Trade costs refer to all costs of moving goods to the end point. To trade internationally, the incurrence of these costs is inevitable. Excluding the

production costs of goods, there are many elements driving the cost of trade. These include transportation, policy barriers, information costs, contract enforcements costs, the cost of dealing with different languages, currencies, local distribution and regulatory costs. They are reported on ad-valorem tax on goods value. Trade costs go up as much as 219 per cent ad-valorem tax for developing countries and 170 per cent for developed countries (Arvis et. al., 2015; WTO, 2015). Its major components are 55 per cent local distribution, 44 per cent border related trade barriers and 21 per cent transport costs (Staboulis et. al., 2018). Trade policies erect barriers causing higher costs and lower efficiency. Dismantling these barriers and facilitating trade in contrast reduces trade costs and increase customs efficiency. Moise et. al., (2011) estimate these savings as high as 10 per cent.

One of the indicators of trade facilitation is cited as CEI (Saslavsky and Sheperd, 2014). It is defined as speed, simplicity and predictability of formalities shown in clearance process (WORLDBANK, 2016). With more efficient clearance processes at the border, lower delays and costs may be achieved. In contrast, the impacts of unpredictable delays at the borders cause significant harm, much more than the negative effects of traditional tariff measures all to gether (OECD/WTO/WORLDBANK, 2014). Stakeholders rate the speed, simplicity and predictability of customs clearance process as critical success factors in competitiveness. Countries on the other hand see customs efficiency as an important driver in boosting trade, investment and national welfare. This makes customs authorities role more of a trade facilitator than a mere protector of public interest (WORLDBANK, 2016).

Therefore, continuous improvements to trade infrastructure is important: the development of customs and border administration and the reduction of trade barriers bring positive effects. Ferrantino, Tsigas and Geiger (2015) calculate these effects at 4.7 percent of GDP, a gain six times greater than the complete elimination of global tariffs. Information and communication technology plays an important role in this: by digitalizing and automating the systems of customs and border administrations, it facilitates the processes resulting in increased reliability, visibility and predictability of the global supply chain. Single window facility is one example that fulfills these objectives. By simplifying and digitalizing the information flow amongst various stakeholders, the time spent at customs borders shortens significantly (Korinek and Sourdin, 2011).

These factors are all interlinked with development objectives. Nations ultimately strive to reach higher level of human development. HDI is one of the indicators of human development, incorporating standard of living, health and education, arriving at a complete picture of how well human being are doing in each and every country (UNDP, 2016). Exploring the effect of TCs and CEI on HDI in turn would provide important insight to the research area. Against this background we now develop the hypotheses.

3. Hypotheses Development

We build up the hyptheses to reflect dual relationships amongst the variables as follows:

3.1. The impact of trade costs on customs efficiency index

Effect of TCs on CEI is negative and there is a clear inverse relationship. While TCs goes up, CEI goes down. Various direct and indirect factors are at interplay: differences in transport infrastructure, tariffs-technical barriers and regulations are to name but a few. Amongst the different modes of transport, the effect of sea transportation is particularly significant as majority of trade is accounted for maritime shipping (Korinek and Sourdin, 2009). The lack of efficient infrastructure has negative bearings on the good functioning of border administrations in the ports (Keçeli, 2011). Poor infrastructure explains the lengthy waiting times, congestions and accounts for 40 to 60 per cent for the countries transport cost (Limao and Venables, 2001). Insufficient level of information communication technology (ICT) infrastructure is cited as another stumbling block in reducing the cost of trade and transport preventing customs facilitation. Customs automation, pre-arrival clearance, risks analysis, electronic submission of custom documents, information management and terminal operations, electronic single windows are all heavily dependent on good functioning of ICT systems (Korinek and Sourdin, 2011, Ojala and Çelebi, 2016). In conclusion, poor transport and trade infrastructure causes high cost of trade negatively impacting the efficiency of customs as a result. The hypothesis we here develop in line with our research aim is as follows:

H_1: Trade costs negatively influence customs efficiency index

3.2. The impact of customs efficiency index on human development index

Higher customs efficiency leads to higher level in human development. There is a positive relationship. Customs efficiency is driven by speed, simplicity and predictability shown in customs process. They are the basis of high level of trust and transparency as well as the quality of physical resources, which in turn characterize the level of customs institutional infrastructure. Based on these characteristics customs services like any other public services can be enhanced for the development of countries (Dunning, 2008). Knack and Keefer (1997), argues that 10 percent increase in trust to institutions is an equivalent of 1 percent growth. Rodrik, Subramanian and Trebbi (2004) reveal that the quality of institutional infrastructure is much more important for nations' development than geographical location and openness. Acemoğlu and Robinson (2013) regard inadequate institutional infrastructure as one of the biggest hinderance to development. Development of institutional infrastructures depends mainly on the success of countries' policies and practices. Countries can use different policy tools to develop their institutional infrastructures in which the development of customs is particulary significant. Turkey, with the help of customs union, is the one that achieved higher institutional infrastructure in customs and trade especially via customs modernization and automation, resulting in higher level of efficiency in customs (Togan, 2012). Poor infrastructure decreases customs efficiency causing a fall in connectivity and development (Arvis et.al., 2015).

From the perspective of the existing literature we develop the hypothesis as follows:

H_2: Customs efficiency index positively influences human development index

3.3. The impact of trade costs on human development index

Trade costs have important bearings on the development of countries and there is a linear inverse relationship. If the costs of trade increase development suffers or vice versa: access to products and services from around the world through lower level of trade costs stimulates nations' level of development (OECD/ITF, 2015). In contrast, higher costs of trade act as an impediment to growth and development. In this relationship, the high

quality of customs infrastructure and administrative procedures are of critical importance (Korinek and Sourdin, 2011; Duranton et. al., 2014). Poor trade and transport infrastructure as well as cumbersome regulations negatively affect development (Togan, 2016). Ongoing reduction of artificial barriers diminished its weight in total trade costs and this in turn elevated the importance of customs and border efficiency. If ports are the first to achieve 12 percent savings to total transportation costs by improving efficiency (Clark et. al., 2004), customs are the next to reach 210 bn USD by facilitating trade (Hilberry and Zhang, 2015). These saving will naturally be significant benefit to nations' development efforts. As this is in line with our research aim, we develop the hypothesis accordingly:

H_3: Trade costs have negatively influence human development index

3.4. Customs efficiency index mediates trade costs and human development index

Connectivity to global supply chains requires a development of higher quality of infrastructure that result in higher efficiency in customs and trade (OECD and World Bank, 2015). Global supply chain trade demands reliable and predictable delivery times. Countries with lower trade costs and efficient administrations are able to faster level of connectivity globally (Hoekman, 2014). Higher connectivity in global supply chain results in improving the level of competitiveness and development. Speed, simplicity and predictability of the processes are highly dependent on the effectiveness of transportation and trade policies driving the cost of trades. Liberalization of customs and trade policies acts as important determinant in reduction of the trade costs (Togan, 2016). In conclusion, this reduction in trade costs increases the efficiency of customs and border administrations, positively impacting human development. In the light of the existing literature and according to our research aim, we develop the following hypothesis:

H_4: Customs efficiency index mediates trade costs and human development index

4. Methodology

This study followed Baron and Kenny method for mediating analysis. This method requires below steps to be fulfilled for a variable to be accepted as a mediator [49]:

- The independent variable influence the mediator variable,
- The mediator variable influence the dependent variable,
- The mediator and the independent variables are both put into the regression at the same time, the effect of the independent variable upon the dependent variable diminishes or terminates.

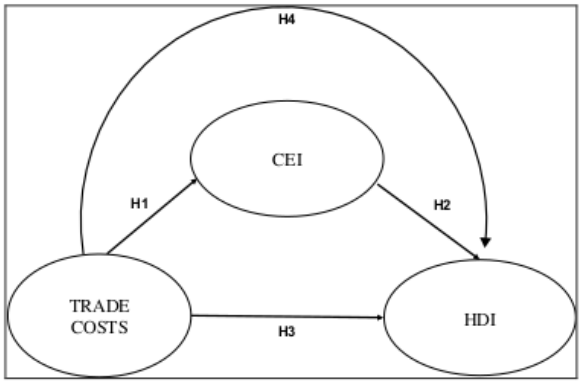

Figure 1. Model

Source: Author

Figure 1 shows the research model. To test the hypotheses, we followed hierarchical multiple regression. Customs efficiency index (CEI), trade costs (TCs) and human development index (HDI) as being constructs in research model, we set the regression equations as follows:

Model I: $HDI = \beta_0 + \beta_1.TCs + \varepsilon$ (H_3)
Model II: $CEI = \beta_0 + \beta_1.TCs + \varepsilon$ (H_1)
Model III: $HDI = \beta_0 + \beta_1.TCs + \beta_2.CEI + \varepsilon$ (H_2 and H_4)

5. Data

Human development index, trade costs and customs efficiency index are the indicators of the variables. This study aims to explore the linear relationships amongst them. To do so, it conducts secondary research on the cross sectional data of eighty partner countries of Turkey for the years 2007,

2010, 2012, 2014 and 2016 accounting for the 88 percent of world gross domestic product. Bi-annual publication of CEI commenced in 2007 being the base year data for this study. This research limits the analysis of trade costs to manufacturing goods, due to its higher and increasing share in international trade (Behar and Venables, 2010). For bilateral trade costs, Turkey is used as a reporting country and the rest of the world countries as partners. As per the bilateral data for Turkey, Germany is used being its biggest trading partner in both directions. The sample size consists of 400 observations and t data is extracted from the secondary sources: the customs efficiency dex from the World Bank, the trade costs from the UN ESCAP and for the human development index from the UN Human Development Program.

We used the data set of TCs, CEI and HDI. By extracti the secondary data. Rather than analyzing the differences between different set of countries or the changes in time, the main objective of this research was to explore the linear relationships by conducting cross sectional analysis for the selected the period. The period and country pairs chosen was thus deemed sufficient for the purpose and the scope of this research.

TCs refer to bi-lateral trading costs amongst country pairs. There are different approaches to quantify them. Some calculations are based on the cost of moving standard container internationally. Some others focus on CIF and FOB trade data or the costs of delivering goods to the next sea port from production facility taking account of the cost of processing paperwork, customs clearance, transport and handling. UN-ESCAP however, offers more inclusive quantification of TCs. It incorporates all costs related to trading goods with foreign partners. It takes TCs in more extensive manner: it combines international transport costs and tariffs with that of other trade cost elements related to differences in languages, currencies and burdensome import or export procedures (Anderson and van Wincoop, 2004).

World Bank publishes CEI as a sub-dimension of logistics performance index since 2007. It scales the level of the country's TTI between 1 (lowest) and 5 (highest). Respondents to the questionnaire are the logistics experts worldwide and they are asked to rate the eight biggest trading partners with their own nations (Arvis et al., 2016).

HDI is an indicator of human development published by UNDP. It is composed of three main components: gross national income (GNI), education and health. GNI reflects the decent standard of living; education reflects the mean years of schooling to acquire necessary knowledge; health reflects the life expectancy having long and healthy life (UNDP, 2016).

We analyzed the data set to test hypotheses. We utilized SPSS program to apply hierarchical regression. We utilized Baron and Kenny mediation methods and Sobel tests for analysis and validation of the results. The result of the analysis is as follows:

6. Results

The method of Baron and Kenny's (1986), requires a significant relationship amongst the variables as a first step. We calculated the correlation coefficients accordingly. Table 1 shows that these relationships are significant:

Table 1. Coefficients of correlation

	CEI	TCs	HDI
CEI	1		
TCs	-.391*	1	
HDI	.731*	-.404*	1

Source: Author's calculation.

* Significance at the 0.01 levels

Table 2 depicts the models testing the mediator effect with R and R^2 values:

Table 2. Summaries of the models

Models	R	R^2	Adjusted R^2	Standard Error of the Estimate
Model I	0.404	0.163	0.161	.13196
Model II	0.391	0.153	0.151	.55744
Model III	0.742	0.551	0.548	.09684

Source: Author's calculation.

Table 3. ANOVA

	Models	Sum of Squares	Df	Mean Square	F	Sig.
I	Regression	1,354	1	1,354	77,765	.000
	Residual	6,930	398	,017		
	Total	8,284	399			
II	Regression	22,348	1	22,348	71,919	.000
	Residual	123,675	398	,311		
	Total	146,023	399			
III	Regression	4,561	2	2,281	243,170	.000
	Residual	3,723	397	,009		
	Total	8,284	399			

Source: Author's calculation.

We found that ANOVA results of the models are statistically significant in Table 3:

Table 4. Results of hypotheses

Relationships	Model I	Model II	Model III
TCs → HDI	-0.404*		-0.140*
TCs → CEI		-0.391*	
CEI → HDI			0.676*

Source: Author's calculation.
Note: Standardized regression coefficients.
*p<0.01

Following to the results of Baron and Kenny method, Sobel test validates the results (Sobel, 1982). Sobel test is significant in Table 5:

Table 5. Results of Sobel test

	Sobel Test statistics	P
TCs → CEI → HDI	-17.88888889	0.00

Source: Author's calculation.*p<0.01

Table 4 shows that test results were statistically significant and supported all the hypotheses with expected signs:

H_1: TCs have a negative effect on CEI (β_{model2}= -0.391, p< 0.01).
H_2: CEI has a positive effect on HDI (β_{model3}= 0.676, p< 0.01).
H_3: TCs have a negative effect on HDI (β_{model1}= -0.404, p< 0.01).
H_4: CEI partially mediates TCs and HDI (β_{model3}= -0.140, p< 0.01).

When CEI is added into the model as a mediator variable, we found that the effect of TCs on HDI weakened: the value of the β coefficient decreased but did not disappear completely. We thus concluded that CEI partially mediates TCs and HDI.

7. Conclusion

The aim of this research was to explore the mediating effect of customs efficiency in the relationships between trade costs and human development. This study observed that trade costs affect customs efficiency as well as human development. While trade costs decreases, customs efficiency and human development index increase. The test results supported these relationships. It also showed that the customs efficiency's role in this relationship is significant and this role is of a partial mediator nature. By including customs efficiency index in the relationship, the previous effect of trade costs on human development index dropped but did not completely vanish.

Current pandemic crisis shows the importance of countries' continuous interdependence to each other and reminds the critical need of keeping borders open for trade and investment for higher level of human well being. To achieve this, keeping trade costs down while increasing customs efficiency index is vital for human development index. Continuing with the efforts to facilitate customs and trade processes is one significant remedy to human well being in the recovery path of post pandemic crisis.

One of the limitations of this research was the fact that the data for the customs efficiency index is based on surveys and this may reflect the subjective opinion of logistics professionals, though this is by far the best way to extract most realistic and credible data from the field. Second, trade costs are based on the bilateral trade of Turkey with its eighty country partners and this may give partial view on the results of the relationships. Third, HDI – by focusing on human development and lacking the environmental dimension – gives only partial view on sustainable development.

Given the limitations, the results still point to the following policy suggestions: the efforts to reduce trade costs are crucial in gaining higher level of human development index. In the meanwhile, policies to improve customs efficiency are also important and need to be concurrently implemented towards a rapid recovery of post pandemic crisis. Further researches looking at the impact in the light of different country pairs and of time periods would extend further the contribution to the field.

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