

TRADE FACILITATION, INFRASTRUCTURE AND INTERNATIONAL TRADE IN CENTRAL ASIAN COUNTRIES

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Trade Facilitation in CAREC: A 10-year CPMM Perspective

BACKGROUND

- Infrastructure is important factor for increasing international trade flows (Bougheas, Demetriades, and Morgenroth, 1999; Stone and Strutt 2010; Rehman, Noman and Ding, 2020)
- Increasing role of soft infrastructure along with the hard infrastructure (Portugal-Perez and Wilson, 2012).
 - This highlights significance of the quality of infrastructure and logistics for trade facilitation (Iimi, 2011)
 - “Border costs” - Feenstra, 2002; Anderson and van Wincoop, 2003; Fontagné and Zignago, 2007; Zaki, 2015; Hendy and Zaki, 2021

Empirical studies on Central Asia

- There are only a few studies on Central Asian countries
 - Given the landlockedness of these countries improvement of border crossings is important and positively affects international trade flows in the region (Raballand, 2003; Grigoriou, 2007; Tanabe, Shibasaki, and Kato, 2016)
 - Kim, Mariano and Abesamis (2022) using CPMM indicators found positive impact of reduction of time at the inbound border on trade among CAREC countries
- However, use of the infrastructure variables along with the trade facilitation measures in the analysis would help us to understand effect of both infrastructure development and trade facilitation policies in promotion of the international trade in the region

OBJECTIVE

- This study aims to empirically study the impact of infrastructure and trade facilitation on international trade in Central Asian countries – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- As trade partners other CAREC countries are considered

DATA

- Empirical analysis is based on the panel data for five Central Asian countries with other CAREC countries as trade partners for the period of 2010-2020 years.
- Data sources:
 - Direction of Trade Statistics - IMF
 - CEPII (Le Centre d'études prospectives et d'informations internationales)
 - Asian Development Bank
 - World Bank
 - Publications of the national statistical authorities

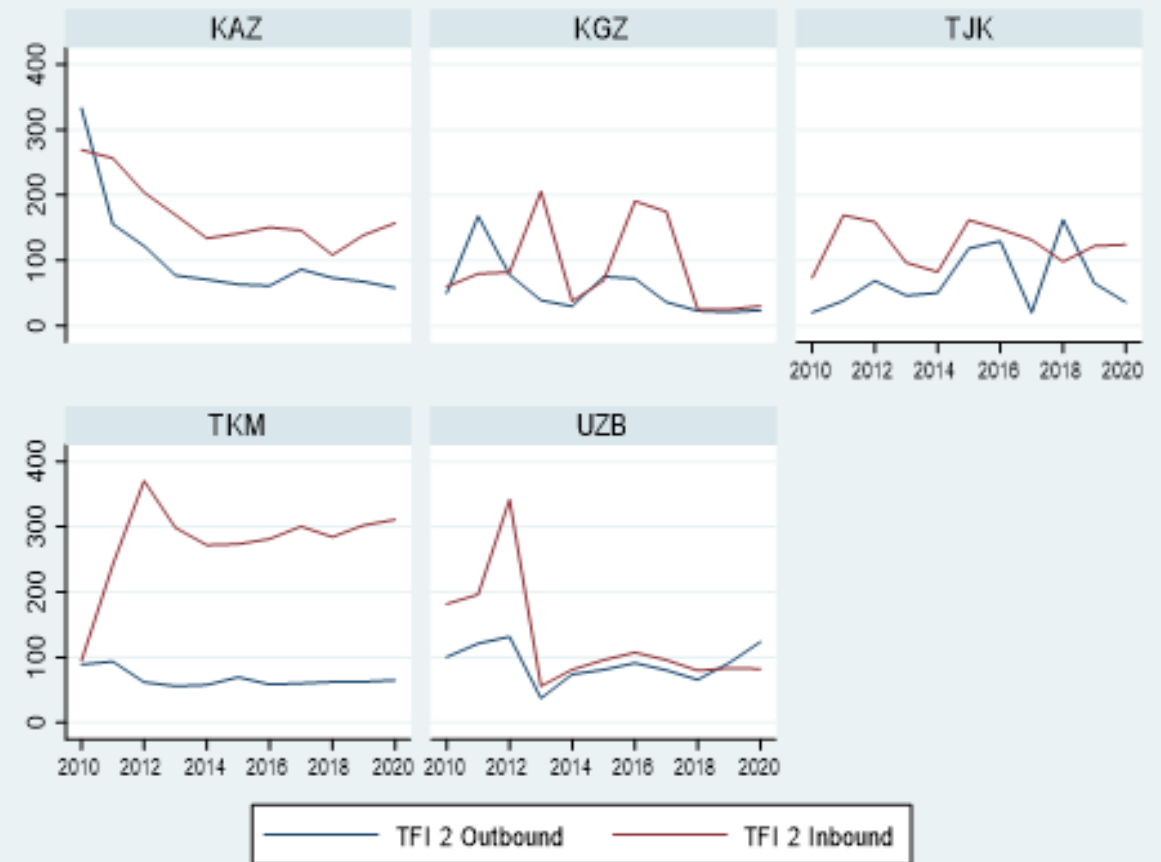
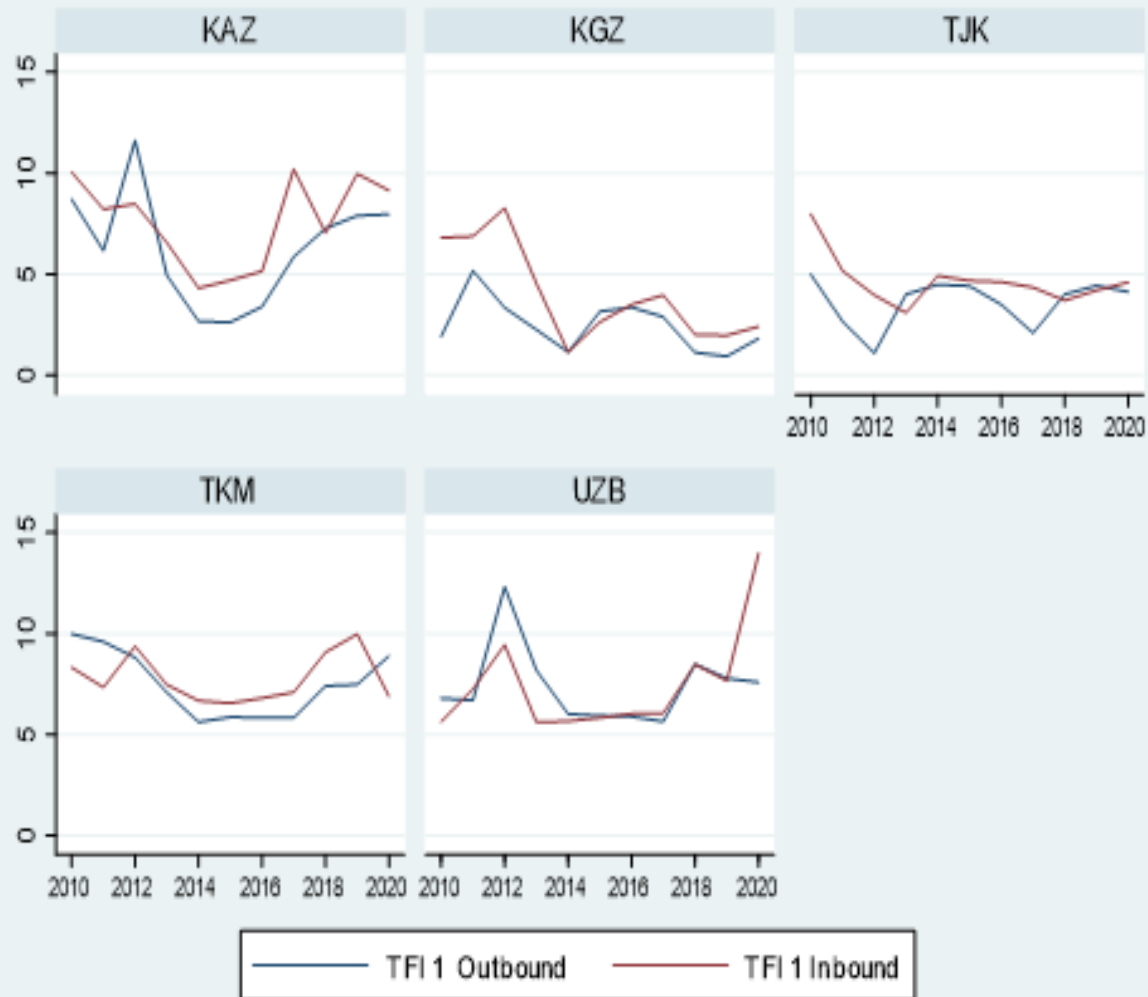
Infrastructure index

- Following Francois & Manchin (2013) principal component analysis is used based on:
 - fixed broadband subscriptions (per 100 people)
 - mobile cellular subscriptions (per 100 people)
 - air transport - freight (million ton-km)
 - railways - goods transported (million ton-km) and heavy railways route (km).
 - One of the main components of the infrastructure is roads. However, due to data limitations roads or paved roads are not included in the index.

	Component 1	Component 2
<i>Infrastructure in countries of origin - Central Asian countries</i>		
Fixed broadband subscriptions (per 100 people)	0.4889	0.1907
Mobile cellular subscriptions (per 100 people)	0.3260	-0.6300
Air transport - freight (million ton-km)	0.1695	0.7523
Railways - goods transported (million ton-km)	0.5586	-0.0268
Heavy railways route (km)	0.5603	-0.0008
Eigenvalue	2.9471	1.39083
Cumulative proportion	0.5894	0.8676
	Component 1	Component 2
<i>Infrastructure in destination countries – other CAREC countries</i>		
Fixed broadband subscriptions (per 100 people)	0.3734	0.4746
Mobile cellular subscriptions (per 100 people)	0.0254	0.8536
Air transport - freight (million ton-km)	0.5359	-0.1311
Railways - goods transported (million ton-km)	0.5365	-0.1278
Heavy railways route (km)	0.5338	-0.1125
Eigenvalue	3.31356	1.21608
Cumulative proportion	0.6627	0.9059

Trade facilitation indicators

- Trade facilitation measures are from the CPMM:
 - TFI1 - Time taken to clear a border crossing points
 - TFI2- Cost incurred at border crossing clearance
 - TFI4 - Speed to travel with delay along CAREC Corridors
 - TFI5 - Speed to travel without delay along CAREC Corridors
 - Time (TFI1) and costs (TFI2) measures at inbound and outbound BCPs are included in the models separately
- CPMM data are used in annual terms - due to annual frequency of other explanatory variables in the model
- Because of the missing values on rail TFI the road trade facilitation indicators is used



Generally, both TFI 1 and 2 have decreasing trend since 2010 in five Central Asian countries. However, exception is in Kazakhstan since 2015 with increasing time spent at BCPs both at the inbound and outbound process. Also, in Uzbekistan there is an evidence of longer time at inbound process since 2018.

EMPIRICAL MODEL

- Gravity model with the Poisson pseudo-maximum-likelihood (PPML) estimation method is applied (Silva and Tenreyro, 2006; Anderson and Van Wincoop, 2003)

$$Export_{ijt} = \exp\left[\beta_0 + \beta_1 GDP_{jt} + \beta_2 GDP_{jt} + \beta_3 Dist_{ijt} + \beta_4 INFRA_{it} + \beta_5 INFRA_{it}^2 + \beta_6 Trade\ facilitation_{ijt}\right] * \delta_t * c_{ij} * \varepsilon_{ijt} \quad (1)$$

$$Import_{ijt} = \exp\left[\beta_0 + \beta_1 GDP_{jt} + \beta_2 GDP_{jt} + \beta_3 Dist_{ijt} + \beta_4 INFRA_{it} + \beta_5 INFRA_{it}^2 + \beta_6 Trade\ facilitation_{ijt}\right] * \delta_t * c_{ij} * \varepsilon_{ijt} \quad (2)$$

EMPIRICAL RESULTS

Impact on exports

	(1) Export	(2) Export	(3) Export	(4) Export	(5) Export
Ln GDP, Central Asian countries	-0.1372 (0.2646)	-0.1742 (0.3211)	-0.1761 (0.3463)	-0.1509 (0.3469)	-0.2833 (0.2869)
Ln GDP, Trading partners	0.3289*** (0.0692)	0.3291*** (0.0691)	0.3296*** (0.0691)	0.3291*** (0.0690)	0.3309*** (0.0692)
Ln Distance	-1.1264*** (0.1313)	-1.1264*** (0.1314)	-1.1259*** (0.1306)	-1.1264*** (0.1315)	-1.1260*** (0.1307)
Infrastructure index, CA	0.5091*** (0.1221)	0.5087*** (0.0919)	0.5236*** (0.1125)	0.4905*** (0.1318)	0.7553*** (0.0774)
Infrastructure index, CA ²	-0.1181** (0.0474)	-0.1224** (0.0551)	-0.0958*** (0.0341)	-0.1378*** (0.0373)	-0.1281*** (0.0198)
Infrastructure index, Trading partners	0.9780*** (0.0839)	0.9769*** (0.0839)	0.9780*** (0.0844)	0.9763*** (0.0841)	0.9762*** (0.0839)
Infrastructure index, Trading partners ²	-0.0945*** (0.0133)	-0.0943*** (0.0137)	-0.0946*** (0.0135)	-0.0942*** (0.0136)	-0.0945*** (0.0135)
TFI 1 inbound	0.0174 (0.0394)				0.0414 (0.0310)
TFI 2 outbound		0.0066 (0.0262)			0.0548* (0.0317)
TFI2 inbound			0.0015** (0.0006)		0.0020*** (0.0006)
TFI2 outbound				-0.0010 (0.0014)	-0.0027** (0.0012)
Log TFI4					0.6676 (0.7536)
Log TFI5					0.9332*** (0.1847)
Constant	11.9586*** (3.4868)	12.5273*** (4.3672)	12.0678*** (4.4184)	12.6930*** (4.3448)	6.8929*** (1.9262)
Years	+	+	+	+	+
Countries	+	+	+	+	+
Log likelihood	-59495.3490	-59547.6616	-59168.2208	-59501.1304	-58471.070
r ²	0.9374	0.9367	0.9369	0.9373	0.9450
N	550	550	550	550	550

Findings

- Infrastructure development both from the side of countries of origin and destination are important for increasing trade flows in Central Asia. However, because of diminishing returns to scale over time
- Increase in the cost of outbound border clearance exports from Central Asian countries decrease
- Though, increasing inbound border clearance costs increases exports
 - This indicates a differential impact of border clearance costs on exports, and this finding is to some extent is in line with Kim, Mariano and Abesamis (2022) pointing out the relative importance of costs at the inbound BCPs for trade flows.
 - On the other hand, costs measured in the CPMM refer to both official and unofficial payments. Therefore, this may partly imply tariff measures for inflow of foreign goods into the local market and, thus, promote its own export.
- Speed without delay along CAREC corridors - with an increase in kilometers per hour along the corridor by 1%, the export of the Central Asian countries will increase by 0.93%.
 - This finding reflects that CAREC corridors are important in promoting the export of CAREC countries, and not only the transit of goods.

Impact on imports

	(1) import	(2) import	(3) import	(4) import	(5) import
Ln GDP, Central Asian countries	0.0314 (0.3738)	0.0053 (0.3899)	0.0088 (0.4065)	-0.0009 (0.3902)	-0.2679 (0.2651)
Ln GDP, Trading partners	0.6335*** (0.1222)	0.6342*** (0.1222)	0.6339*** (0.1218)	0.6337*** (0.1223)	0.6375*** (0.1192)
Ln Distance (km)	-1.2304*** (0.2368)	-1.2305*** (0.2365)	-1.2303*** (0.2364)	-1.2303*** (0.2364)	-1.2311*** (0.2357)
Infrastructure index, CA	0.0741 (0.1188)	0.1033 (0.1326)	0.0834 (0.1161)	0.0809 (0.1173)	0.3088** (0.1481)
Infrastructure index, CA ²	0.0287** (0.0136)	0.0267** (0.0133)	0.0282* (0.0165)	0.0301* (0.0161)	0.0415** (0.0205)
Infrastructure index, Trading partners	0.8677*** (0.0962)	0.8651*** (0.0927)	0.8635*** (0.0935)	0.8642*** (0.0942)	0.8508*** (0.0948)
Infrastructure index, Trading partners ²	-0.1154*** (0.0269)	-0.1150*** (0.0262)	-0.1146*** (0.0263)	-0.1147*** (0.0265)	-0.1127*** (0.0270)
TFI 1 inbound	0.0130 (0.0129)				0.0350*** (0.0105)
TFI 2 outbound		0.0128 (0.0110)			0.0317 (0.0217)
TFI2 inbound			0.0002 (0.0006)		-0.0000 (0.0006)
TFI2 outbound				0.0002 (0.0005)	0.0001 (0.0002)
Log TFI4					1.1996*** (0.3546)
Log TFI5					0.6272*** (0.2339)
Constant	6.3915 (4.2852)	6.6551 (4.6042)	6.7088 (4.9587)	6.8149 (4.3789)	2.3284 (3.7539)
Years	+	+	+	+	+
Countries	+	+	+	+	+
Log likelihood	-27243.187	-27254.344	-27274.096	-27276.435	-26699.396
r ²	0.9613	0.9616	0.9607	0.9609	0.9636
N	550	550	550	550	550

Findings

- Infrastructure of Central Asia countries shows statistically significant positive impact on import volume.
 - Interestingly, square of the infrastructure index shows positive impact, suggesting that it is not non-linear, but rather infrastructure development over time promotes import of goods.
 - Infrastructure index of trading partner CAREC countries demonstrate expected positive and non-linear effect.
- The speed of movement along the CAREC corridors - Both TFI4 and TFI5 have a statistically strong influence on Central Asian countries' imports.
- Contrary to expectation – TFI 1 increased time at the inbound BCPs has positive impact on imports.
 - Potential reason: CPMM data is based on the collection of information of truck drivers, which may face and declare more time spend at the inbound in those BCPs where import volumes are intensive. Therefore, it may be that not the longer time of customs operations at borders, but rather BCPs are limited in capacity and cannot deal with relatively large volumes of imports.

Policy Implications

- Findings suggest that complementarity of physical infrastructure development and trade facilitation measures are important
 - Development of infrastructure itself may not provide with improved international trade unless trade facilitation measures are considered.
- Infrastructure development both of countries of origin and destination are important for increasing trade flows
 - Difference in infrastructure development may pose challenges in the cooperation of CAREC economies and intensification of trade flows among them.
 - Regional cooperation on infrastructure development.
- Presence of trade agreements between Central Asian countries may not imply trade improvement, but rather other barriers including non-tariff measures may play important role in practice
- Central Asia as being dominantly landlocked region needs diversified development of the infrastructure
 - Reliance and use of the dominantly one type of transport infrastructure is not beneficial for the sustainability cooperation trends.

Limitations

- Due to the data limitations in the infrastructure measurement roads are not included. Though, roads are dominant type of transportation in the landlocked countries
- Despite the available quarterly data of the CPMM, within the gravity model and necessary variables we used the annual data. Although, analysis at higher frequency based on quarterly data may provide more detailed insights
- CPMM provides with detailed information on time and costs collected directly from the participants of the trade process it does not explicitly measure about other non-tariff measures, which are important in understanding trade barriers
 - Case studies using the CPMM data with analysis of the relevant government trade regulation policy in some countries might be helpful in understanding trade dynamics
 - Analysis by category of goods policy regulations and not-tariff measures may differ depending on the category of trading goods. Studies further elaborating trade flows by category of goods would be interesting to examine potential divergent impact of trade facilitation measures

THANK YOU!