

# Impact of Trade Facilitation Indicators on Trade Flows in Transport Corridors of CAREC Region and Policy Implications

**Falendra Kumar, University of Jammu, India**

**&**

**Balwant Singh Mehta, Institute for Human Development, India**

**Joint Workshop on  
Transport Corridors in CAREC Region  
Supply Chain Resilience and Trade Facilitation  
26-27 September 2023, Almaty, Kazakhstan**

## ***Disclaimer for presentations***

*The views expressed in this presentation are the views of the authors and do not necessarily reflect the views or policies of the Asian Development Bank Institute (ADBI), the Asian Development Bank (ADB), its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.*

# Outline of Presentation

- Introduction
- Review of Literature
- Theoretical Framework
- Objectives and Methodology
- Results and Discussion
- Conclusion and Policy Implications

# Introduction

- Transport corridors
  - link economic hubs domestically and across borders
  - accentuate infrastructure, trade, and investment integration of regional economies for inclusive growth and improved welfare
- Trade facilitation
  - effective and transparent information, regulations, and border clearance procedures for cross-border mobility of products
- Trade facilitation indicators (TFIs)
  - transportation and institutional infrastructure , official practices, customs clearance and cooperation, which significantly impact trade flows
- Trade costs
  - create significant obligatory obstacles to cross-border trade than tariffs
- Delays in time at border crossing point (BCP)
  - increase trade costs and trading time surges with increase in official procedures, which lowers export value specifically of perishable goods and high-tech products

# Introduction

- Longer times spent in customs clearance
  - increase illegal rent-seeking, trade-linked bribery, and discourage exports
- Upgrading all features of trade facilitation improve trade performance and support export diversification
  - while time to imports and lengthy paper procedures for exports adversely impact trade outcomes
- Modern border procedures and trade facilitation reforms lower trade costs significantly and increase trade flows
- Transportation barrier induced trade delays
  - significantly more in landlocked Central Asian countries
    - while efficient trade facilitation promotes trade flows
- Against this backdrop, this paper intends to analyze the impact of TFIs on trade flows in the Central Asia Regional Economic Cooperation (CAREC) transport corridors and offer policy implications for strengthening trade facilitation

# Review of Literature

Author(s)	Studies on trade facilitation and trade costs
Jacks, Meissner, and Novy 2008	Trade facilitation reforms and benefits
Arvis et al. 2016	Trade costs substantially higher in developing countries than developed countries
WTO and OECD 2017; Sakyi et al. 2017; Ali and Shakoor 2020	Trade facilitation reduces transportation costs and benefits
Wilson, Mann, and Otsuki 2003	Effectiveness of ports, border clearance, regulations, and e-trade positively impact trade flows
Kouty 2021	Inefficient trade procedures negatively impact trade

# Review of Literature

Author(s)	Studies on CAREC region and trade costs
Raballand, Kunth, and Auty 2005	CAREC region's trade depends on transport corridors via bordering nations
Mazhikeyev, Edwards, and Rizov 2015	Landlockedness significantly lowers trade value in CAREC countries
Raballand 2003; Arvis, Raballand, and Marteau 2010 ; Arvis et al. 2011	In landlocked CAREC economies, trade gains are smaller due to greater transportation costs, inadequate infrastructure and feeble institutions
UNESCAP 2018	Trade-linked tariff costs significantly more in CAREC economies than other Asian countries
ADB and UNESCAP 2013	Intraregional trade costs declined considerably in CAREC economies in recent years, but remained higher compared to national trade costs

# Review of Literature

Author(s)	Studies on trade facilitation measures in CAREC
Pomfret 2017	Inadequate trade facilitation measures due to bureaucratic impediments at corridor borders cause substantial trade costs than remoteness of the CAREC region
Arvis, Raballand, and Marteau 2010; Kim and Mariano 2020	The repetition of documentation clearance and inefficient handling at borders linger the consignment, which adversely affects the agricultural exports in the CAREC region and forces the CAREC countries to trade their farm goods within the region, which causes underutilization of agricultural trade capacity
Grigoriou 2007; Shepherd and Wilson 2006; Kim, Mariano, and Abesamis 2022	Improvement in trade facilitation and transit infrastructure can significantly lower transit time and boost intraregional trade in the CAREC region

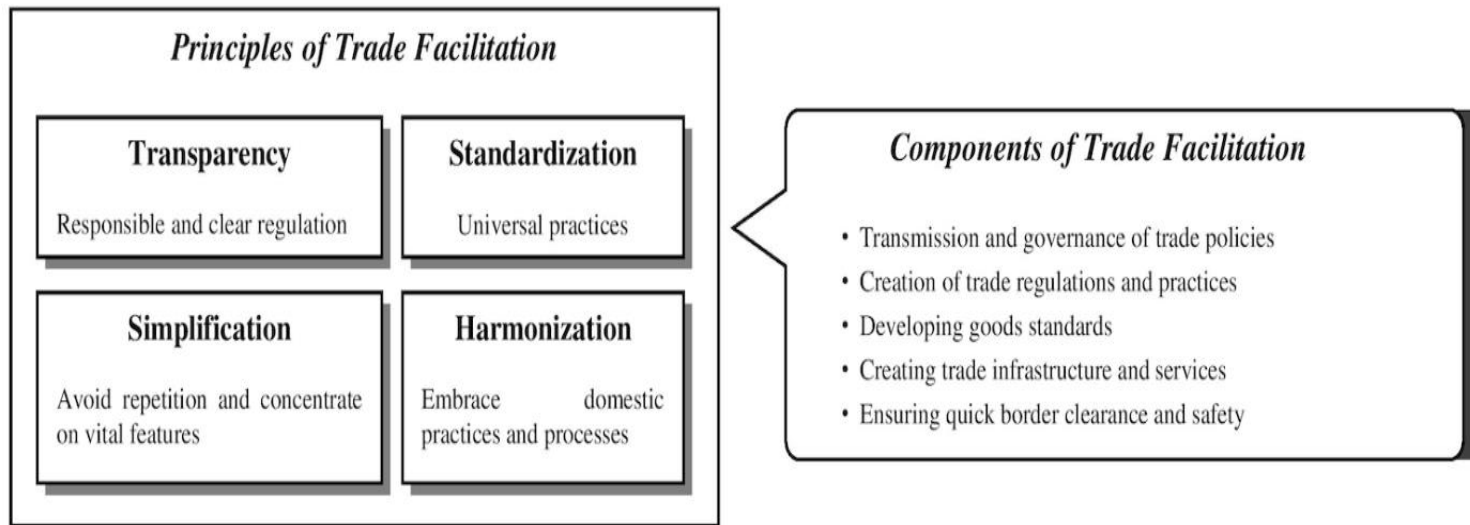
# Review of Literature

Author(s)	Studies on trade facilitation indicators
Felipe and Kumar 2012;	Used LPI - trade facilitation and upgrading corridors' infrastructure led to substantial trade gains in CAREC region with considerable country level variations
Tanabe, Shibasaki, and Kato (2016)	Used CPMM TFIs - improvement in trade transit facilities can significantly lower costs and boost trade flows in the CAREC region
Sharafeyeva 2020	Used perception based trading across border indicators - optimistic linkage between export volume and time
Kim and Mariano 2020; Sharafeyeva 2023	Total exports highly susceptible to time compared to cost in CAREC region
Pomfret 2021; Pomfret 2017; De Soyres et al. 2018	Trade patterns considerably altered in CAREC region by linking PRC and Eurasian countries via Kazakhstan due to substantial investment in BRI, lowering border crossing time and trade cost
Kim, Mariano, and Abesamis 2022	Significance of TFIs in increasing trade flows in CAREC region



# Theoretical Framework

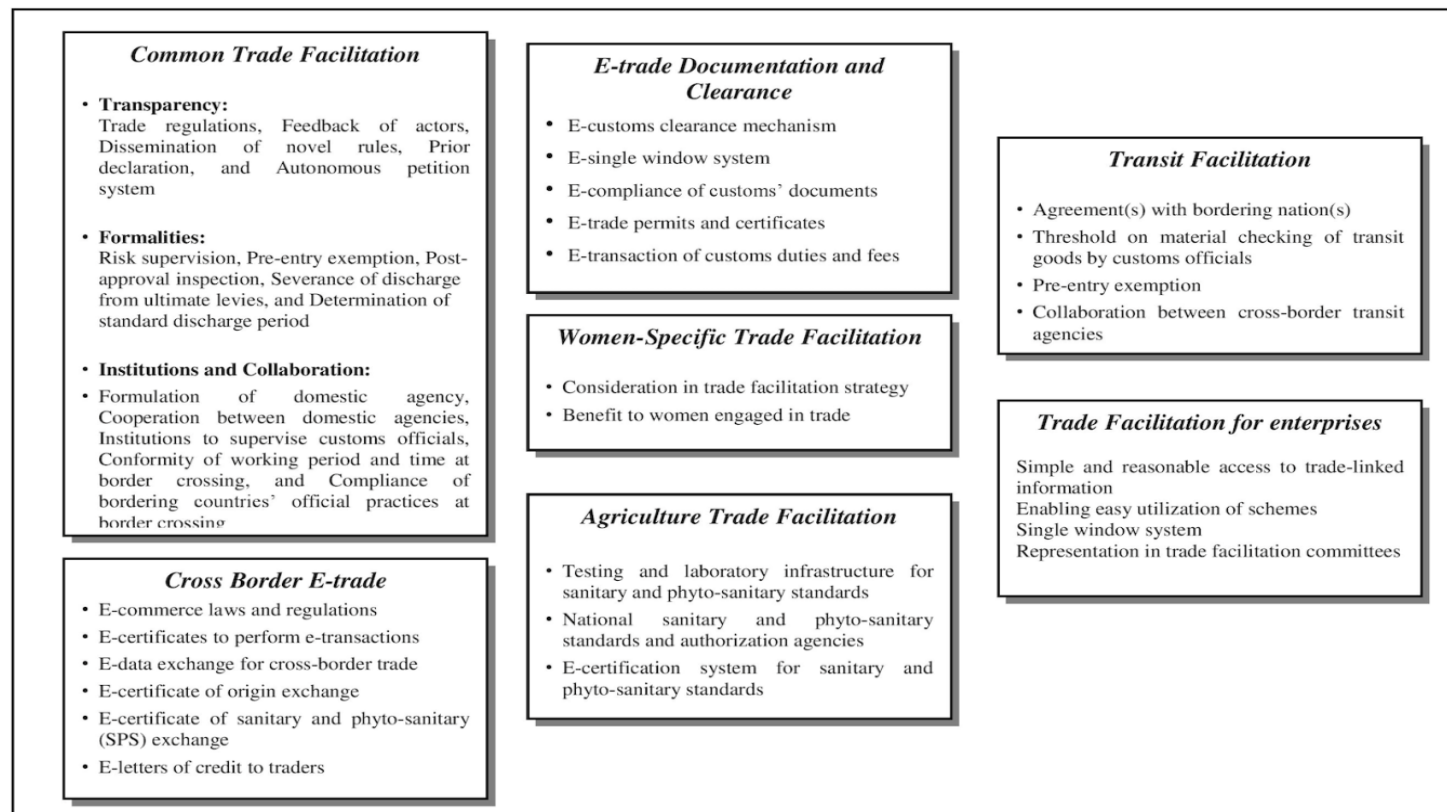
Figure 1: Principles and Components of Trade Facilitation



Source: Author's creation based on UNECE 2012; ADB and ESCAP 2013.

# Theoretical Framework

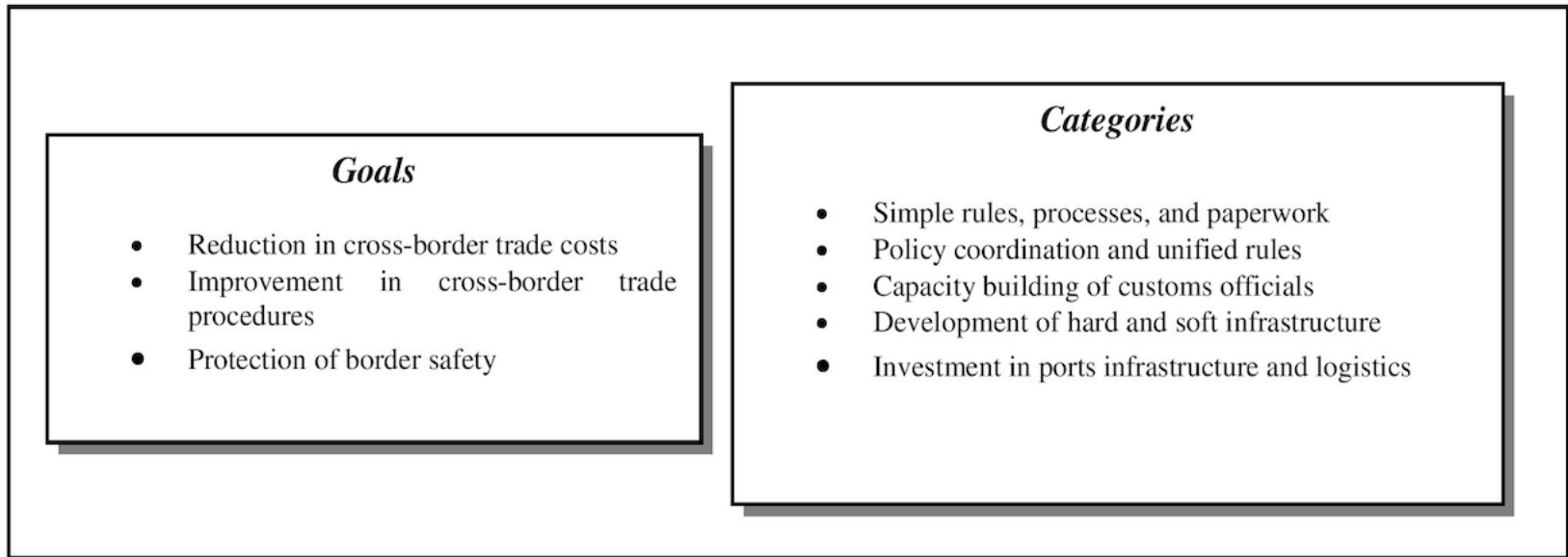
Figure 2: Measures of Trade Facilitation



Source: Author's creation based on UNESCAP 2019.

# Theoretical Framework

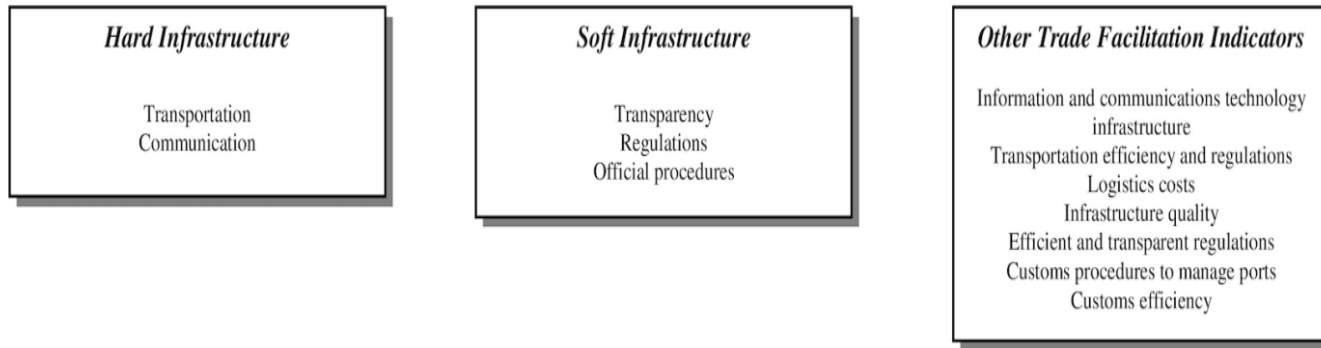
**Figure 3: Goals and Categories of Trade Facilitation Measures**



Source: Author's creation based on World Bank 2017.

# Theoretical Framework

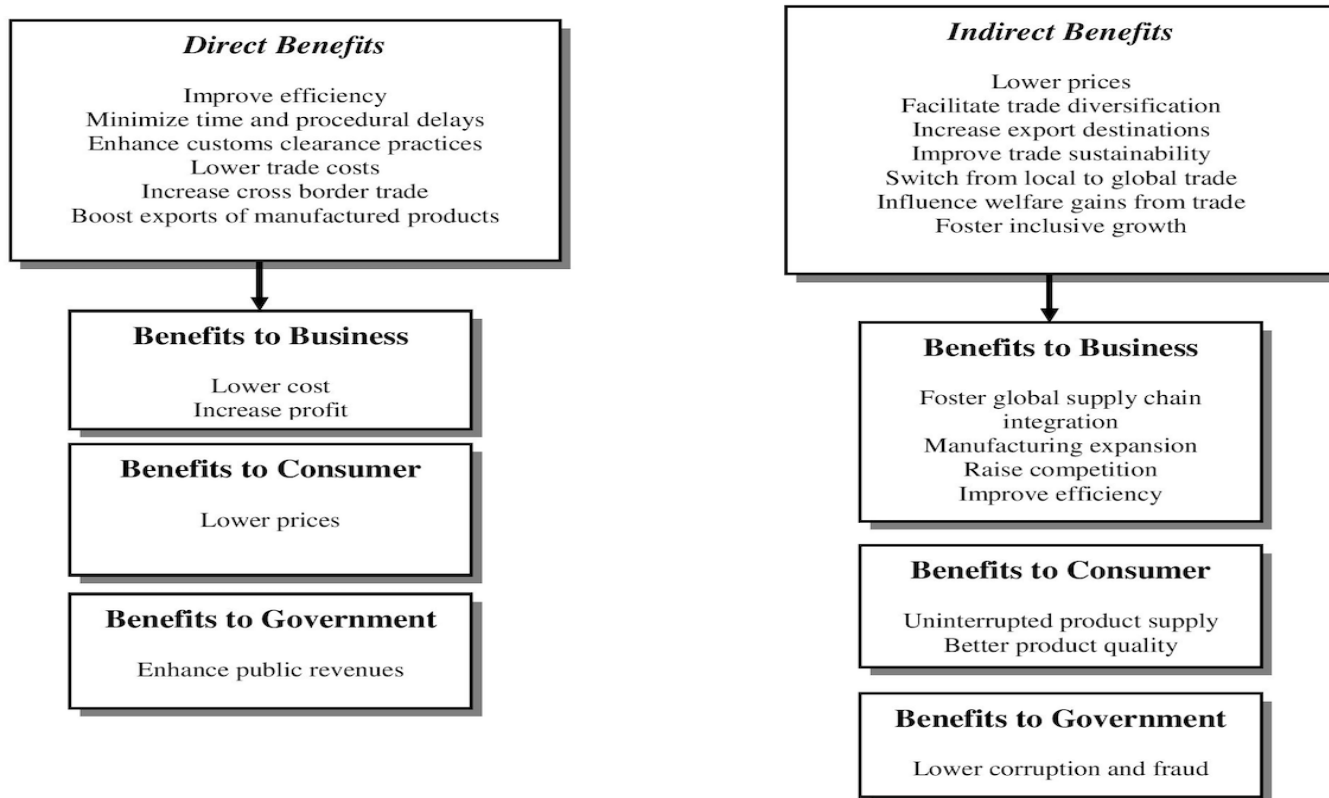
Figure 4: Trade Facilitation Indicators



Source: Author's creation.

# Theoretical Framework

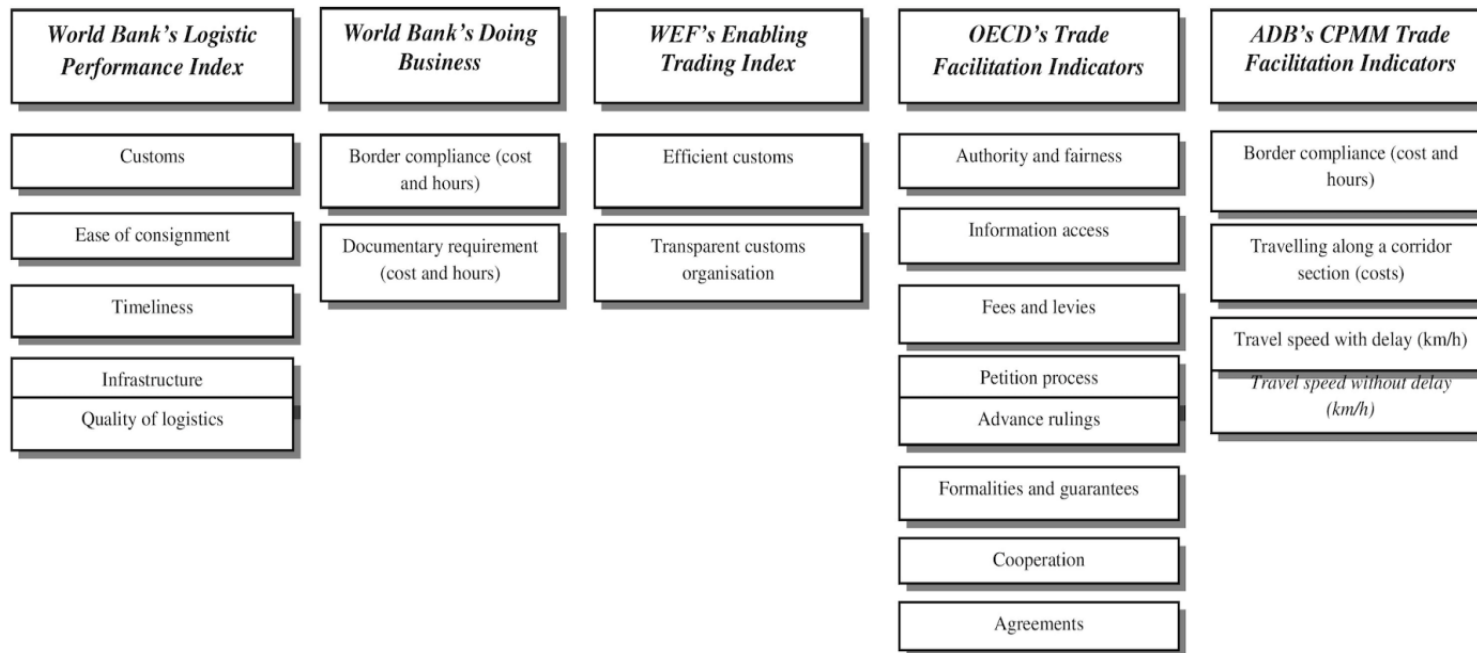
Figure 5: Benefits of Trade Facilitation



Source: Author's creation.

# Theoretical Framework

Figure 6: Comparing Trade Facilitation Indicators



Source: Author's creation based on World Bank 2016, 2017; WEF 2016; OECD 2013; ADB 2013.

# Objectives

## Main objectives

- To analyze the impact of TFIs on trade flows in the CAREC transport corridors economies using the database on the CPMM TFIs and
- To draw policy implications for improving the TFIs

# Variables and Data Sources

<b>Dependent variable</b>	<b>Description</b>	<b>Source</b>
Bilateral goods exports	Nominal value (in \$) of goods exports from source country $i$ to destination country $j$ , expressed in natural logarithmic. The export values are in terms of free-on-board, i.e. transaction costs for the shipping of the goods are borne by the exporter.	IMF DOTS
<b>Explanatory Variables</b>		
Bilateral Distance	Measure of distance between country $i$ 's capital city and country $j$ 's capital city in kilometers. This variable is expressed as natural logarithmic	CEPII Database by Head and Mayer (2014)
Contiguity	A dummy variable that takes the value of 1 if country pair $i$ and $j$ share a common border. Contiguous countries are expected to engage more in trade, and hence have higher bilateral trade flows than non-contiguous countries	CEPII Database by Head and Mayer (2014)
Common official language	A dummy variable that takes the value of 1 if country pair $i$ and $j$ share a common official language. Countries are more likely to trade if there are no language barriers, which implies easier transaction among traders	CEPII Database by Head and Mayer (2014)
Colonial relationship	A dummy variable that takes the value of 1 if country pair $i$ and $j$ were ever in a colonial relationship (with one country as the colonizer and the other as the colony). Trade between two countries can also be reflected by their historical association.	CEPII Database by Head and Mayer (2014)
Clearing time at border crossing points (BCPs): Inbound and outbound	Number of hours it takes to move cargo across a BCP—exit from country $i$ and enter country $j$ .	CAREC CPMM
Costs incurred at a BCP: Inbound and outbound	Cost (in \$) of moving cargoes across a BCP—exit from country $i$ and enter country $j$ . All costs are taken into account, such as fees for road tolls, vehicle registration, weight inspection, traffic inspection, immigration, phytosanitary inspection, and customs clearance.	CAREC CPMM
Number of BCPs	Number of BCPs crossed in the bilateral trade. In non-contiguous country pairs, it would take more than two BCPs to pass and move cargo.	CAREC CPMM



# Methodology

- CAREC CPMM database of 6 CAREC corridors covers 11 countries - Afghanistan, Azerbaijan, Georgia, Kazakhstan, Mongolia, Pakistan, the Kyrgyz Republic, the PRC, Tajikistan, Turkmenistan, and Uzbekistan
  - focuses on 4 TFIs covering time taken to clear a PCP, cost incurred at custom clearance, cost incurred to travel a corridor section, and speed to travel covering both road and rail transport for 2010-2020
  - used to analyze operational efficiency of the TFIs and increase access along the routes
  - these indicators used to assess and validate the impacts TFIs on trade flows in CAREC corridors economies

# Methodology

$$\log Y_{ijt} = \alpha + \beta \log X_{ij} + \gamma \log Z_{ijt} + \sum_{k=1}^6 C(k) + v_{ijt} \quad (1)$$

where  $Y_{ijt}$  = value of country  $i$ 's goods exports to country  $j$  by crossing the corridor at time  $t$ .

Independent variables are depicted as under:

$X_{ij}$  = a vector of time variant exogenous trade cost incurred at BPCs,

$Z_{ijt}$  = a vector of trade facilitator measures,

$C(k)$  = dummy variables for the  $k^{\text{th}}$  corridor ( $k=1,2,\dots,6$ ), for the country  $i$  and  $j$  use for the export,  
and

$v$  = error term.

# Methodology

The values are expressed as natural logarithmic form.

$$\log Y_{ijt} = \alpha + \beta \log X_{ij} + \gamma \log Z_{ijt} + \sum_{k=1}^6 \rho(k) C(k) + v_{ijt} \quad (2)$$

where  $Y_{ijt}$  = the value of country  $i$ 's goods exports to country  $j$  by crossing the corridor at time  $t$ .

Independent variables are described as below:

$X_{ij}$  = a vector of time variant exogenous average time taken to clear BCPs,

$Z_{ijt}$  = a vector of trade facilitator measures,

$C(k)$  = dummy variables for the  $k^{\text{th}}$  corridor ( $k=1,2,\dots,6$ ), for the country  $i$  and  $j$  use for the export, and

$v$  = error term.

The detail description of the variables is given in Annexure 1. In the above equation, the vectors of coefficients,  $\beta$  and  $\gamma$ , are magnitude of partial effects of  $X_{ij}$  and  $Z_{ijt}$  on bilateral trade flows.

# Data and Variables

<b>Dependent variable</b>	<b>Description</b>	<b>Source</b>
Bilateral goods exports	Nominal value (in \$) of goods exports from source country $i$ to destination country $j$ , expressed in natural logarithmic. The export values are in terms of free-on-board, i.e. transaction costs for the shipping of the goods are borne by the exporter.	IMF DOTS
<b>Explanatory Variables</b>		
Bilateral Distance	Measure of distance between country $i$ 's capital city and country $j$ 's capital city in kilometers. This variable is expressed as natural logarithmic	CEPII Database by Head and Mayer (2014)
Contiguity	A dummy variable that takes the value of 1 if country pair $i$ and $j$ share a common border. Contiguous countries are expected to engage more in trade, and hence have higher bilateral trade flows than non-contiguous countries	CEPII Database by Head and Mayer (2014)
Common official language	A dummy variable that takes the value of 1 if country pair $i$ and $j$ share a common official language. Countries are more likely to trade if there are no language barriers, which implies easier transaction among traders	CEPII Database by Head and Mayer (2014)
Colonial relationship	A dummy variable that takes the value of 1 if country pair $i$ and $j$ were ever in a colonial relationship (with one country as the colonizer and the other as the colony). Trade between two countries can also be reflected by their historical association.	CEPII Database by Head and Mayer (2014)
Clearing time at border crossing points (BCPs): Inbound and outbound	Number of hours it takes to move cargo across a BCP—exit from country $i$ and enter country $j$ .	CAREC CPMM
Costs incurred at a BCP: Inbound and outbound	Cost (in \$) of moving cargoes across a BCP—exit from country $i$ and enter country $j$ . All costs are taken into account, such as fees for road tolls, vehicle registration, weight inspection, traffic inspection, immigration, phytosanitary inspection, and customs clearance.	CAREC CPMM
Number of BCPs	Number of BCPs crossed in the bilateral trade. In non-contiguous country pairs, it would take more than two BCPs to pass and move cargo.	CAREC CPMM

# Results and Discussion

Table 1: Impact of Average Time at BCP on Bilateral Trade (Pooled Regression)

Dependent variable Ln (Export)	(1)	(2)	(3)
Ln (Distance)	-0.0157*	-0.058*	-0.0275*
	(-0.09)	(-0.36)	(-0.17)
Contiguity	1.408***	1.492***	1.442***
	(3.96)	(4.28)	(4.12)
Number BCPs passed	-0.403**	-0.380**	-0.381**
	(-0.328)	(-0.315)	(-0.314)
Colonial relationship	4.208***	4.224***	4.122***
	(6.57)	(6.74)	(6.54)
Common language	0.438	0.53	0.578
	(0.48)	(0.6)	-0.65
Ln (Average time at inbound BCPs, in hours)	-0.1793**		
	(-0.082)		
Ln (Average time at outbound BCPs, in hours)		-0.0988*	
		(0.062)	
Ln (Average total time at BCPs, in hours)			-0.1379*
			(0.076)
Constant	12.65***	11.61***	11.31***
	(10.41)	(9.95)	(9.5)
Corridor dummies	Yes	Yes	Yes
No of observation	1057	1060	1061
R-squared	0.3117	0.3359	0.3313
Adjusted R-squared	0.3045	0.329	0.3243

t statistics in parentheses

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

# Results and Discussion

Table 2: Impact of Average Cost at BCP on Bilateral Trade (Pooled Regression)

Dependent variable Ln (Export)	(1)	(2)	(3)
Ln (Distance)	-0.0146*	-0.0858*	-0.0192*
	(0.09)	(-0.52)	(-0.12)
Contiguity	0.129***	0.158***	0.139***
	(0.367)	(0.448)	(0.390)
Number BCPs passed	-0.380**	-0.402***	-0.403**
	(-3.12)	(-3.32)	(-3.27)
Colonial relationship	0.449***	0.476***	0.424***
	(0.638)	(0.709)	(0.662)
Common language	0.423	0.571	0.391
	(0.47)	(0.64)	(0.43)
Ln (Average cost at inbound BCPs, in \$)	-0.0736***		
	(-0.0627)		
Ln (Average cost at outbound BCPs, in \$)		-0.0600	
		(-0.039)	
Ln (Average total cost at BCPs, in \$)			(-0.0611)
			(-0.044)
Constant	15.53***	10.33***	13.24***
	(11.82)	(8.26)	(9.99)
Corridor dummies	Yes	Yes	Yes
No of observation	1055	1058	1060
R-squared	0.323	0.3297	0.3116
Adjusted R-squared	0.3159	0.3226	0.3044

t statistics in parentheses

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

# Conclusion and Policy Implications

- TFIs in CAREC corridors generated considerable positive impact on bilateral trade flows of CAREC economies though fluctuating
- Trade times and longer time delays can increase trade costs and lower trade
- Transaction delays and inefficient information, longer physical inspection, inadequate coordination and lengthy customs procedures can negatively impact inbound trade flows
- Longer customs clearance hampers quality and prices of agricultural exports
- Heterogeneity in TFIs along CAREC corridors considerable and likely to have a significant positive influence on bilateral trade flows in CAREC economies
- With robust TFIs, regional integration and cooperation between CAREC corridors economies along routes bolstered
- With better TFIs in CAREC corridors economies, inward trade flows likely to decline comparatively higher than surge in outward trade flows
- Bilateral trade inflows are likely to boost trade volume and can be used for development of infrastructure and natural resources

# Conclusion and Policy Implications

- Developing stronger TFIs along CAREC corridors can result in significant positive impact on bilateral trade performance in CAREC economies
- Therefore, CAREC corridors economies should be vigorously supported to bolster transport corridors development and improve TFIs for robust trade performance
- This can facilitates CAREC corridors economies to spot relative benefits in resources and markets along routes and improve pathetic infrastructure by substantial investment in transport corridors projects
- Stronger regional economic cooperation should promote development of novel technologies, skills and knowledge to improve TFIs further for better trade outcome
- Besides, developing economies in CAREC corridors experience differential influence of TFIs on trade flows than comparatively more developing economies along routes, which signify that CAREC corridors can ease disparity in international division of labour between developing and more developing economies
- Therefore, regional economic cooperation among CAREC corridors economies should also centre on heterogeneity of TFIs in developing and more developing economies along routes



# Conclusion and Policy Implications

- Trade facilitation reforms necessary to bolster border clearance mechanisms and drastically reduce trade costs, which entail reducing customs documentation, time, and real customs clearance costs
- More transparency in official communications and regulations can lower delays in trade flows
- Institutional and organizational development of border agencies should be implemented to minimize trade times and facilitate smoother cross border trade
- Rationalized customs procedures and physical verification of trade documents facilitate fast mobility of products at border
- Pre-arrival verification of customs documents can smooth goods mobility at border points
- Information and data sharing among border agencies can facilitate stronger cooperation of customs administration
- Trade facilitation reforms should focus on recruiting and retaining trained manpower and boost teamwork among border bureaucracy to bolster border agencies
- Customs bureaucracy should be incentivized to build transparency and accountability to achieve intents of trade facilitation reforms and to reduce leakages

## Conclusion and Policy Implications

- Robust customs infrastructure and logistics can significantly reduce trade costs and increase trade flows
- Digitalization of customs procedures is needed to reduce trade costs
- Use of ICT apparatus for official customs procedures can lower trade delays, improve transparency of custom operations, lower trade costs, and increase trade flows
- Capacity building of border administration essential to implement digitalization of custom practices
- A single window system can reduce time delays, reduce trade costs and boost trade flows considerably
- Authorized operator scheme can lower border clearance time, increases exports and facilitates export diversification

# Conclusion and Policy Implications

- Trade facilitation reforms essential for enforcement of cost-effective customs procedures and cooperation of border agencies to minimize rents
- Expenses to leverage automated customs clearance, data, exchange, single windows, digital equipment, and capacity building should be curtailed to lower trade costs using efficient and transparent strategies
- Sustainability of trade facilitation reforms require capacity building to impel changes and identify and tackle novel problems which can emerge in future
  - capacity building of higher officials in border agencies to escort and carry trade facilitation reforms
- Trade facilitation reforms to bolster border agencies should be evaluated to ascertain impact and offer corrective measures
- Trade facilitation measures can entail novel legislation to revise available laws
  - time and specialized officials to evaluate available regulations, guarantee reliability and consistency with existing national strategies policies and analyze likely unplanned effects on different clients

**Thank  
You**

