Geographical Proximity and Trade Impacts in the CAREC region

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Sequence of the presentation

- Value proposition
- Introduction
- Data and Methodology
- Description and Empirical Analyses
- Conclusion and policy recommendations

What are the Value Propositions?

- eSPS certification implementation in the CAREC region
- Seeing the impact of RTAs/FTAs/PTAs/partnership trade agreements
- Regional analysis, trade facilitation measures (transit infrastructure) in neighboring areas/regions also generate additional regional trade.
  - Origin centric
  - Destination centric
  - Origin-destination centric

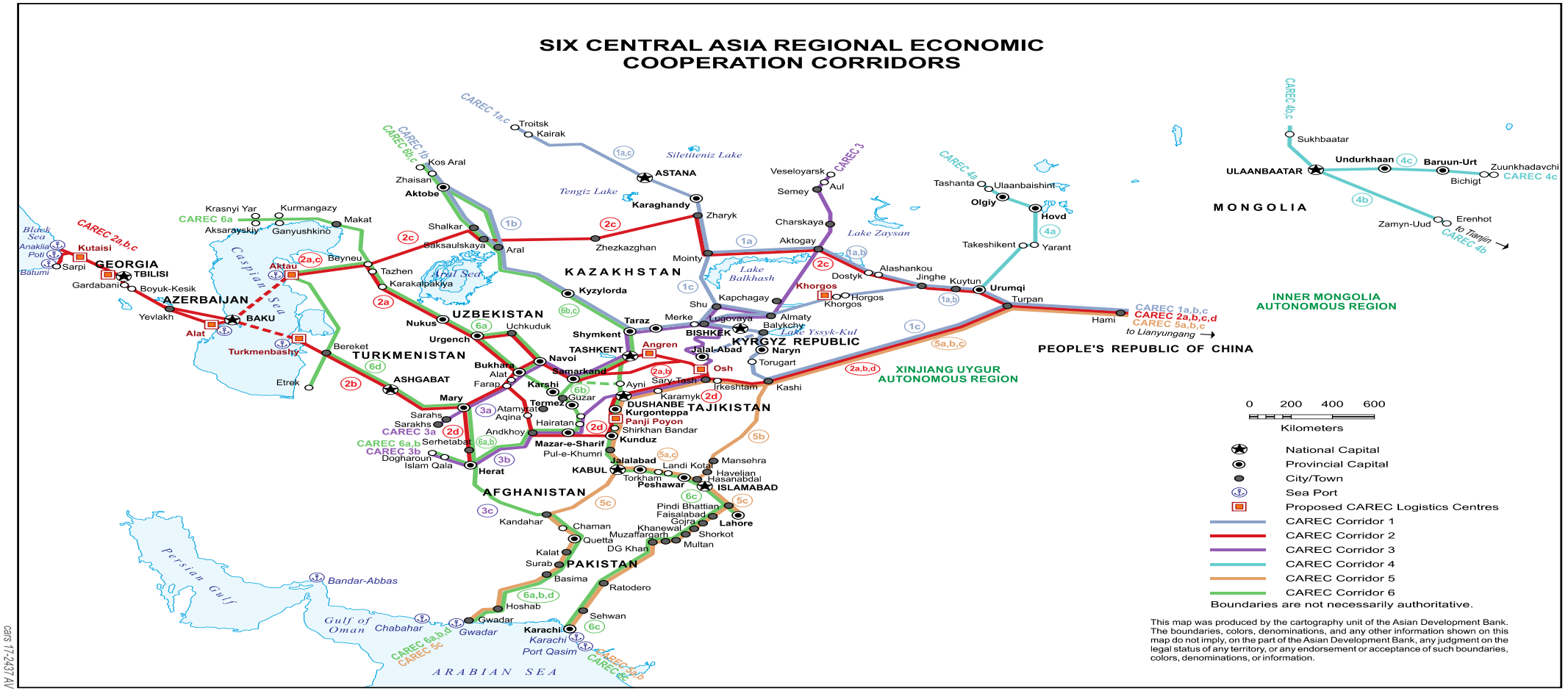
Introduction

- It is estimated that underdeveloped infrastructure accounts for 40% of predicted transport costs for coastal and roughly 60% for landlocked countries (Limao and Venables, 2001).
- Besides fees applied for the transit countries, the additional time spent on border-crossing transactions can be viewed as additional trade costs. For instance, the value of trade drops from 13-35% or 10-51% when one trading partner or both partners are landlocked (Mazhikeyev et al., 2015)
- Djankov et al. (2010) conclude that each additional day delay prior to being shipped reduces trade by 1%. In a similar study, Persson (2008) found that one extra day in time to export (imports) decreased exports by 1% (0.5%).

Introduction, continued

- On the other hand, exploiting World Bank's Logistic Performance Index (LPI) Hertel and Mirza (2009) show that trade facilitation reforms in South Asia caused to increase of 5.8 billion US$ (75%) in intra-regional trade and a 30.8 billion US$ (22%) increase in trade outside the regions.
- Kim et al (2022) The results imply that reducing time at the importer's border by 10% increases intra-CAREC trade by 1.41%.
- Tobler's (1979) "everything is related to everything else, but adjacent things are more related than distant things." Tobler's theory provides importance to the spatial interactions among regions. Therefore, ignoring spatial dependence in econometrics analysis leads to bias estimation (Anselin 1988).

Designated Road Corridors



Data: Trade Facilitation Indicators (TFI1, TFI2)

TFI1 Time taken to clear a border crossing point (hr)

Average length of time (hour) it takes to move cargo (20 tons) across a border from the exit point of one country the entry point of another; to capture both the complexity and the inefficiencies inherent in the border crossing process

TFI2 Cost incurred at border crossing clearance (US$)

Average total cost (U$) of moving cargo (20 tons) across a border from the exit point of one country to the entry point of another; Both official and unofficial payments are included

TFI3 Cost incurred to travel a corridor section (per 500km, per 20-ton cargo)

Average total costs (U$) incurred for a unit of cargo (a cargo truck or train with 20 tons of goods) traveling along a corridor section within a country or across borders; Both official and unofficial payments are included

TFI4 Speed to travel with delay on CAREC Corridors (kph) – SWD (Speed With Delay)

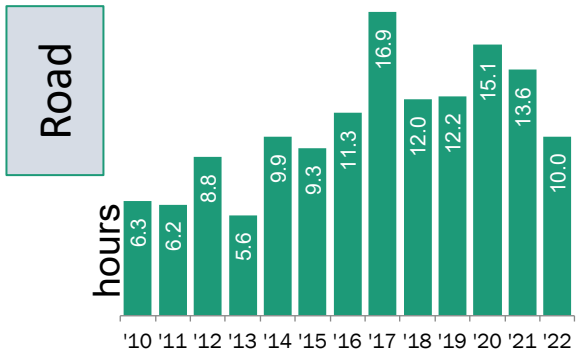
Average speed (kph) at which a unit of cargo travels along a corridor section (a stretch of road 500 km long) within a country or across borders; The total time taken for the entire journey; Distance and time measurements include border crossings; An indicator of the efficiency of BCPs along the corridors

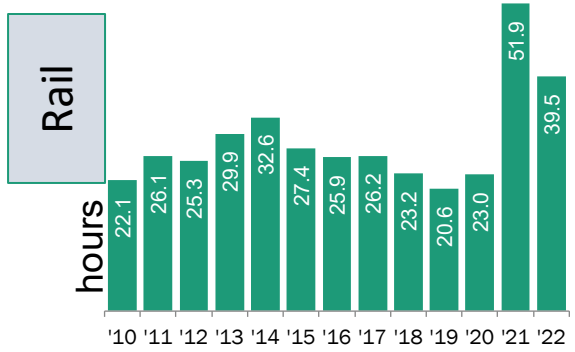
TFI5 Speed to travel without delay on CAREC Corridors (kph) – SWOD (Speed Without Delay)

Traveling speed only; A measure of the condition of physical infrastructure (such as road and railways)

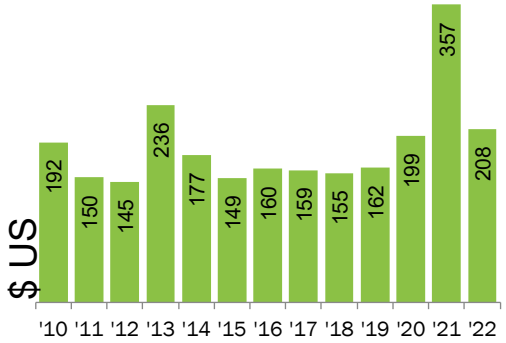
Four Trade Facilitation Indicators (2010 to 2022)

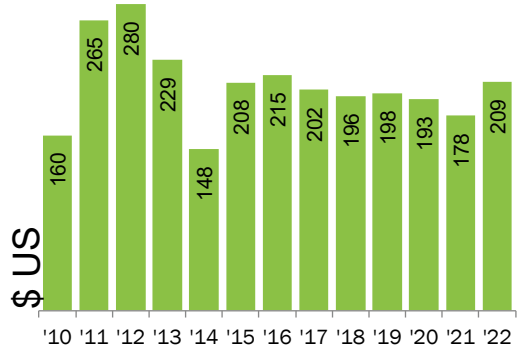
TFI1 Time taken to clear a BCP



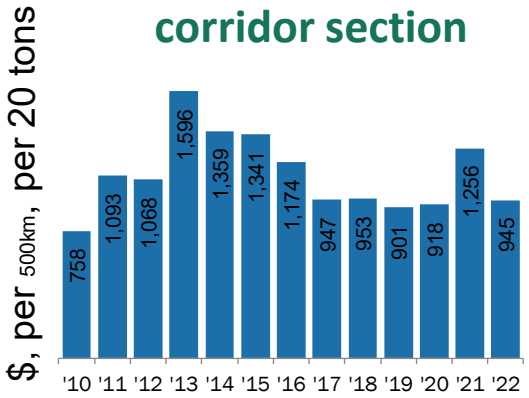


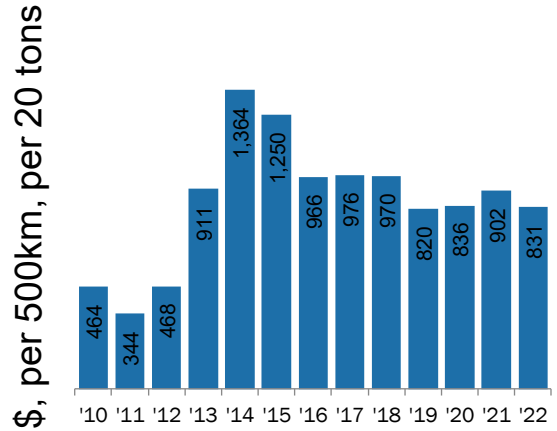
TFI2 Cost incurred at BCP



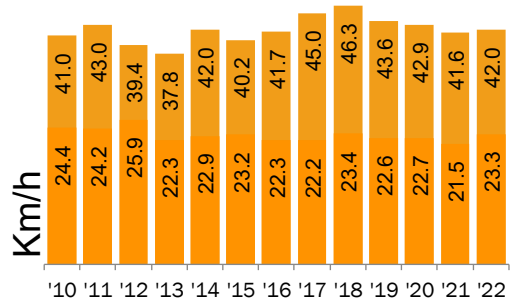


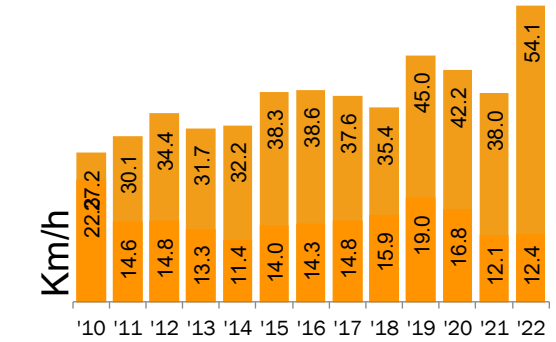
TFI3 Cost incurred to travel a corridor section





TFI4 Speed to travel on CAREC corridors





Identification of Time-Consuming BCPs

Average border-crossing time at ROAD BCPs, in hours

Outbound Traffic	Country	Duration (hours)	
		Average	Median
Alashankou	PRC	81.3	68.4
Chaman	PAK	54.0	53.7
Torugart	KGZ	50.1	50.1
Karasu	PRC	42.7	5.6
Farap	TKM	26.7	26.7
Tsiteli Khidi	GEO	24.2	14.6
Peshawar	PAK	24.2	26.0
Krasnyi Most	AZE	23.9	6.7
Khorgos	PRC	23.5	10.7
Takeshikent	PRC	21.4	20.8

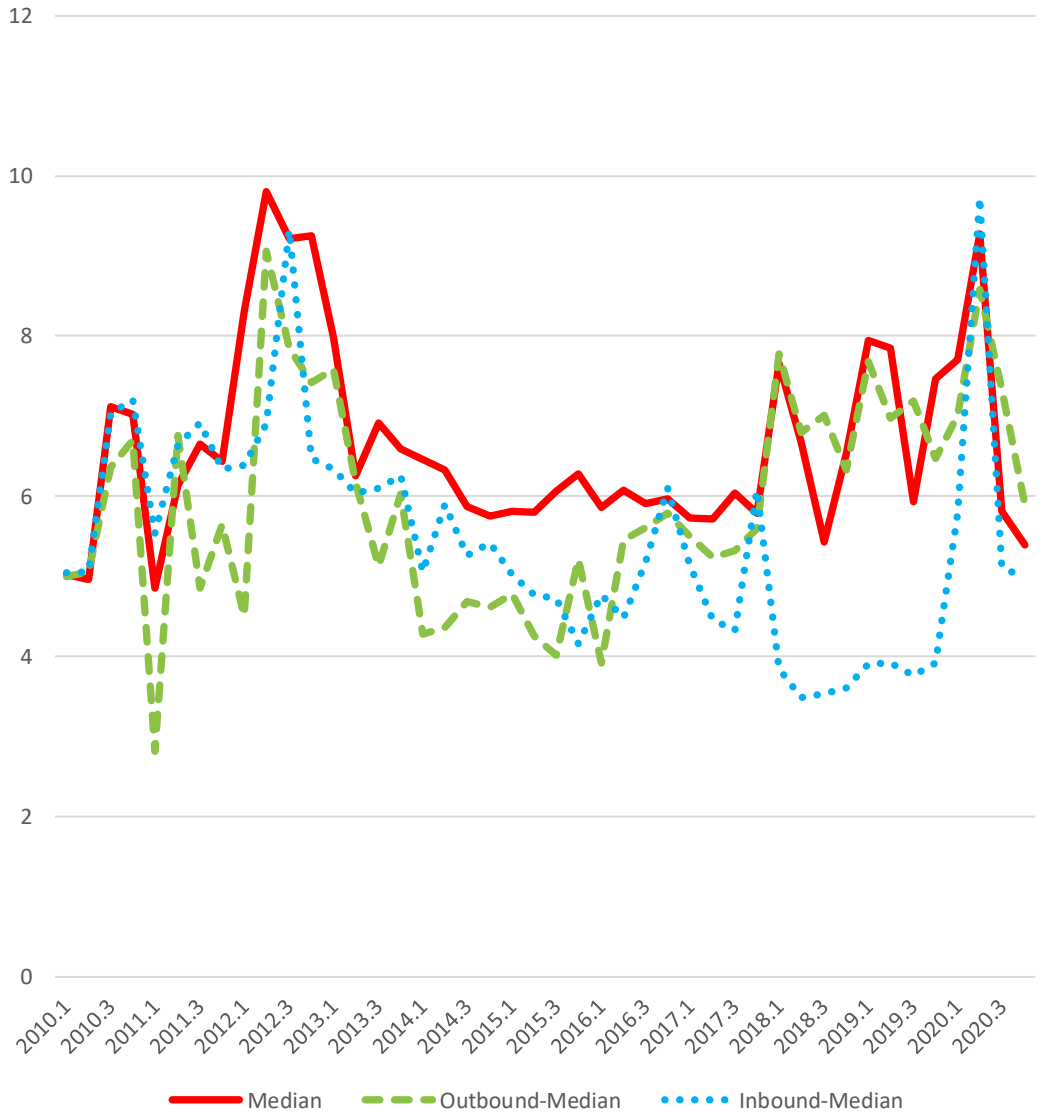
Inbound Traffic	Country	Duration (hours)	
		Average	Median
Dostyk	KAZ	20.7	15.9
Torkham	AFG	15.6	12.4
Yarant	MON	11.5	10.3
Nur Zholy	KAZ	10.7	5.7
Kulma	TAJ	10.4	6.0
Spin Buldak	AFG	7.6	7.5
Panji Poyon	TAJ	7.4	6.7
Farap	TKM	6.5	6.5
Karasu	KAZ	5.7	0.5
Torugart	KGZ	5.1	5.2

Average border-crossing time at RAIL BCPs, in hours

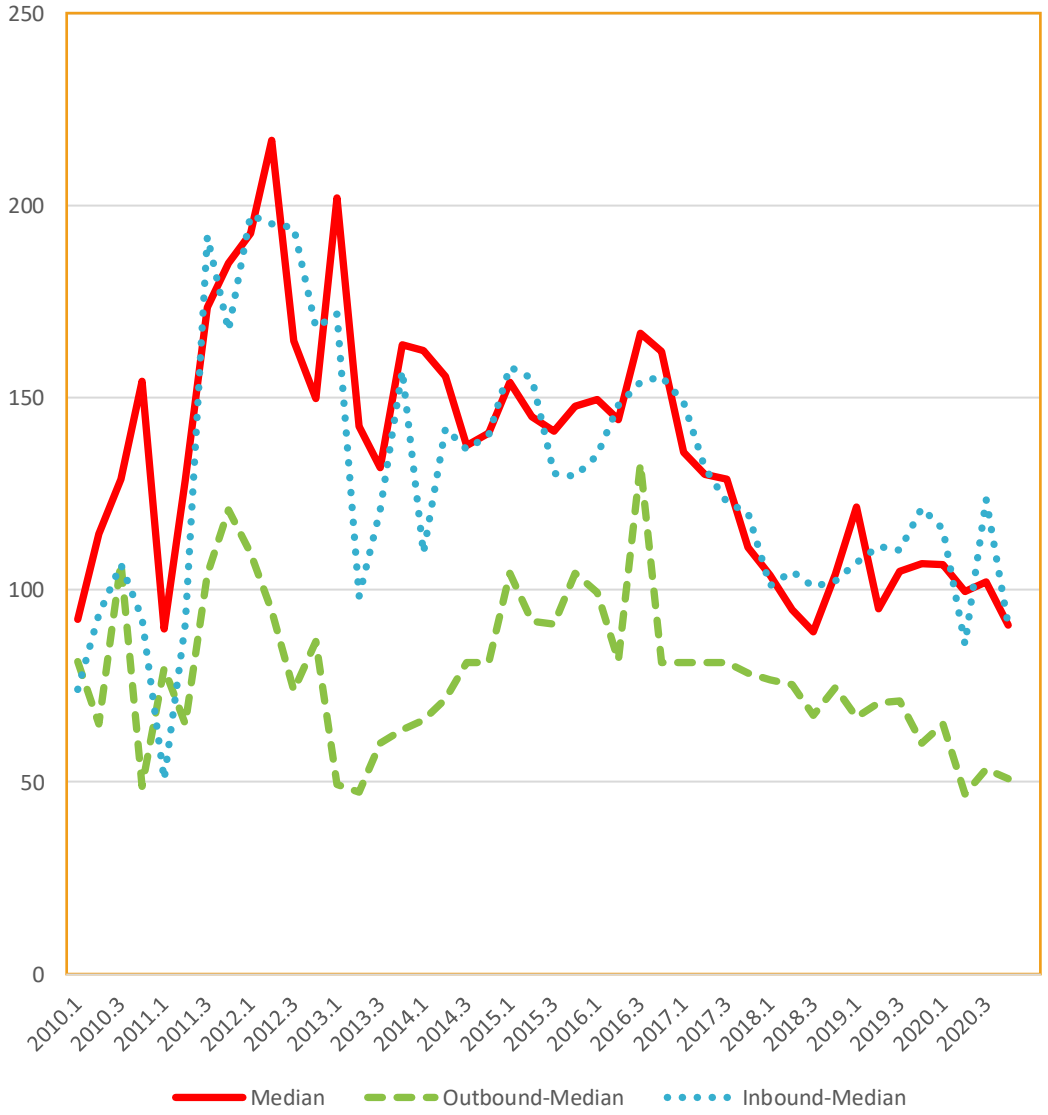
Outbound Traffic	Country	Duration (hours)	
		Average	Median
Erenhot	PRC	44.4	43.7
Bekabad	UZB	36.0	36.0
Alashankou	PRC	30.1	23.5
Khorgos	PRC	26.1	15.5
Zamiin-Uud	MON	20.1	10.4

Inbound Traffic	Country	Duration (hours)	
		Average	Median
Altynkol	KAZ	82.7	73.5
Dostyk	KAZ	76.0	69.7
Erenhot	PRC	54.9	53.1
Sukhbaatar	MON	12.2	7.7
Termez	UZB	8.5	8.5

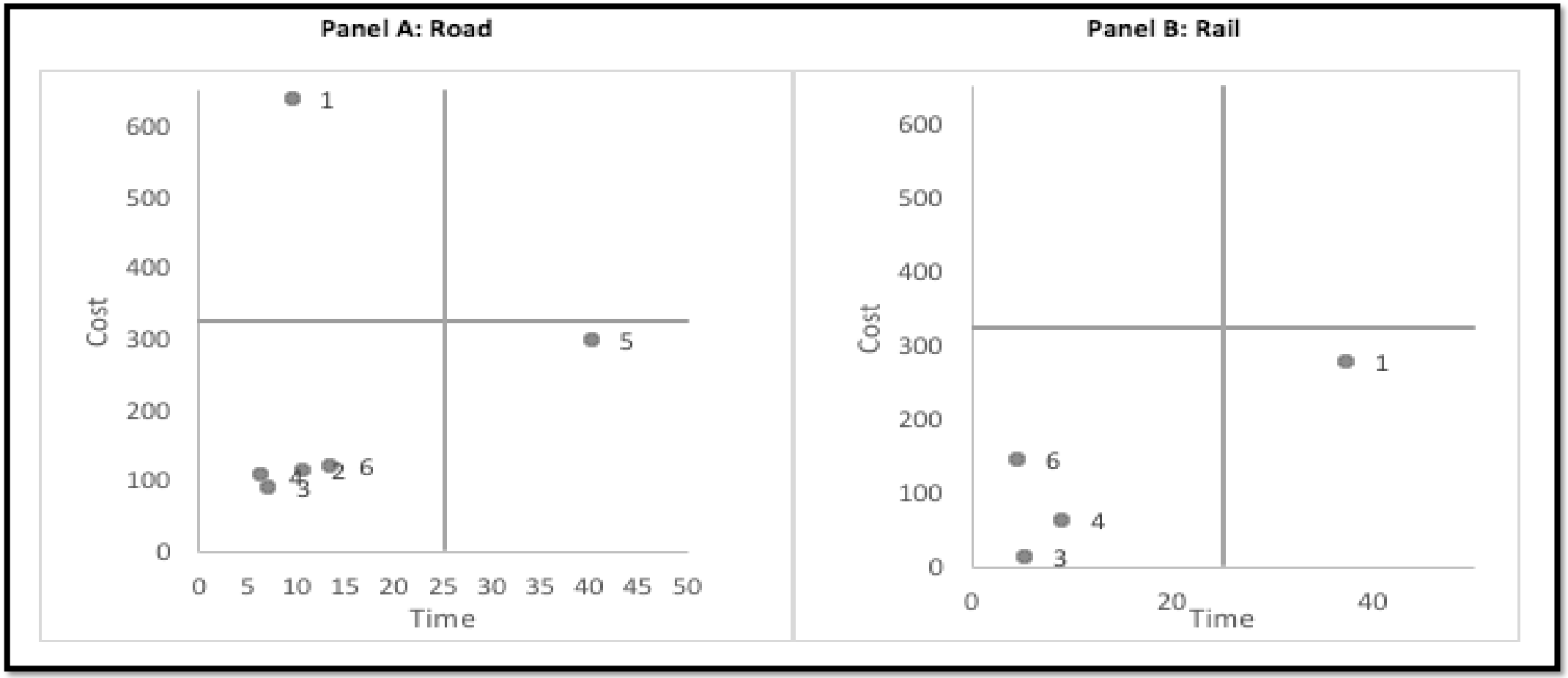
Time taken to clear a BCP (TFI1 in hour) - Road



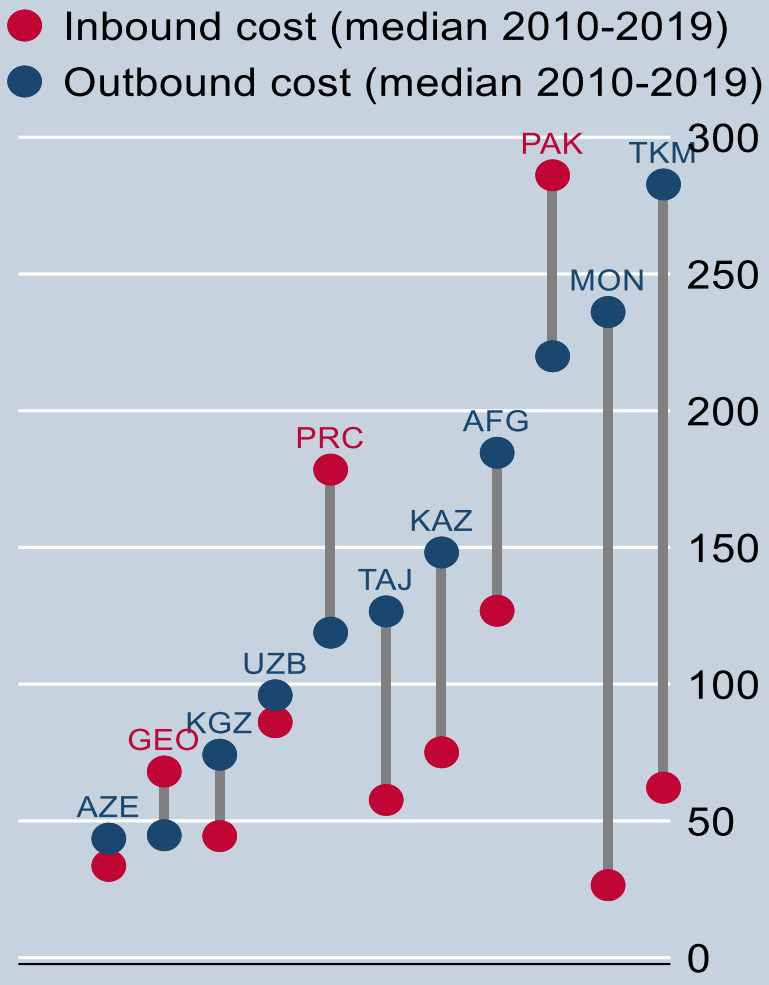
Costs taken at BCPs (TFI2 in US$) –Road

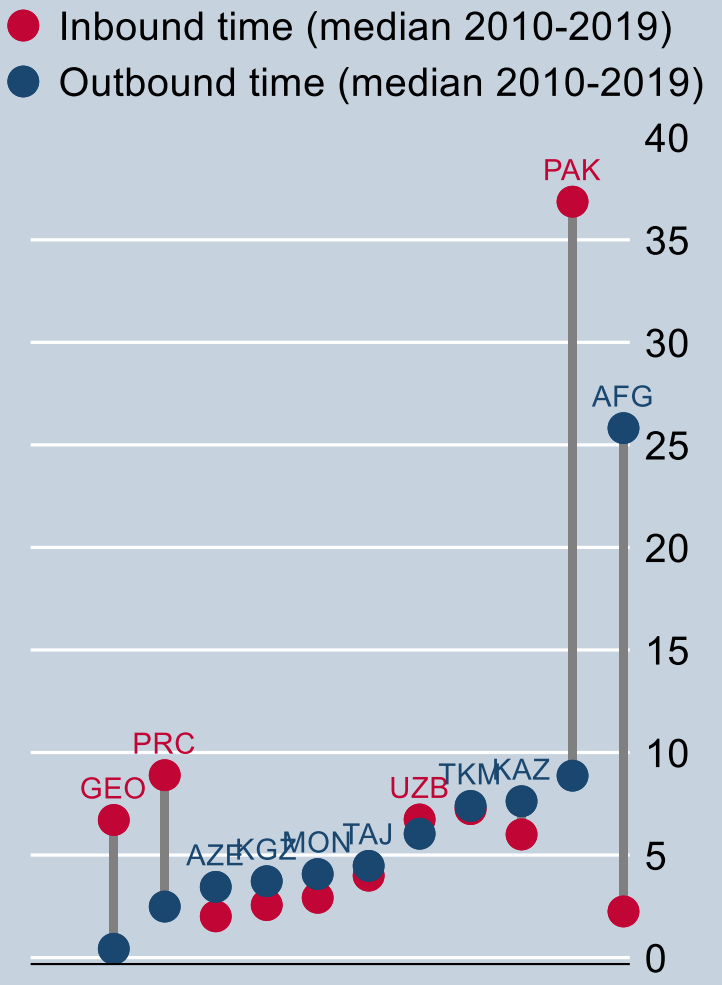


Time and Cost Comparison (2020)

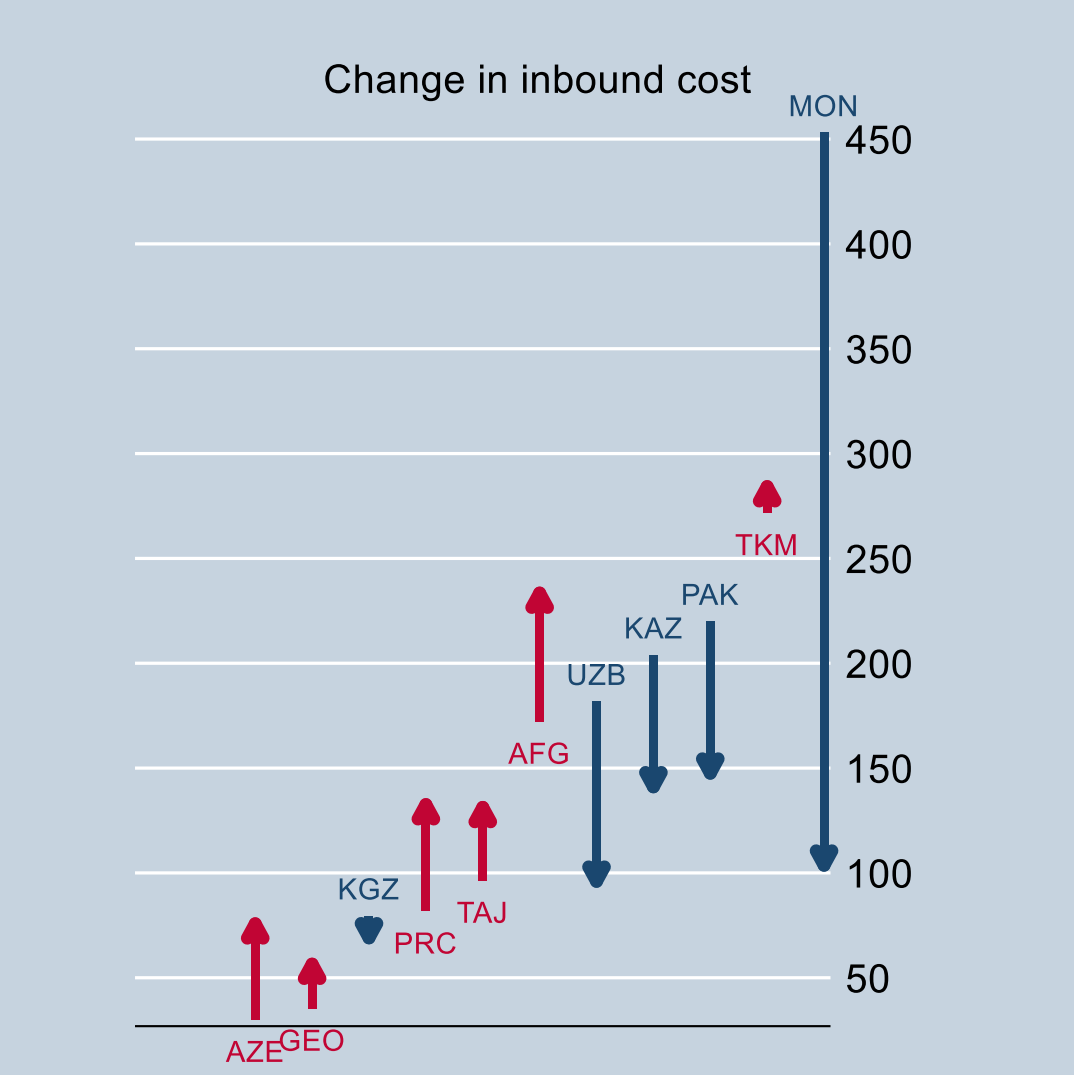


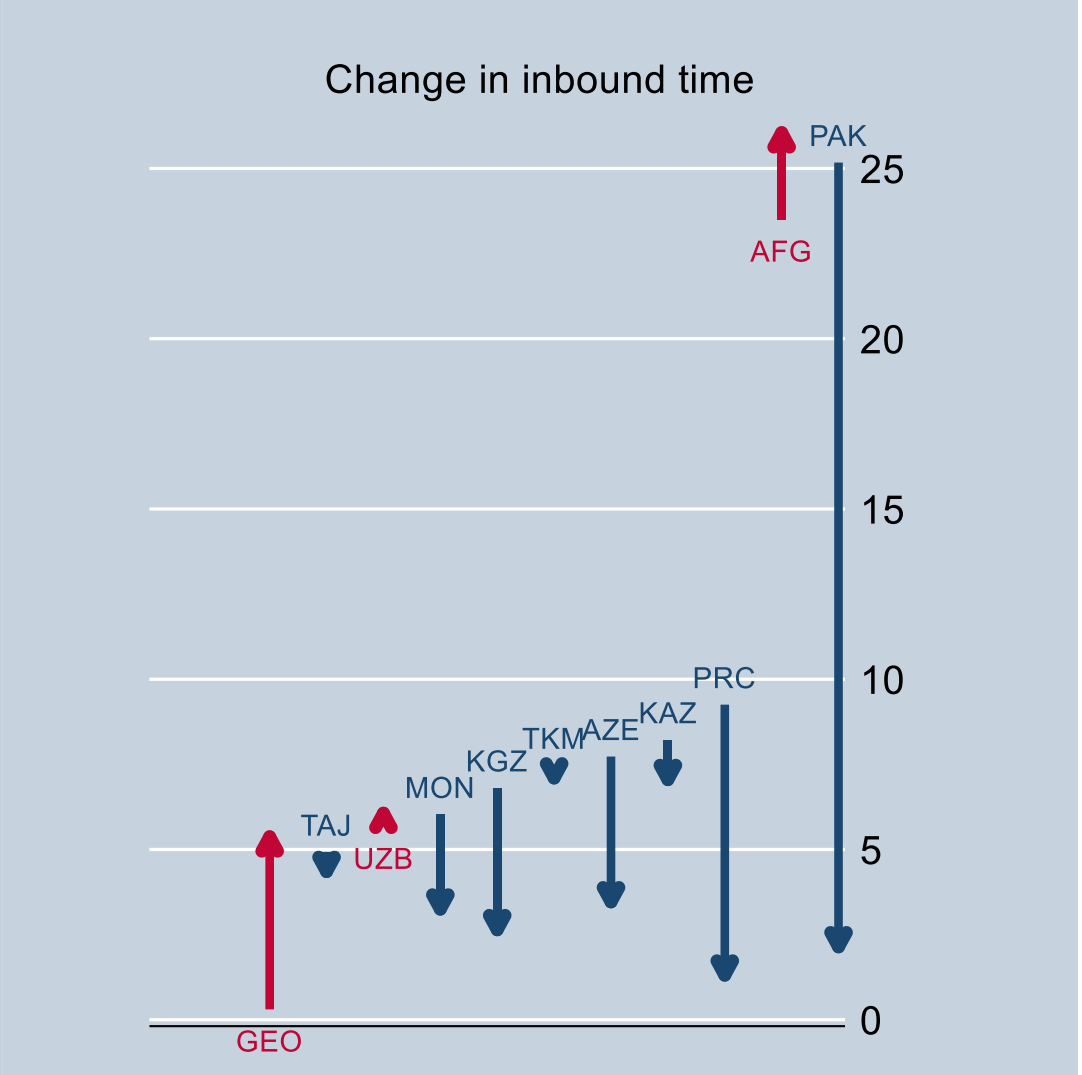
Difference in Inbound and Outbound Cost/Time



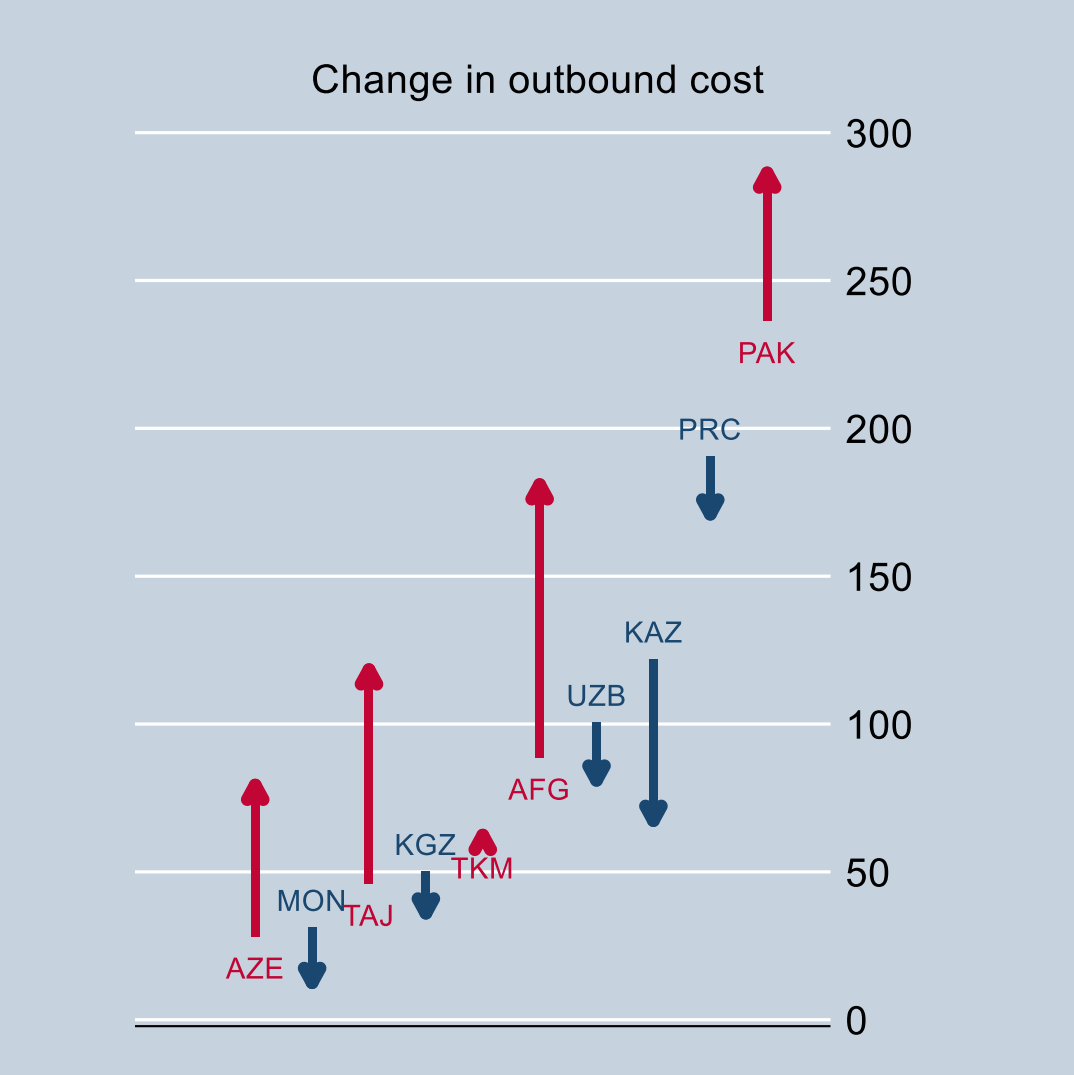


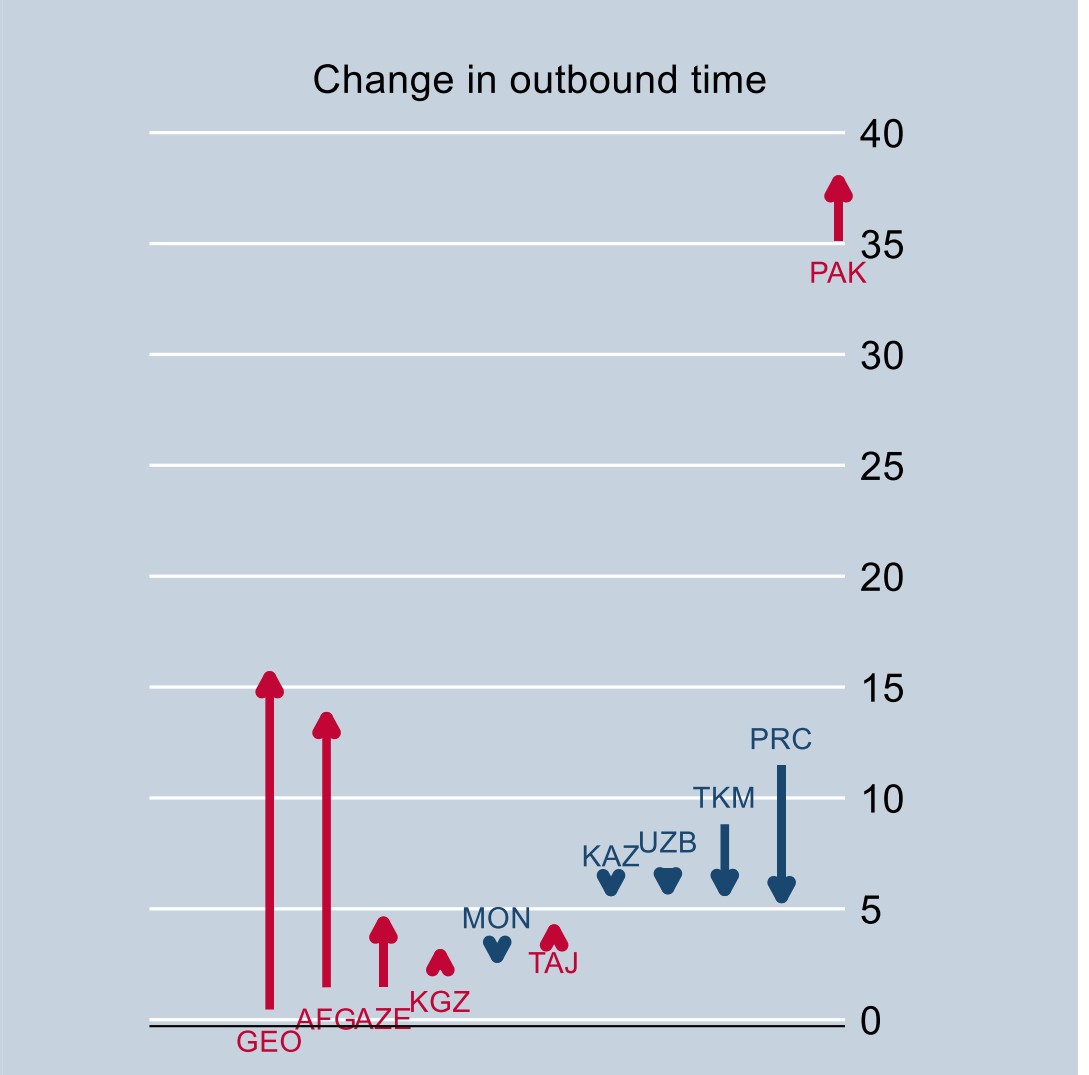
Change in Inbound Cost/Time





Change in Outbound Cost/Time





Gravity model

$$Trade_{ijt} = exp[\alpha_1 ln(Distance_{ij}) + \alpha_2 Language_{ij} + \alpha_3 Colony_{ij} + \alpha_4 RTA_{ijt} + \alpha_5 ln(BorderCost_{ijt}) + \alpha_6 ln(BorderTime_{ijt}) + \alpha_7 ln(BorderTime\_eSPSijt) + \alpha_8 ln(CostTime\_eSPS_{ijt}) + \beta_{it} + \gamma_{jt}] + \varepsilon_{ijt}$$

where

- $Trade_{ijt}$: Trade of an origin *i* to a destination *j* during year *t*.
- Log-transformed values of the annual gross domestic product of exporter and importer are denoted by GDP_{it} *and* GDP_{jt} *respectively.*
- $Distance_{ij}$ captures the bilateral geographical distance between country-pairs whereas $Language_{ij}$ **and** $Colony_{ij}$ are dummies to record language commonality and colonial relationship, respectively**.**
- RTA_{ijt} denotes the existence of a regional trade agreement between the country-pair**.**
- **eSPS** represents electronic SPS certification for the country transitioned from hard copy exchanges.
- *Export fixed effects and importer fixed effects are captured by* β_i ***and*** γ_j.
- *Furthermore, to account for trade evolution over time, we included year dummies, denoted by* δ_t**.**

Comparison of means with and without eSPS procedures

	eSPS (Mean)	Non-eSPS (Mean)	Differences
Inbound Cost	92.60	171.14	-78.54
Inbound Time	6.81	9.17	-2.36
Outbound Cost	82.01	118.07	-36.07
Outbound Time	6.75	9.25	-2.50
N	100		

Gravity Estimates

	(1)	(2)	(3)	(4)
$\ln(\text{Distance}_{ij})$	-1.364***	-1.367***	-1.359***	-1.392***
	(0.080)	(0.080)	(0.079)	(0.081)
Language_{ij}	0.664***	0.661***	0.685***	0.661***
	(0.116)	(0.116)	(0.120)	(0.122)
Colony_{ij}	0.737***	0.738***	0.682***	0.706***
	(0.106)	(0.105)	(0.114)	(0.108)
RTA_{ijt}	0.429***	0.430***	0.420***	0.426***
	(0.091)	(0.090)	(0.091)	(0.090)
$\ln(\text{BorderCost}_{ijt})$	-0.442**		-0.495***	
	(0.179)		(0.179)	
$\ln(\text{BorderTime}_{ijt}$		-0.183**		-0.239***
		(0.091)		(0.090)
$\ln(\text{BorderCost\_eSPS}_{ijt})$			0.061**	
			(0.026)	
$\ln(\text{BorderTime\_eSPS}_{ijt})$				0.063***
				(0.022)
Constant	31.174***	29.048***	31.124***	29.257***
	(1.339)	(0.782)	(1.326)	(0.787)
β_{it}, γ_{jt}	Yes	Yes	Yes	Yes
Observations	11,374	11,572	11,374	11,572

Spatial Autoregressive Model

$$
\begin{aligned}
&Y_{ij,t} \\
&= \exp\left[\alpha_i + \beta_j + \gamma_t + \delta_1 \ln(GDP_{it}) + \delta_2 \ln(GDP_{jt}) + \delta_3 \ln(Distance_{ij})\right. \\
&+ \delta_4(Contiguity_{ij}) + \delta_5(Language_{ij}) + \delta_6(Contiguity_{ij}) \\
&\left.+ \delta_7(RTA_{ijt}) + \delta_8 \ln(BorderCost_{ij}) + \rho\, W_{it}y + \phi\, W_{jt}y + \omega\, W_{wt}y\right] \\
&+ \varepsilon_{ijt}
\end{aligned}
$$

- This gravity model can be inadequate in explaining origin-to-destination trade flows in terms of how each region might affect its neighbors.
- Diffusion of production technologies, value chain networks, trade routes, and other infrastructure constitute spatial dependence of origins and destinations on their neighboring regions.

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Spatial Estimates

	(1)	(2)	(3)	(4)
ln(Exporter GDP)	0.496***	0.463***	0.497***	0.463***
	(0.156)	(0.161)	(0.156)	(0.161)
ln(Importer GDP)	0.695***	0.664***	0.704***	0.663***
	(0.195)	(0.211)	(0.195)	(0.219)
ln(Distance)	-1.320***	-1.326***	-1.319***	-1.326***
	(0.248)	(0.247)	(0.251)	(0.250)
Contiguity	0.267	0.265	0.267	0.265
	(0.269)	(0.268)	(0.270)	(0.269)
Language	0.788***	0.785***	0.788***	0.785***
	(0.261)	(0.260)	(0.260)	(0.260)
Colony	0.902***	0.902***	0.902***	0.902***
	(0.277)	(0.275)	(0.277)	(0.275)
RTA	0.571***	0.572***	0.571***	0.572***
	(0.169)	(0.169)	(0.170)	(0.169)
ln(Border Cost)	-0.505***		-0.504***	
	(0.178)		(0.177)	
ln(Border Time)		-0.274***		-0.274***
		(0.085)		(0.084)
e-SPS			-0.005	0.000
			(0.061)	(0.061)
Observations	5,120	5,240	5,120	5,240

Conclusion and Policy Recommendations

- Higher border cost related to border clearance procedure is trade restrictive.
- Similarly, the effect of time required for border clearance procedure is negative and statistically significant. However, the effect is relatively smaller compared to the cost.
- Digitalization of the trade facilitation indicators, for example, e-SPS certification, plays a significant role in the trade facilitation at the BCPs.
- RTAs/FTAs facilitate trade with the partner countries.
- Digitalization initiatives at BCPs can be encouraged which will reduce time delays and cost incurred.
- A pragmatic approach can be developed for the RTAs/FTAs/PTAs with the partner countries so that trade at BCPs can be facilitated.
- For robust contiguity (regions) level analyses need to overcome data limitations at the regional level.
- For a country-level holistic and robust analysis, we need to start trade data collection at the regional/BCPs level.

THANK YOU