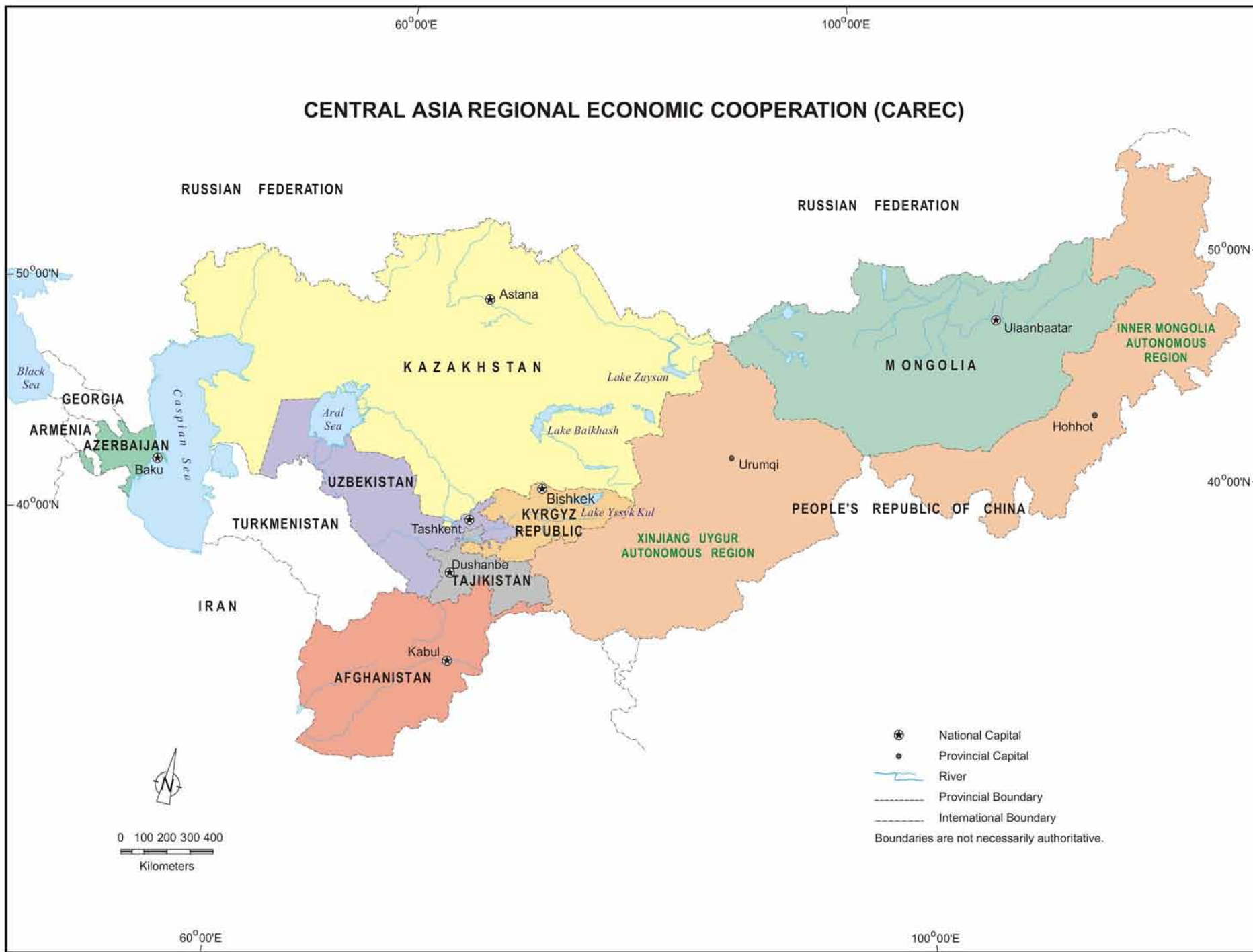# The Role of Trade Facilitation in Central Asia: Results from a Gravity Model

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Asian Development Bank

ADB

CENTRAL ASIA REGIONAL ECONOMIC COOPERATION (CAREC)

Map of Central Asia Regional Economic Cooperation (CAREC) region showing:

RUSSIAN FEDERATION

RUSSIAN FEDERATION

Black Sea

GEORGIA

ARMENIA

AZERBAIJAN
Baku

Caspian Sea

Aral Sea

KAZAKHSTAN
Astana

Lake Zaysan

Lake Balkhash

MONGOLIA
Ulaanbaatar

INNER MONGOLIA AUTONOMOUS REGION

Hohhot

UZBEKISTAN

TURKMENISTAN

Tashkent

Bishkek
KYRGYZ REPUBLIC
Lake Yssyk Kul

Urumqi

Dushanbe
TAJIKISTAN

XINJIANG UYGUR AUTONOMOUS REGION

PEOPLE'S REPUBLIC OF CHINA

IRAN

Kabul

AFGHANISTAN

60°00'E

100°00'E

50°00'N

40°00'N

N

0 100 200 300 400
Kilometers

⊛ National Capital
• Provincial Capital
〜 River
------- Provincial Boundary
- - - - - - International Boundary
Boundaries are not necessarily authoritative.

09-0720 HR

CAREC Countries are landlocked

| Country	Total Area (sq. km.)	Land Boundaries (km)	Border Countries	Coastline
Afghanistan	647,500	5,529	PRC, Iran, Pakistan, Tajikistan, Turkmenistan, Uzbekistan	Landlocked
Azerbaijan	86,600	2,013	Armenia, Georgia, Iran, Russia, and Turkey	Landlocked, borders the Caspian Sea
Xinjiang, PRC	1.660 million	15,106	Kazakhstan, Kyrgyz Republic, Tajikistan, Mongolia, Pakistan, India, Afghanistan, and Russia	Landlocked, Urumqi, the capital, is the most distant large city from a seaport in the world
Kazakhstan	2.717 million	12,012	PRC, Kyrgyz Republic, Russia, Turkmenistan, and Uzbekistan	Landlocked, borders the Aral Sea and Caspian Sea
Kyrgyz Republic	198,500	3,878	PRC, Kazakhstan Tajikistan, and Uzbekistan	Landlocked
Mongolia	1.565 million	8,220	PRC, Russia	Landlocked
Tajikistan	143,100	3,651	Afghanistan, PRC, Kyrgyz Republic, and Uzbekistan	Landlocked
Uzbekistan	477,400	8,220	Afghanistan, Kazakhstan, Kyrgyz Republic, Tajikistan, and Turkmenistan	Double landlocked, includes the southern portion of the Aral Sea

Outline of the presentation

- Barriers to trade in Central Asia

- Research questions

- The Logistics Performance Index

- The Gravity Model

- Results

- "What-if" exercise

- Conclusions and policy implications
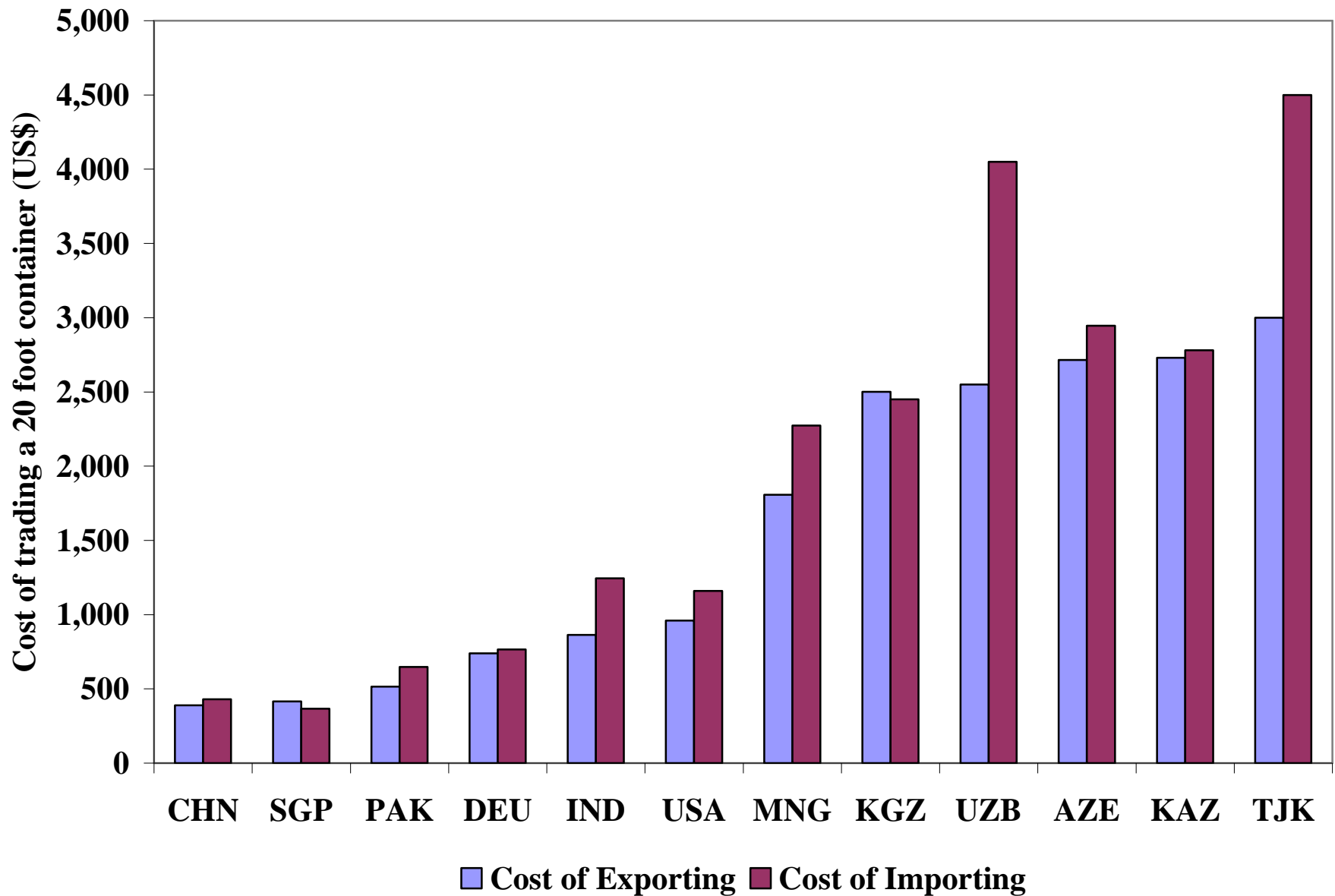
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Issue: Barriers to trade

- Tariffs

- Non-tariff barriers (quantitative restrictions, standards)

- Natural barriers such as distance and landlockness

- Man-made non-tariff barriers (trade facilitation)

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Tariff barriers have fallen…average tariff rate in CAREC countries is low
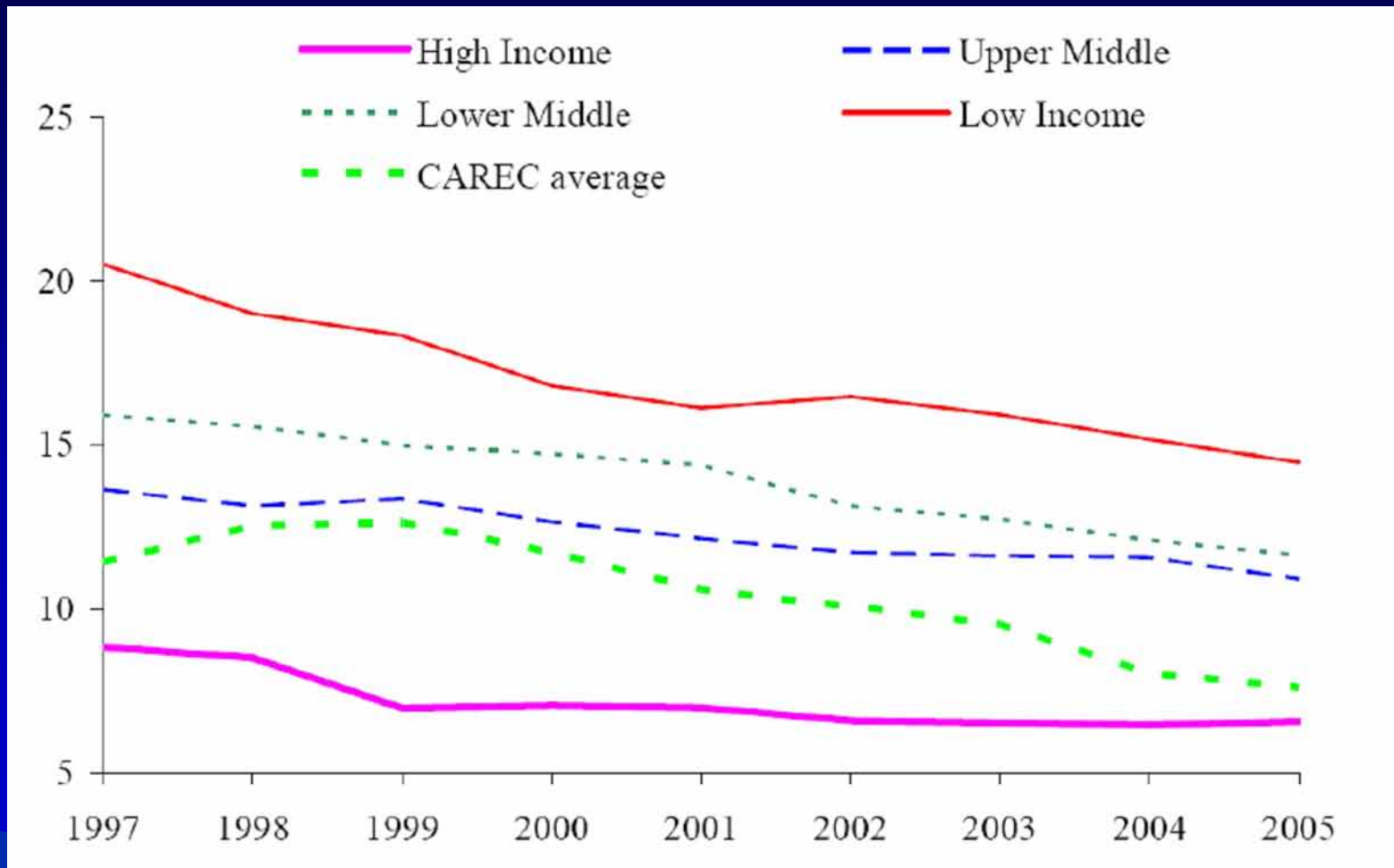
Source: van der Ploeg and Venables (2009)

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Trade costs in the CAREC region are high

What is trade facilitation?

- Ease of moving goods across borders

- It includes:
  - Efficiency of customs administration
  - Quality of physical infrastructure (and now IT as well)
  - Availability and access to transport network, and a competent logistics sector

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Logistics Performance Index

Data for 155 countries in LPI 2010

- Released January 15, 2010

1,000+ respondents from 130 countries

Analytical report & data worldbank.org/LPI

LPI 2007 also available

THE WORLD BANK

Turku School of Economics, Finland

International Federation for Freight Forwarders Associations

GEA *Global Express Association*

GFP

Global Facilitation Partnership for Transportation and Trade

Connecting to Compete 2010

Trade Logistics in the Global Economy

The Logistics Performance Index and Its Indicators

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The 6 Key Dimensions of Overall LPI score

155 countries* based on 5,000+ individual country assessments evaluated on:

- **Customs and other border procedures;**   **0.42**
- **Transport and IT infrastructure and   services; 0.42**
- **Ease and availability of shipments;**   **0.37**
- **Logistics competence;**   **0.42**
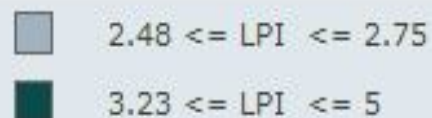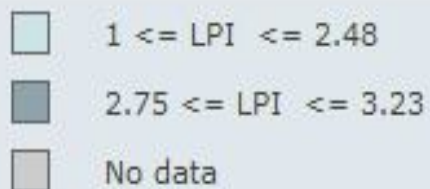- **Traceability of shipments;**   **0.41**
- **Timeliness of shipments**   **0.40**

Component loadings for the international LPI 2010

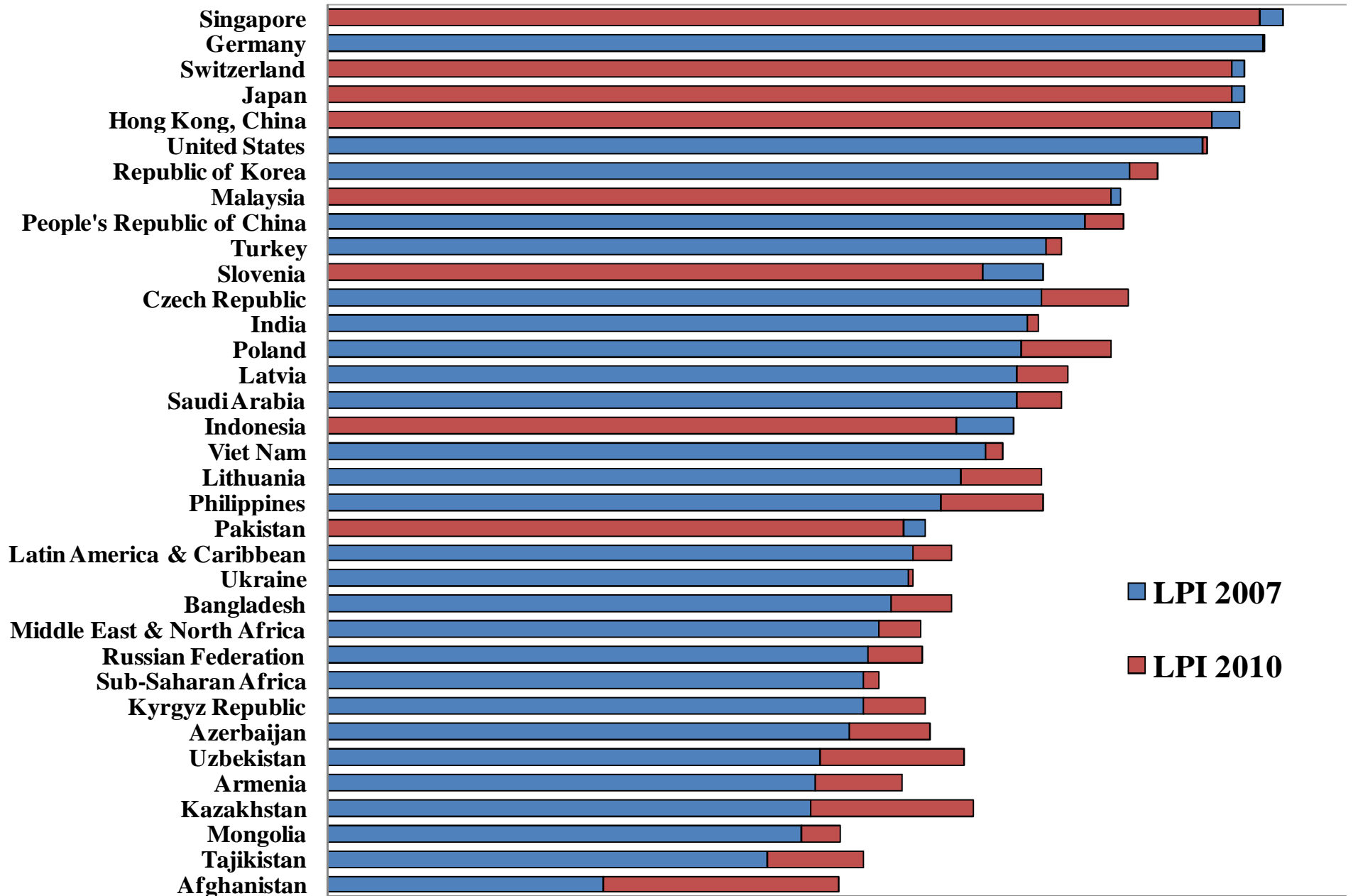*** 150 countries in LPI 2007**

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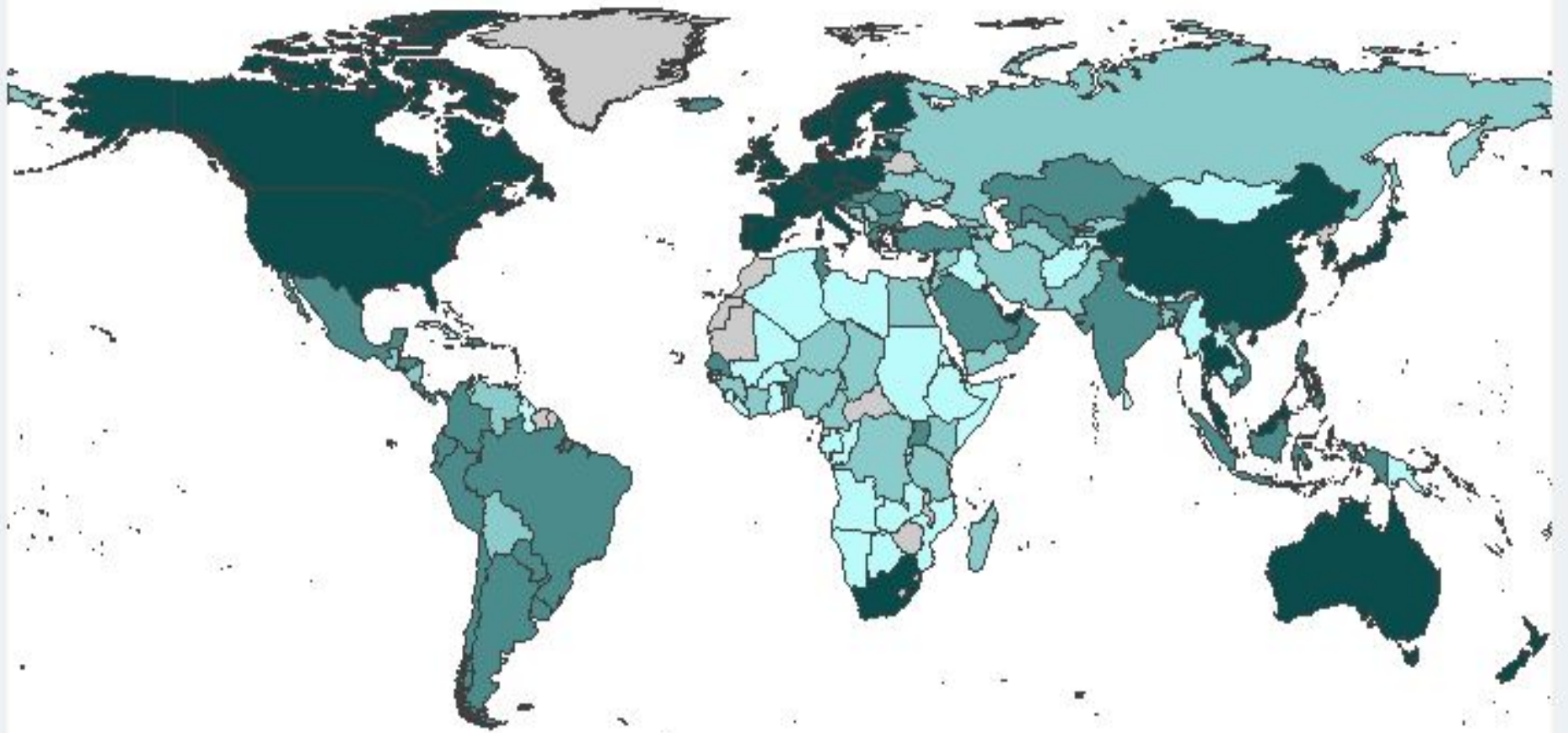
Overall LPI 2010 scores on a World map
www.worldbank.org/lpi

1 <= LPI <= 2.48	2.48 <= LPI <= 2.75
2.75 <= LPI <= 3.23	3.23 <= LPI <= 5
No data	1 is the lowest score and 5 is the maximum score.

CAREC countries are ranked low in terms of logistics performance. But improved in 2010

Singapore
Germany
Switzerland
Japan
Hong Kong, China
United States
Republic of Korea
Malaysia
People's Republic of China
Turkey
Slovenia
Czech Republic
India
Poland
Latvia
Saudi Arabia
Indonesia
Viet Nam
Lithuania
Philippines
Pakistan
Latin America & Caribbean
Ukraine
Bangladesh
Middle East & North Africa
Russian Federation
Sub-Saharan Africa
Kyrgyz Republic
Azerbaijan
Uzbekistan
Armenia
Kazakhstan
Mongolia
Tajikistan
Afghanistan

LPI 2007

LPI 2010

In general, the ranking of CAREC countries improved between 2007 and 2010

	LPI Rank in 2007	LPI Rank in 2010	Change in Ranking
China	30	27	3
Pakistan	68	110	-42
Kyrgyz Republic	103	91	12
Azerbaijan	111	89	22
Uzbekistan	129	68	61
Armenia	131	111	20
Kazakhstan	133	62	71
Mongolia	136	141	-5
Tajikistan	146	131	15
Afghanistan	150	143	7

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CAREC countries perform poorly in terms of the various components of LPI 2007

Legend: Overall LPI, Customs, Infrastructure, Logistics

Countries (left to right): Tajikistan, Mongolia, Kazakhstan, Uzbekistan, Azerbaijan, Kyrgyzstan, Pakistan, India, China, S. Korea, Germany, Singapore

But improvement in 2010
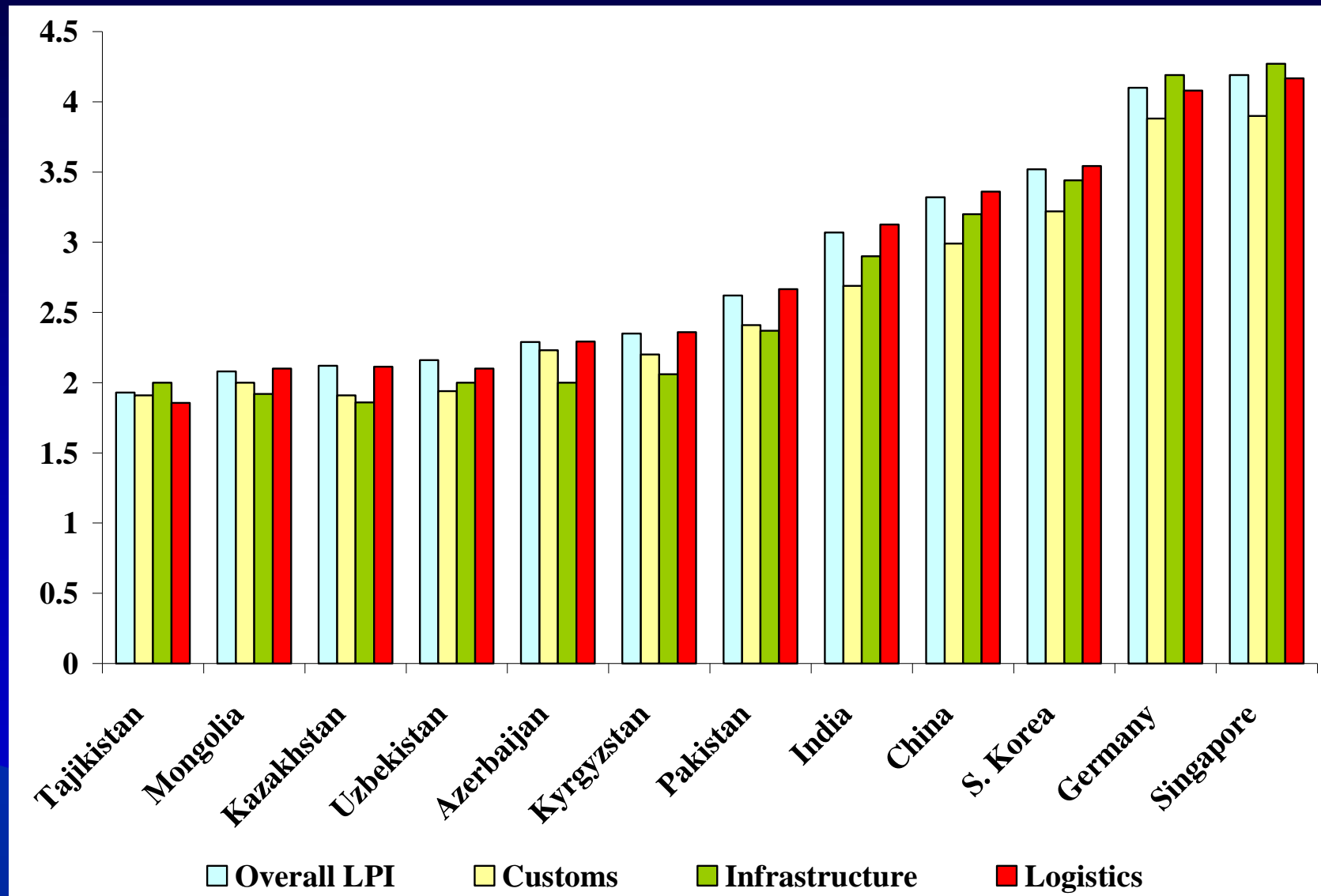
Legend: Overall LPI 2010, Customs 2010, Infrastructure 2010, Logistics 2010
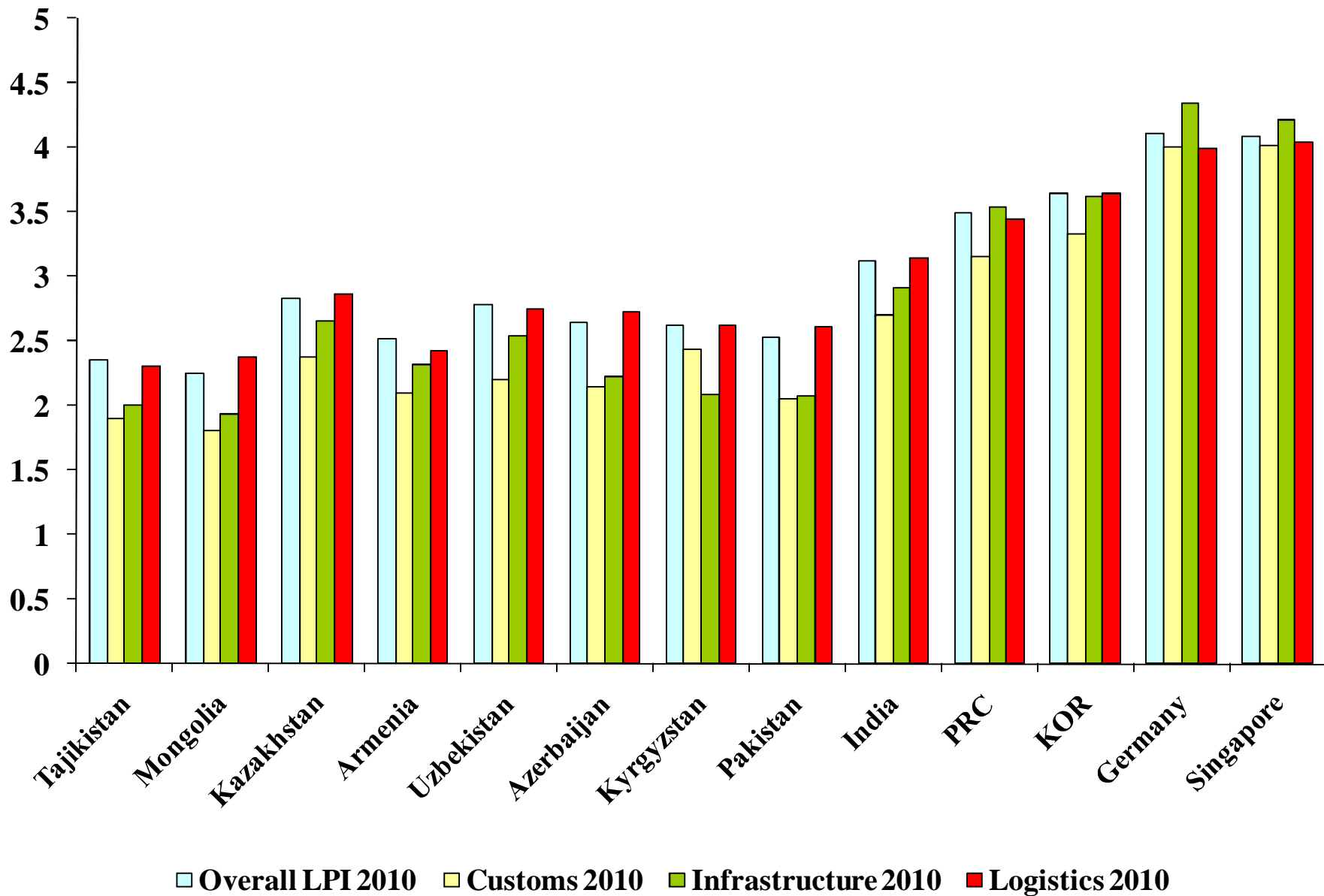
Given per capita income, CAREC countries have LPI lower than expected
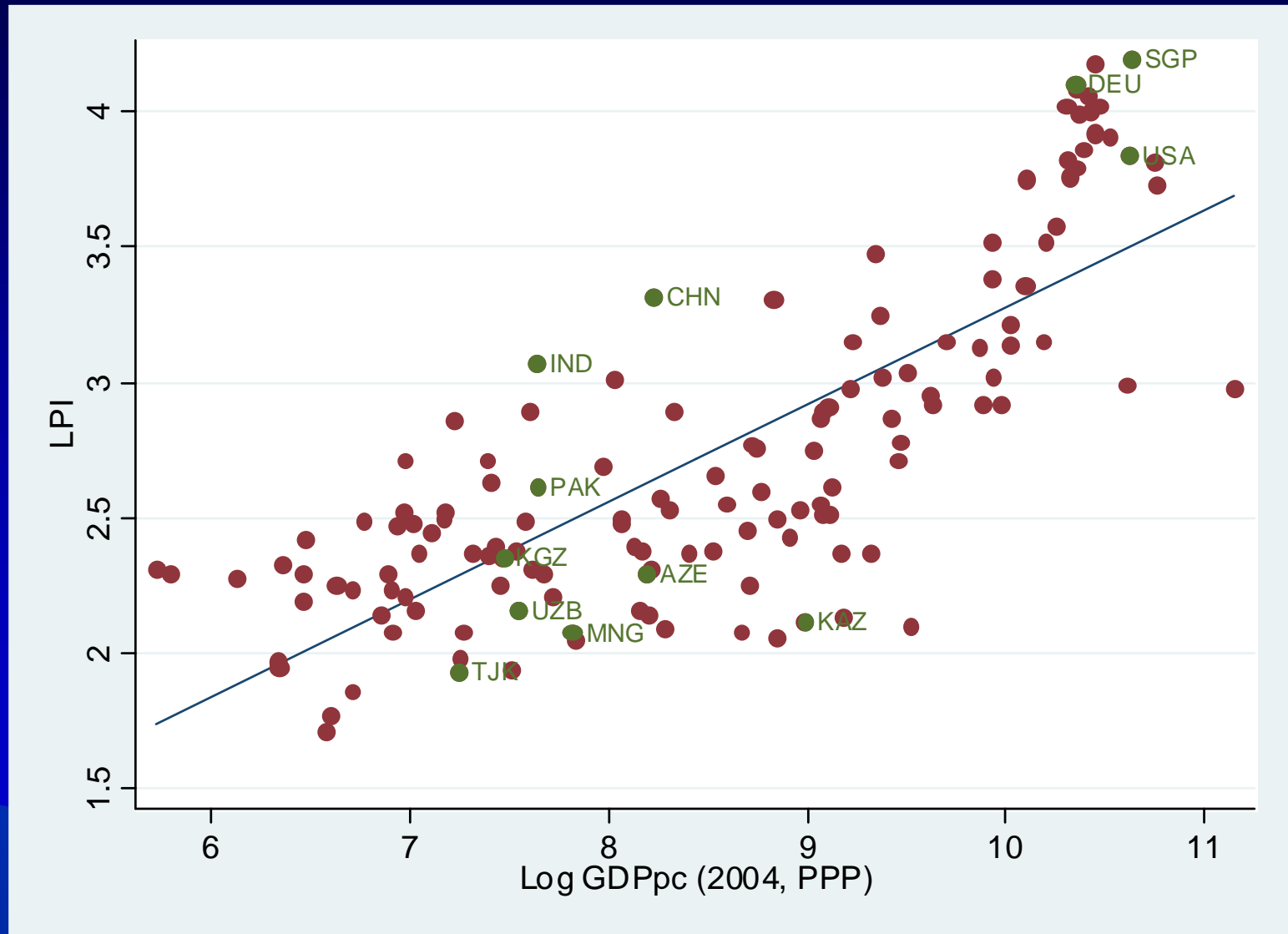
Gravity Model: Questions

- Does trade facilitation (TF) impact trade? If yes, how much?

- How much would trade increase in the CAREC countries as a result of better trade facilitation?

- What is the effect on trade of improvements in the different components of TF?

- What is the impact of distance on trade flows?

- Do landlocked countries trade less?

- What is the effect of common language and common border on trade?

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Gravity Model

The idea behind the model comes from the law of universal gravitation

Widely used tool to understand bilateral trade flows

Trade flows are positively related to the size of the trading partners and inversely related to the distance between them

Used to explain bilateral trade flows, model dates back to Tinbergen (1962) and Pöyhönen (1963)

Anderson (1979) and Anderson and van Wincoop (2003) provide theoretical foundations for the gravity model

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Definition of key variables

- Dependent variable: log of bilateral trade (exports) between countries i and j (source: BACI)

- Distance: Log of distance (measured in kilometers) between capital cities, calculated using great circle distance formula, of countries i and j (source: CEPII)

- GDP: Log of GDP (measured in PPP terms) for countries i and j (source: WDI)

- GDPpc: Log of GDP per capita (measured in PPP terms) for countries i and j (source: WDI)

- LPI: Log of logistics performance index of countries i and j (source: World Bank)

- Landlocked=1 if one of the trading partners is landlocked

- Border=1 if the trading partners share a common border

- Remoteness: log of GDP-weighted average distance to all other countries (source: own calculations)

- Common language=1 if importer and exporter share a common language (source: BACI)

- Colonial ties=1 if importer (or exporter) colonized its trading partner

- Common colonizer=1 if importer and exporter shared a common colonizer

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Zero Trade

	No. of Country Pairs (observations)
Positive trade in both directions	11,864
Positive trade in one direction	3,322
Zero trade in both directions	4,274

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Trade by region (total trade)

Legend: ■ Positive trade in both directions ■ Positive trade in one direction □ No trade in either direction
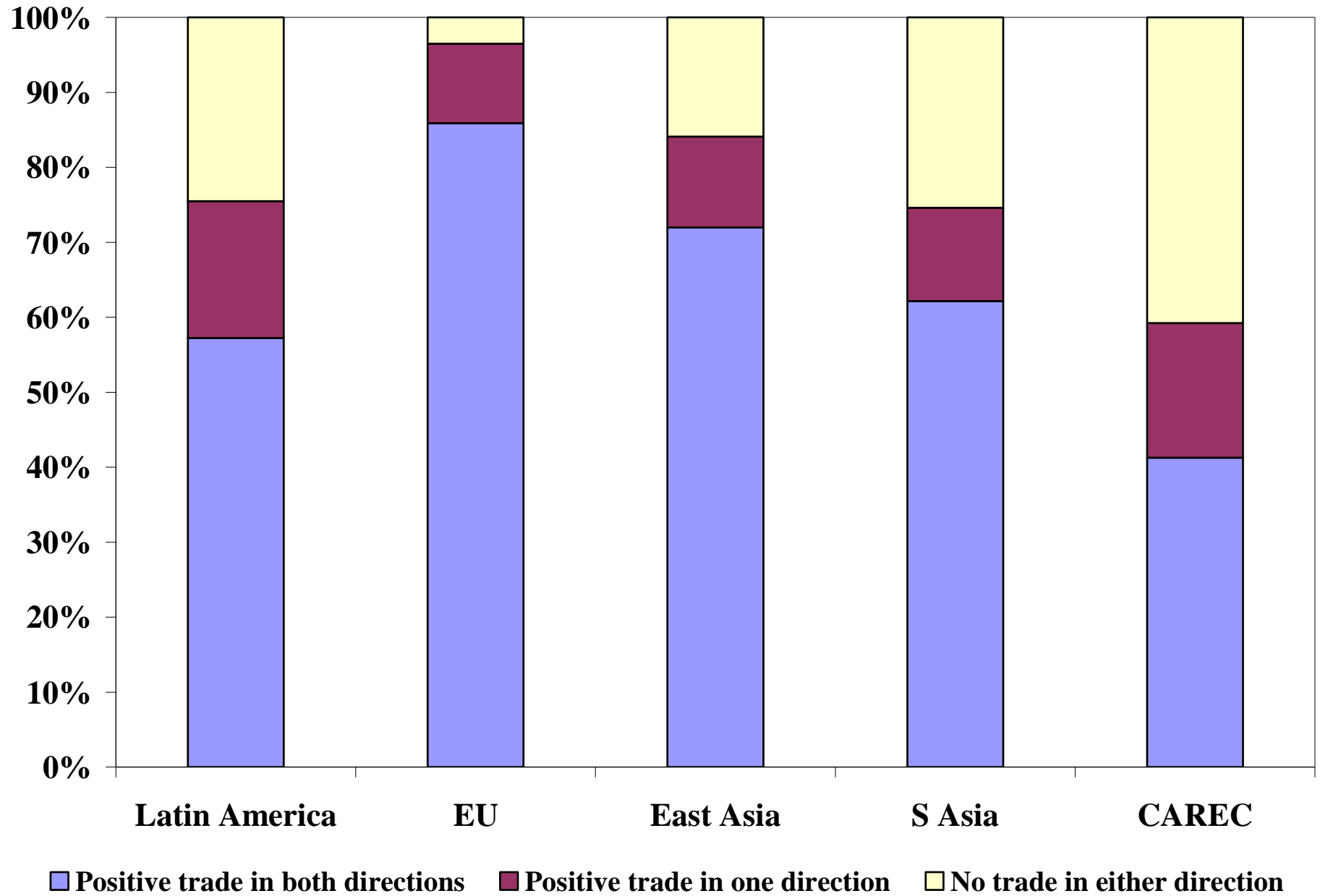
Summary statistics (Mean)

	Overall	CAREC
Bilateral trade	US$ 333m	US$ 13m
Distance (bilateral)	7,353 km	1,881 km
GDP	US$ 373 bn	US$ 37.2 bn
GDP per capita	US$ 10,896	US$ 3185
LPI	2.743	2.155
Customs	2.551	2.032
Infrastructure	2.581	1.973
Logistics	2.725	2.137
Remoteness	7,920 km	6,745 km
No. landlocked countries	28	6
Number of trading pairs		
Contiguous	432	10
Common Language	1,590	2
Colonial Ties	266	0
Common Colonizer	1,546	20

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Trade Facilitation is an important determinant of trade flows

- Decrease in distance by 1% increases trade by 1.56% (economically and statistically large effect on trade)

- Improvement in trade facilitation (LPI) of the exporting country by 1% increases exports by 5.5%

- Improvement in trade facilitation (LPI) of the importing country by 1% boosts imports by 2.8%

- Landlocked exporters (importers) trade 25% (38%) less than coastal exporters (importers)

- Countries with a common border trade 2.4 times more than countries that do not share a common border

ADB

Trade Facilitation is an important determinant of trade flows

- Exporter remoteness: Other things equal, if country Z is farther from the ROW than country S by 1%, then Z's exports to a common third country X will be higher than those of S by 0.43%

- Importer remoteness: Other things equal, if country Z is farther from the ROW than country S by 1%, then Z's imports from a common third country X will be higher than those of S by 1.13%

- Having a common border is equivalent to a reduction in distance of about 3,147 kms. (evaluated at the mean distance)

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Effect of the different components of LPI

Dependent Variable: Log of Bilateral Trade flows (Manufacturing Sector)		
	Estimated Coefficient	Beta Coefficient
Log of customs-Exporter	-0.001	-0.00003
Log of customs-Importer	1.04***	0.05
Log of infrastructure-Exporter	3.09***	0.16
Log of infrastructure-Importer	0.86***	0.04
Log of logistics-Exporter	2.19***	0.1
Log of logistics-Importer	0.75***	0.03

***,**,* indicates statistical significance at 1%, 5% and 10%. Logistics is a simple average of the following subcomponents of LPI: ease of arranging international shipments, competence of the local logistics industry, and ability to track and trace shipments. Other regressors included are the same as in the previous slide

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"What-if" exercise: Calculating gains from improving logistics

Effect on total trade of improvement in all six CAREC countries' LPIs (as exporters and importers) *up to halfway* of the distance between each country's LPI and the average of all countries in the sample				
	Initial LPI in 2007	New LPI	% change in LPI	LPI in 2010
Azerbaijan	2.29	2.52	10.04%	2.64
Kazakhstan	2.12	2.43	14.62%	2.83
Kyrgyz Republic	2.35	2.55	8.51%	2.62
Mongolia	2.08	2.41	15.86%	2.25
Tajikistan	1.93	2.34	21.24%	2.35
Uzbekistan	2.16	2.45	13.42%	2.79

Gains from improvement in trade facilitation index (LPI)

	% change in total trade	Due to exports	Due to imports
Azerbaijan	28.4 (9.6)	3.2	25.2
Kazakhstan	46.8 (14.3)	16.6	30.2
Kyrgyz Republic	34.1 (16.0)	12.3	21.8
Mongolia	50.8 (23.5)	18.6	32.2
Tajikistan	62.5 (15.7)	11.2	51.3
Uzbekistan	46.6 (11.7)	20.3	26.3

Numbers in brackets are percentage point increase in total trade as share of GDP in 2005

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Significant gains in intra-regional trade

	% change in total trade	Due to exports	Due to imports
Azerbaijan	95.3	26.7	68.6
Kazakhstan	100.7	49.1	51.6
Kyrgyz Republic	88.0	51.7	36.3
Mongolia	115.2	4.0	111.2
Tajikistan	115.8	3.7	112.1
Uzbekistan	103.5	70.0	33.5

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Largest gains in trade come from improvement in quality of infrastructure

	% change in total trade		
	Infrastructure	Customs	Logistics
Azerbaijan	14.1	6.9	7.8
Kazakhstan	24.4	12.8	14.7
Kyrgyz Republic	19.7	7.8	10.4
Mongolia	22.4	10.4	15.3
Tajikistan	18.1	14.5	20.6
Uzbekistan	21.3	11.5	16.6

Each cell shows the percent increase in total trade (exports + imports) from improvement in different components of LPI

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Conclusions and Policy Implications

- Trade Facilitation is an important trade barrier in CAREC

- Improvements in TF lead to significant gains in trade in the CAREC region, with the larger share coming from increase in imports

- Large gains in intra-regional trade

- Infrastructure improvements lead to largest gains in trade, followed by logistics and then customs

- Some measures such as improvements in customs efficiency are easy and cheap to implement

- Besides scoring low in TF, CAREC countries are landlocked. Developing regional infrastructure will provide transport corridors for trade within and outside the region

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Thank you