THE IMPACT OF COVID-19 MOBILITY RESTRICTIONS

ON TRADE FACILITATION AT BORDERS IN THE CENTRAL ASIA REGIONAL ECONOMIC COOPERATION REGION

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The Impact of COVID-19 Mobility Restrictions on Trade Facilitation at Borders in the Central Asia Regional Economic Cooperation Region

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ABSTRACT

During the coronavirus disease (COVID-19) pandemic, restrictions on mobility significantly increased trade time and cost at the borders in many landlocked developing countries. Using monthly bilateral time measures at borders in the Central Asia Regional Economic Cooperation (CAREC) countries, this paper investigates the impact of COVID-19 mobility measures on the time for cargo to clear borders. The impulse response function estimation suggests that time could increase up to 70% when the most stringent level of mobility restrictions was imposed. The results suggest that outbound border-crossing points were more affected by measures than inbound points, but were more resilient in that impact was short-lived. We find that both inbound and outbound times increased when mobility restrictions in a trading partner tightened. Given a country, increasing its stringency measures had longer impacts on inbound time, while the measure occurring in a partner country had more lingering impact on outbound time. We also found heterogeneity in the response of each country in magnitude and timing of the impact of the stringency measures.

Keywords: COVID-19 pandemic, trade facilitation, Central Asia Regional Economic Cooperation Program, impulse response
JEL: C23; F14; I18

ABBREVIATIONS

BCP	–	border-crossing point
CAREC	–	Central Asia Regional Economic Cooperation
COVID-19	–	coronavirus disease
CPMM	–	corridor performance measurement and monitoring
IRF	–	impulse response function
km	–	kilometer
OxCGRT	–	Oxford COVID-19 Government Response Tracker
TFI	–	trade facilitation indicator

I. INTRODUCTION AND BACKGROUND

The coronavirus disease (COVID-19) pandemic has increased the pressure on the already vulnerable and fragile states of many landlocked countries. Economic and social conditions rapidly deteriorated following global border restrictions and lockdown measures, aggravating their isolation, and limiting access to global supplies. For landlocked developing countries which rely on transit countries for trade, border restrictions in surrounding countries significantly slowed delivery and reduced access to goods, raising trade costs and travel times. The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP 2021a) estimated that port-of-entry closures can increase trade costs by 25%.

In the Central Asia Regional Economic Cooperation (CAREC) region, health and quarantine controls at border-crossing points (BCPs) raised average border-crossing time by 23.7%, from 12.2 hours in 2019 to 15.1 hours in 2020 (ADB 2021)[1] due to COVID-19 testing procedures at the border. Similarly, road transport costs increased by 1.8% and rail by 1.9% in 2020. As a result, merchandise trade in the CAREC region fell around 10% in the first half of 2020 compared to the same period in 2019. According to Kim, Mariano, and Abesamis (2021), a 10% increase in time at BCPs led to a 2%–3% decline in trade among the CAREC countries.

This disruption highlighted the importance of simple, transparent, and harmonized cross-border processes to ensure the movement of goods across borders even during crises. For instance, Georgia established measures to simplify customs procedures and expedited clearance by introducing a web portal with detailed information on customs operations and procedures (Vassilevskaya 2020). In Kazakhstan, the application for a permit for international road freight of cargo carriers was automated. Uzbekistan created an operational headquarters to expedite the processing of cargo at border checkpoints.

While a few studies have reported on the impact of COVID-19 on trade flows (Barbero, de Lucio, and Rodriguez-Crespo 2021; Holzhacker 2020; SANEM 2020), the discussion on the impact on trade facilitation focused mostly on case-based impacts, and policy measures to address and prevent delays at borders. While the outbreak created confusion due to additional border controls that were not harmonized, it also accelerated implementation of digitalization in automated border processing, single-window facilities, and web portals for information dissemination (UNCTAD 2022, OECD 2020).

Experiences vary across Asia. Country- or subregion-specific studies discuss trade facilitation measures taken during the pandemic. De (2020) finds that South Asian countries converged toward simplifying trade procedures and digital trade facilitation such as launching trade information portals to increase transparency. For East Asia, Fu (2020) argues that while various trade facilitation measures were initiated, its implementation varied by cultural, societal, and economic circumstances in individual countries. The People's Republic of China (PRC), for instance, enabled electronic submission of documents for verification, subject to submission of hard copies upon approval. The Republic of Korea, which made headway in implementing single-window procedures, prepared an emergency response manual to ensure continuous flow of operation in the absence of system administrators and office closures. Some countries in Central Asia simplified procedures for essential goods, especially food and medical supplies (Vassilevskaya 2020). Countries in the Eurasian Economic Union, whose members include Armenia, Belarus, Kazakhstan, and the Russian Federation, benefited from a single set of coordinated policies

[1] This report was prepared based on information available for Afghanistan as of 31 July 2021. The CAREC Program aims to promote economic cooperation among 11 member countries: Afghanistan (AFG), Azerbaijan (AZE), the People's Republic of China (PRC), Georgia (GEO), Kazakhstan (KAZ), the Kyrgyz Republic (KGZ), Mongolia (MON), Pakistan (PAK), Turkmenistan (TKM), and Uzbekistan (UZB).

among member states. This facilitated their immediate response through the establishment of green corridors to expedite the flow of critical goods.

This paper investigates the impact of mobility restrictions on cargo border crossing for CAREC member countries by using the CAREC Corridor Performance Measurement and Monitoring Trade Facilitation Indicators (CPMM TFIs). It also investigates if any heterogeneity exists in the impact of different mobility measures. Finally, the paper explores impact variation by country. The availability of high-frequency trade facilitation measures allows us to capture monthly pandemic impacts on time taken at BCPs. This paper thus helps timely monitoring and evidence-based decision-making for trade facilitation policies in CAREC countries. It also adds value to the literature on the COVID-19 impact on trade facilitation.

The results from the impulse-response estimation suggest that mobility-restricting measures caused more time delays at outbound BCPs than at inbound BCPs, but impact was shorter at outbound BCPs than at inbound BCPs. Mobility restrictions in bilateral trading partners also slowed crossings at outbound and inbound BCPs. Among the mobility measures, international restrictions had the largest impact, but affected inbound BCPs only. The magnitude and timing of the impact of a change in the stringency measures also varied by country.

In the rest of the paper, section 2 discusses the data and model, section 3 presents the estimation results, and section 4 concludes with main findings and policy implications.

II. DATA AND MODEL

A. Data

The CAREC CPMM TFIs are time and cost measures. They aim mainly to monitor and assess trade and transport facilitation performance in the six CAREC transport corridors and are based on the UNESCAP time/cost–distance approach. Five indicators are measured in either hours/days, US dollars, or kilometers (km) taken to trade in the corridors. TFI1 measures the duration of a 20-ton cargo moving in or out of a BCP on average and TFI2 measures the accounting costs. TFI3 measures cost incurred when moving the freight in a corridor section (in US dollars per 500 km, per 20-ton cargo). TFI4 and TFI5 measure average speed of travel (in km per hour) along a corridor section (Kim, Mariano, and Abesamis 2021).

Among the five CPMM TFIs, we choose the average border-crossing time (TFI1) as a representative measure of trade facilitation. The measure is calculated from large samples and is more objective than costs valued in US dollars, in that cost measures are affected by multiple factors such as foreign exchange rates, inflation, and unofficial payments (Kim, Mariano, and Abesamis 2021). Unlike other indicators available annually by country—such as the World Bank's Logistic Performance Index, the World Economic Forum's Enabling Trade Index, and the Organization for Economic Co-operation and Development's Trade Facilitation Indicators—the CPMM TFIs capture BCP-specific monthly trade facilitation activities. The pandemic's impact on time can be evaluated using the TFI1 data from January 2020 to December 2021 for 14 countries.[2] The analysis yields 778 observations for outbound time and 776 for inbound in a panel data structure where the unit of observation is a BCP pair.

[2] This includes the 11 CAREC member countries plus the Russian Federation, Iran, and Türkiye. The three additional countries are included as they are bordering countries and have trade flows going through the CAREC BCP borders.

To measure the level of stringency in COVID-19-induced mobility restrictions, we use monthly averages of the Oxford COVID-19 Government Response Tracker (OxCGRT) indicators that account daily for levels of school closures, workplace closures, cancellations of public events, restrictions on gatherings, closing of public transport, availability of public information campaigns, stay-at-home policies, restrictions on internal movement, international travel controls, testing policies, contact tracing, requirements on face coverings, and vaccination policy.

Following Deb et al. (2022), we use current and lagged monthly confirmed cases to control for expectations about the progression of the virus. The confirmed cases data are from the COVID-19 Data Repository (Dong, Du, and Gardner 2020). In addition to control for degree of economic activity, which could be associated with border congestion, we use the value of monthly bilateral merchandise exports and its lags obtained from the Direction of Trade Statistics database (2022). This can serve as a proxy for traffic in land transport at the border, as most of the trade in the CAREC region takes place through rail and road. We also use visits to groceries and pharmacies, workplaces, and transit stations from the Google Mobility Report (Google LLC 2022) to control for congestion effects. Data sources and summary statistics are presented in Appendix 1, Tables A1.1 and A1.2.

B. Model

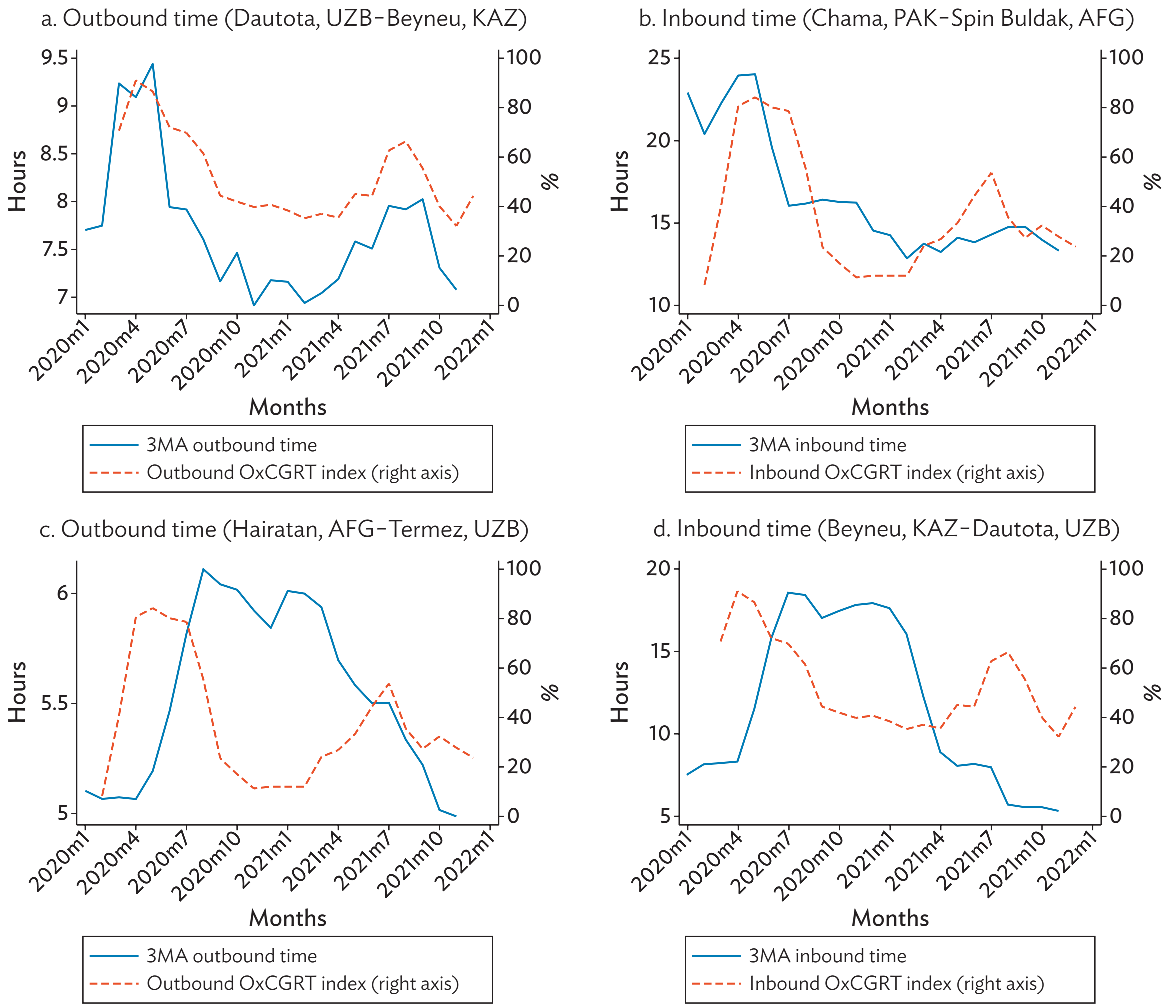
To measure the dynamic response of inbound/outbound time to a change in mobility restriction measures, we estimate impulse response functions (IRFs) using the local projection method introduced by Jordà (2005). For IRF estimation, local projection has been widely used in the field of macroeconomics with studies on credit and business cycle (Jordà, Schularick, and Taylor 2013; Teulings and Zubanov 2014), fiscal policy (Jordà and Taylor 2016; Ramey and Zubairy 2018), structural reforms (Alesina et al. 2020), monetary policy shocks (Furceri, Loungani, and Zdzienicka 2018), and exchange rate pass throughs (Caselli and Roitman 2019). Recently, it was used in the studies estimating the impact of the COVID-19 containment measures on remittances (Kpodar et al. 2021), economic activity (Deb et al. 2022), and lockdown fatigue (Goldstein, Yeyati, and Sartorio 2021). Local projection is known to be more robust to misspecification of the models than the vector autoregressive models when the data-generating process is unknown (Kpodar et al. 2021). More technical details on the model are presented in Appendix 2.

C. Exploratory Analysis

Figure 1 suggests varying degrees of relationships between the outbound/inbound time and the OxCGRT index depending on the BCP pair. For example, the outbound time from Dautota (UZB) to Beyneu (KAZ) closely moved together with the stringency of mobility restrictions for the duration of the analysis period (Figure 1a). Similarly, the inbound time to Spin Buldak (AFG) from Chama (PAK) shows a co-moving trend (Figure 1b).[3] On the other hand, there could be a few-month lag between outbound/inbound time and mobility restrictions as seen in the outbound time from Hairatan (AFG) to Termez (UZB) (Figure 1c) and the inbound time to Dautota (UZB) from Beyneu (KAZ) (Figure 1d).

[3] ADB placed on hold its assistance in Afghanistan effective 15 August 2021. *ADB Statement on Afghanistan Asian Development Bank. (Published on 10 November 2021). Manila.*

Figure 1: Trends of Trade Facilitation Indicator 1 and Government Stringency Index for Select Border Crossing Point Pairs



3MA = 3 month moving average, BCP = border-crossing point, OxCGRT = Oxford COVID-19 Government Response Tracker, TFI = Trade Facilitation Indicator 1.

Source: Authors' calculations using CAREC Corridor Performance Measurement and Monitoring trade facilitation indicators data and OxCGRT stringency index.

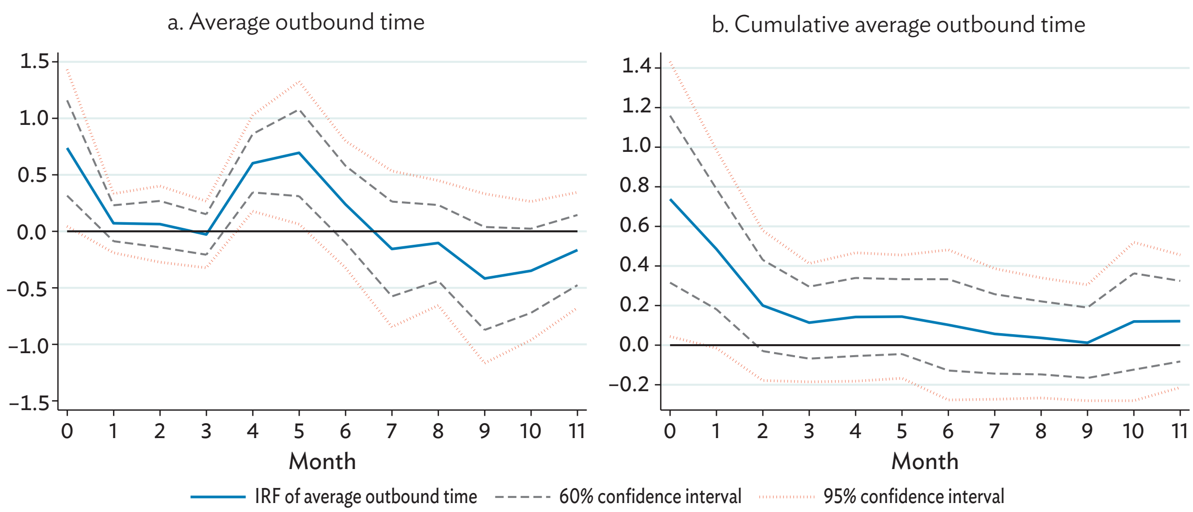
III. ESTIMATION RESULTS

A. CAREC Region – Impact of Own-Country Mobility Restrictions

Figures 2 and 3 show the dynamic response of the outbound and inbound time in logarithm due to a unitary change in the OxCGRT index over a 12-month period after implementing mobility restricting measures. The left panels show the response of average time per month, while the right panels show the cumulative response of the average time.

Examining the results at the 95% confidence interval, both figures indicate that the imposition of more stringent mobility restrictions lead to overall increases in average time, but with varying degrees and patterns. Specifically, Figure 2a suggests that once lockdown measures have tightened, average outbound time increases immediately as well as at the fourth and fifth months, showing around 0.7% to 0.8% increases, before it starts declining. Figure 2b shows that cumulative responses, referring to average outbound time throughout the period since the tightening of lockdown, is the largest, with a 0.7% immediate increase followed by a gradual fall. For the inbound time, a unitary change in the OxCGRT index leads to a 0.6% increase in the second month and a 1.3% increase in the fourth month after implementation (Figure 3a). Figure 3b indicates that a rise in mobility restrictions increases cumulative average inbound time by around 0.5% before the impact starts dissipating from the sixth month onward.

Figure 2: Effects of a Unit Increase in Stringency Index on Outbound Time in CAREC (%)

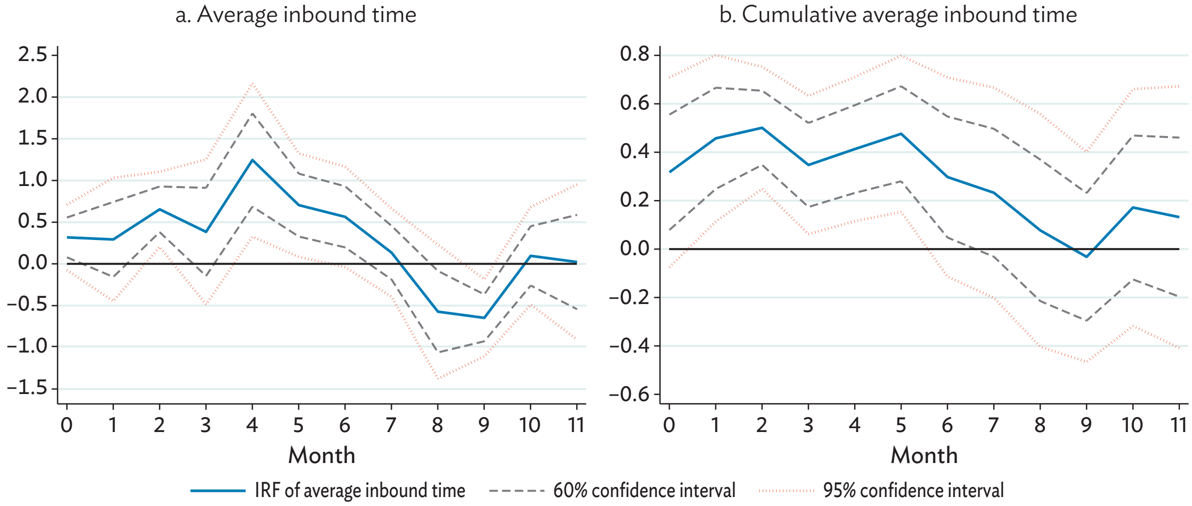


CAREC = Central Asia Regional Economic Cooperation, IRF = impulse response function.

Note: Impulse response functions estimated from the fixed effect panel regression model.

Source: Authors' calculations.

Figure 3: Effects of a Unit Increase in Stringency Index on Inbound Time in CAREC (%)



CAREC = Central Asia Regional Economic Cooperation, IRF = impulse response function.

Note: Impulse response functions estimated from the fixed effect panel regression model.

Source: Authors' calculations.

The results imply that if a country imposes the most stringent restrictions moving straight from no restriction ($\Delta OxCGRT_t = 100$), then the cumulative outbound average time will increase immediately by 70% and the inbound average time will increase by 50% until the fifth month before coming down. This suggests that outbound BCPs receive higher immediate impact of mobility restrictions than inbound BCPs, but the duration of the impact is shorter, or in other words, it requires more time for the inbound BCPs to recover.

We conducted a robustness test by implementing the suggestion in Teulings and Zubanov (2014) to include *h*-month ahead lead of the OxCGRT index to control for potential bias in the local projection estimator. The bias occurs when the regression of the dependent variable at $t + h$ with the shock variable at t does not reflect observations of the dependent variable that are already affected by the shock.[4] Appendix 1, Figures A1.1 and A1.2 show the results from the robustness test. The figures show that the impact of a unitary change in the OxCGRT index is robust for both outbound and inbound BCPs. Figure A1.1a suggests that once lockdown measures have tightened, average outbound time increases immediately as well as at the fourth and fifth months, showing around a 0.7% increase, consistent with the baseline results. Figure A1b shows that cumulative responses are the largest with a 0.75% immediate increase followed by a gradual fall until the fourth month. Figure A1.2a also confirms the baseline results with a 1.1% increase in the fourth month. However, the cumulative response of average inbound time in Figure A1.2b is only significant in the second and fifth month after restrictions are implemented.

[4] For illustration, suppose that the mobility restrictions are only implemented at $t = 6$ and assume that the forecast horizon $h = 4$. At $t = 1$, the corresponding regression is correctly specified as regressing $TFI1_{i,1+4} = TFI1_{i,5}$ to $\tau_{i,1}$ and other control variables for all *i*'s will produce unbiased estimates given that there are no changes in the mobility restrictions implemented in between $t = 1$ to $t = 5$. However, at $t = 3$, the regression using $TFI1_{i,3+4} = TFI1_{i,7}$ to $\tau_{i,3}$ and other control variables will produce biased results as $TFI1_{i,6}$ and $TFI1_{i,7}$ are already affected by the mobility restrictions implemented at $t = 6$, but the controlled variables used do not reflect this shock. Teulings and Zubanov (2014) proposed to include the shock variables occurring between t to $t + h$, i.e., $\{\tau_{i,t+1}, \ldots, \tau_{i,t+h-1}\}$ as part of the explanatory variables to account for the possible bias.

B. CAREC Region – Impact of Trading Partner's Mobility Restrictions

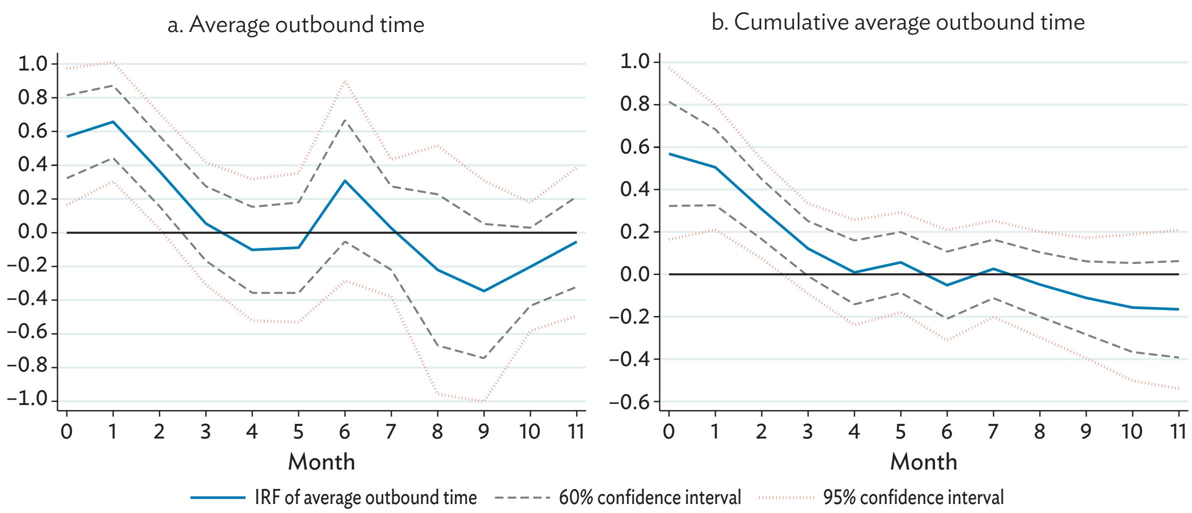
In this section, we test the impact of the trading partner's stringency index on own country's outbound and inbound time. We follow the same model specification from the previous section, but use the stringency index of trade partners instead of own country's stringency index.

The results indicate that the mobility restrictions imposed by trading partners also lead to overall increases in average time, but the impact on outbound time is generally larger and lasts longer for consecutive months than that on inbound time. Figure 4a shows that once lockdown measures in the trading partner have tightened, average outbound time increases immediately and the impact peaks in a month, showing around a 0.62% increase, before it starts declining. Figure 4b shows that the cumulative responses immediately increased around 0.58% and gradually fell in the third month onward. For the inbound time, a unitary change in the trading partner's stringency index leads to a 0.7% increase on the sixth month after implementation, as shown in Figure 5a. Figure 5b indicates that the raised mobility measure increases the cumulative inbound time by 0.45% in the first month after implementation.

C. Impact by Containment Measure

In this section, we compare the impact of four different containment measures associated with mobility: internal restrictions, international restrictions, public transportation restrictions, and workplace closures. We follow the same model specification from the previous sections, with the only difference being that each of the four containment measures is included individually in the model. The four containment measures are normalized to range from 0 to 100.

Figure 4: Effects of a Unit Increase in a Partner's Stringency Index on Own Outbound Time in CAREC (%)

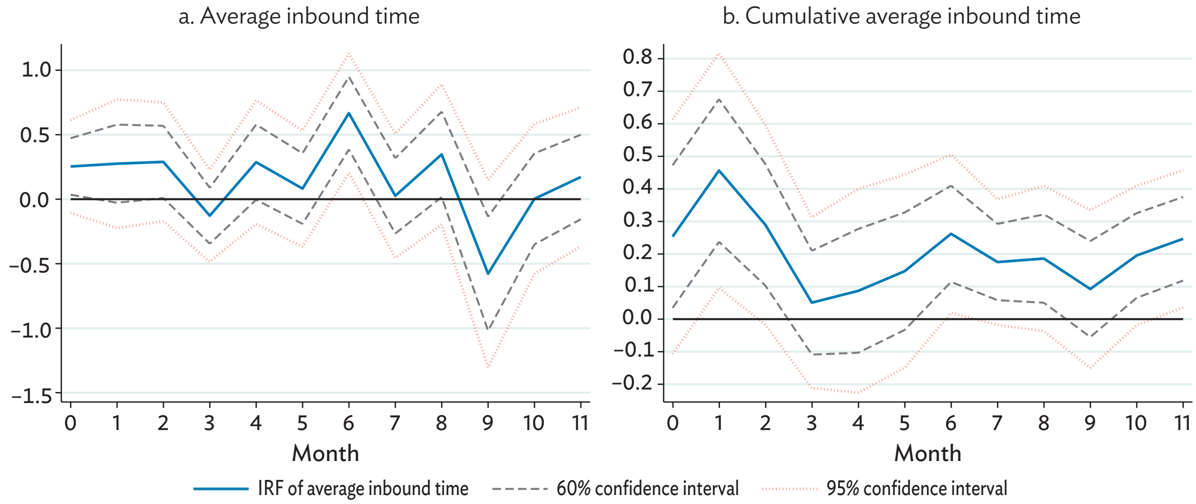


IRF = impulse response function.

Note: IRFs estimated from the fixed effect panel regression model.

Source: Authors' calculations.

Figure 5: Effects of a Unit Increase in a Partner's Stringency Index on Own Inbound Time in CAREC (%)



IRF = impulse response function.

Note: IRFs estimated from the fixed effect panel regression model.

Source: Authors' calculations.

The results highlight that among the four types of mobility measures, international restrictions, which represent border control, showed the most significant contribution to increased delays in inbound time for a period of 6 months since policy implementation.

Figure 6 shows the cumulative response of the outbound and inbound time due to a unitary change in each of the four containment measures over a 12-month period after implementation for the full CAREC dataset. The left panels show that only a unitary change in workplace closures have a significant impact on average outbound time. Workplace closures decrease the average outbound time by 0.15% by the fourth month and last up to the ninth month after implementation, but the impact decreases by 0.05%.

The right panels of Figure 6 show the impact on average inbound time. A unitary change in internal restrictions caused cumulative inbound time to significantly increase in the fifth, seventh, 10th, and 11th months. On the other hand, the average inbound time increased by 0.5% in the initial month of the policy implementation and peaked at 0.75% in the first month after implementation. The impact lasted up to the sixth month after implementation, but weakened to 0.3% by then. An increase in public transportation restrictions showed a cumulative impact of 0.14% at the initial month and peaked at 0.2% in the fifth month after implementation. Inbound BCPs are border points where shipments cross from the restriction-implementing country to another.

Figure 6: Effects of a Unit Increase in Stringency Index on Cumulative Average Outbound and Inbound Time by Containment Measure (%)

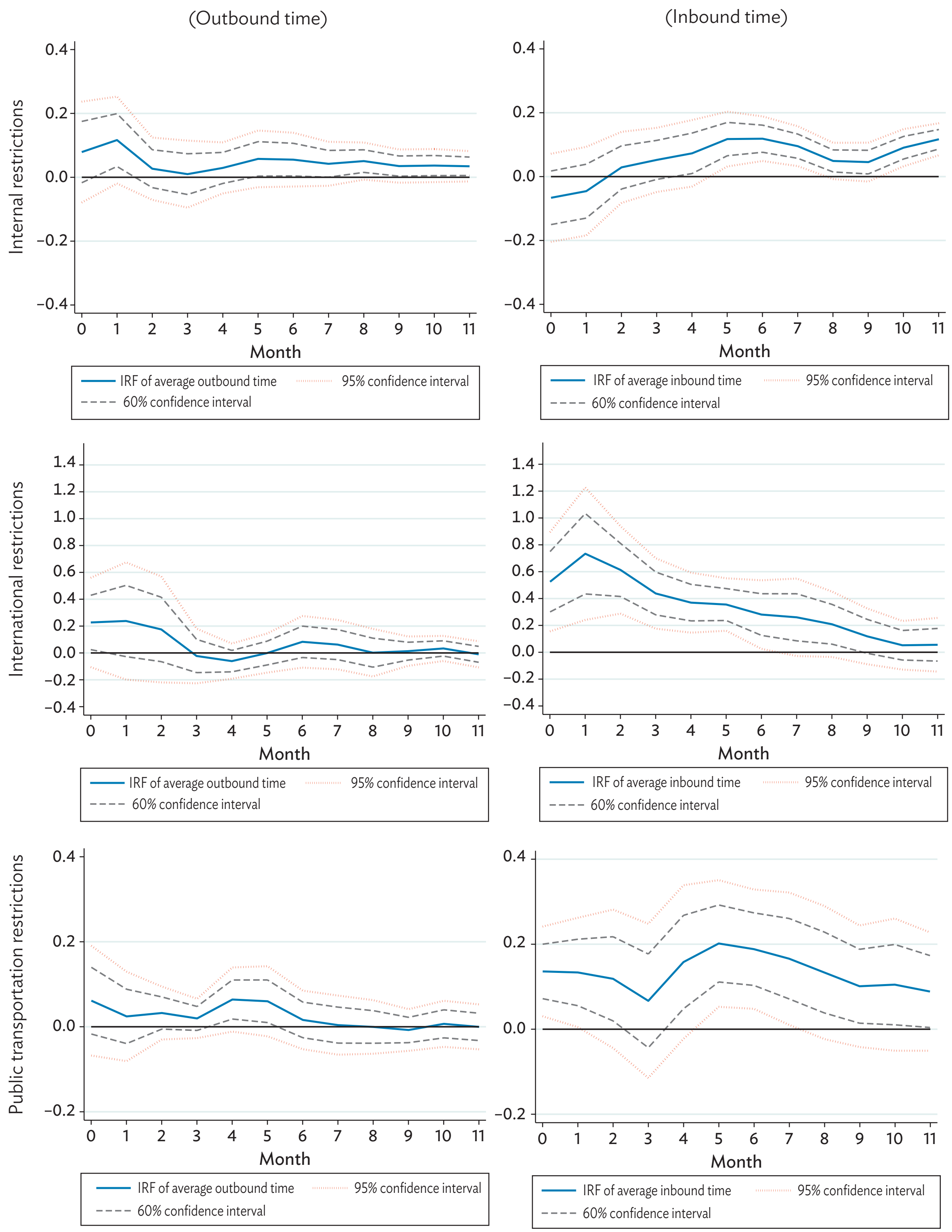


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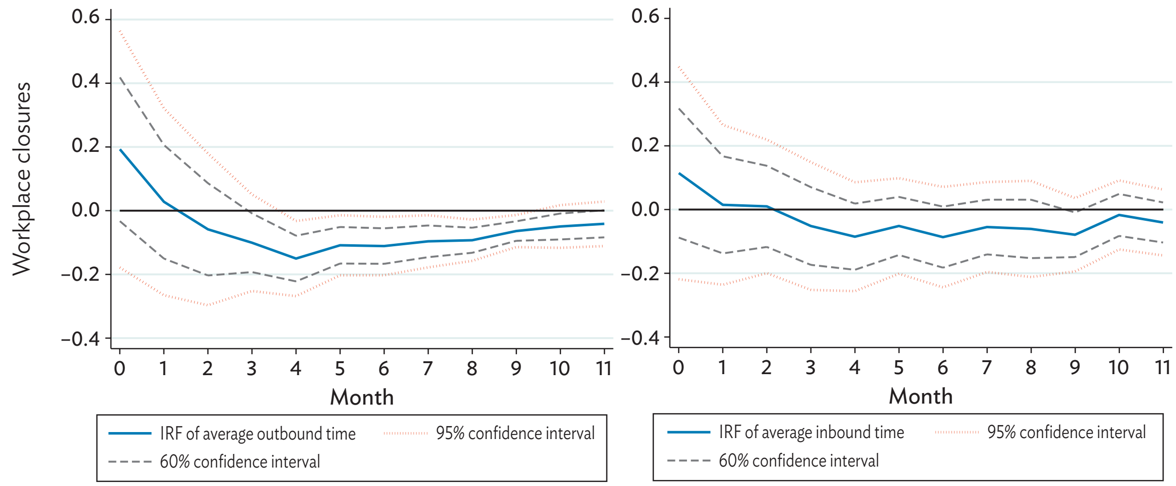
Figure 6 *continued*



IRF = impulse response function.

Source: Authors' calculations.

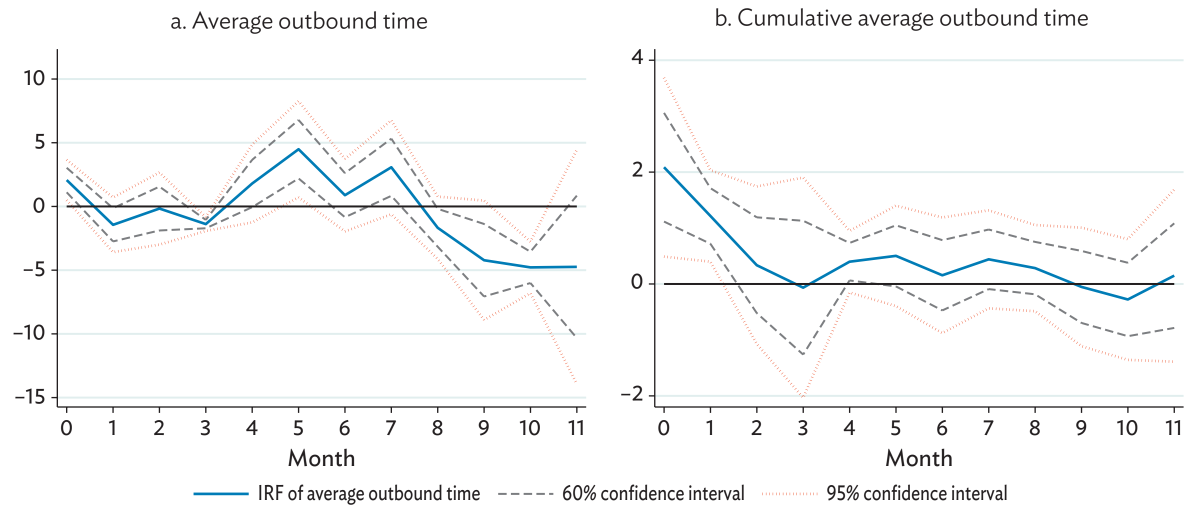
D. Country Results: The Cases of the Kyrgyz Republic and Kazakhstan

Figures 7 and 8 show the dynamic response of the outbound and inbound time due to a unitary change in the OxCGRT index over a 12-month period after implementation of the measures in the BCPs of the Kyrgyz Republic and Kazakhstan, respectively. Compared to the model using the full CAREC panel data, the smaller number of samples makes it difficult to deliver reliable estimates for a model specific to an individual country.[5] Nevertheless, this exercise shows the potential of the CAREC CPMM data set in analyzing trade facilitation per country, which could help design country-specific policy measures.

Figure 7 shows that an increase in the OxCGRT index had multiple effects on the average outbound time of the Kyrgyz Republic's BCPs. These include an increased average outbound time by 2% in the initial month and 4.5% in the fifth month after implementation and a decreased average outbound time by 2% in the third month and 3.5% in the 10th month after implementation. However, the cumulative outbound time increased by 2% in the initial month and 1% in the first month after implementation, then dissipated afterward. Figure 8 shows that a unitary change in the OxCGRT index increased the average inbound time of Kazakhstan's BCPs. Tighter mobility restrictions increased the average inbound time by 3% in the second month and around 3%–4% in the fourth month after implementation. In cumulative impact to average inbound time, a unitary change in the index increased the average inbound time by 1.5% by the seventh month after implementation.

5 The number of observations in the analysis are 76 for the Kyrgyz Republic and 120 for Kazakhstan.

Figure 7: Effects of a Unit Increase in Stringency Index on Outbound Time in the Kyrgyz Republic (%)

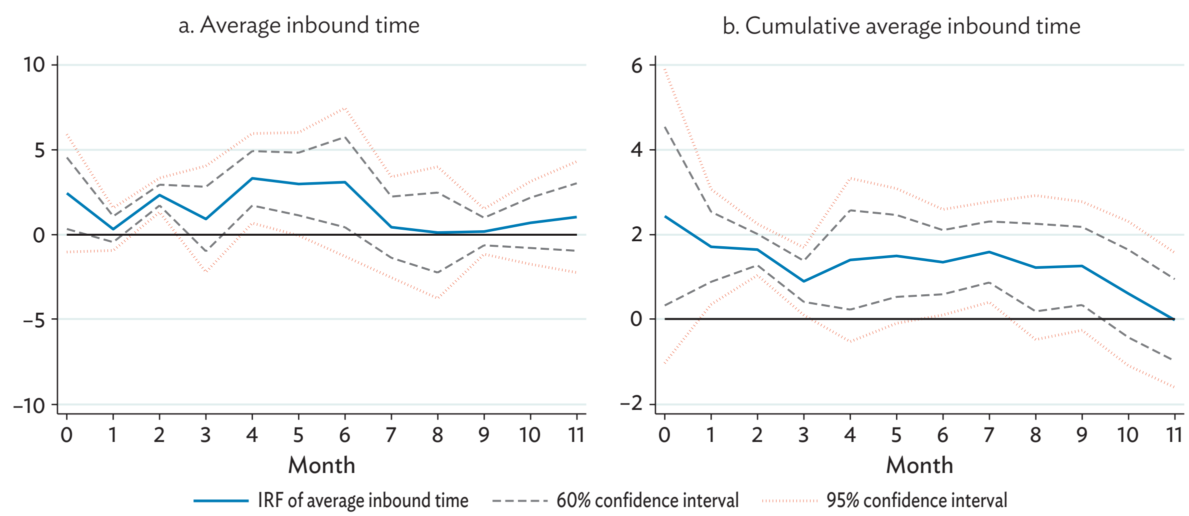


IRF = impulse response function.

Note: IRFs estimated from the fixed effect panel regression model.

Source: Authors' calculations.

Figure 8: Effects of a Unit Increase in Stringency Index on Inbound Time in Kazakhstan (%)



IRF = impulse response function.

Note: IRFs estimated from the fixed effect panel regression model.

Source: Authors' calculations.

The results of estimating IRFs for the individual countries indicate differences in the findings compared to when using the full CAREC data set. When it comes to the impact on outbound BCPs, the impact in the Kyrgyz Republic is more volatile than the impact in the full CAREC data set partly due to the small number of data points. The cumulative impact also lasts longer by 1 month. The results also show that compared to the average impact in CAREC, the Kyrgyz Republic was affected more, given the 2% to

4.5% increase in average outbound time. When it comes to the impact on inbound BCPs, the impact on Kazakhstan's BCPs is higher than the average impact on the CAREC region. Regarding cumulative impact, however, the impact dissipated faster compared to the average impact in CAREC. This shows that there is heterogeneity in the response of each country in impact of the stringency measures.

IV. CONCLUSIONS

Using the CAREC CPMM trade facilitation indicators, this study investigates the impact of COVID-19 on the time taken to clear cargoes at CAREC countries' borders. By using the monthly inbound and outbound time data at the level of BCPs, IRFs were estimated for all CAREC member countries and for each member country.

The main findings are as follows:

(i) A unitary rise in the level of mobility restriction index increases the CAREC outbound time by 0.7% in the initial month of implementation and increases the CAREC inbound time by 0.5%, with the impact lasting up to the fifth month after implementation.
(ii) This implies that in a country that implements the strictest COVID-19 mobility restrictions, the outbound BCPs' time could increase up to 70%, and the inbound BCPs' time up to 50%.
(iii) The outbound BCPs are more affected by mobility restrictions than the inbound BCPs. However, the outbound BCPs are resilient to the mobility measure as its impact is short-lived.
(iv) Tightened mobility restrictions in a trading partner also increases inbound and outbound time in an own country.
(v) However, increasing own-country stringency measures has longer impacts on inbound time, while the measure occurring in a partner country has more lingering impact on outbound time.
(vi) International restrictions have the highest impact among the different kinds of mobility measures.
(vii) Country-specific results highlight that there is heterogeneity in the response of each country in terms of the magnitude and timing of the impact of the mobility policy measures.

These results suggest important policy considerations.

The effects of mobility and quarantine policies are spilling across borders, affecting trade facilitation activities in trade partners. This highlights the need for more policy coordination and monitoring for emergency situations. It is also important that trade facilitation measures are specific to address delays in inbound and outbound time as lockdown measures would result in varying degrees and duration of the impact, depending on whether the impact is on inbound or outbound BCPs.

Although the pandemic continues to impact trade facilitation, the current estimated effects provide a brief overview into the existing challenges experienced by BCPs. While overall trade facilitation implementation in CAREC has improved, growth potential remains considerable, especially for paperless trade. According to UNESCAP (2021b), progress was made on digital trade facilitation from 2019 to 2021, but implementation remains low at 40%, particularly for the cross-border paperless trade measure. The Electronic single window system in CAREC countries varies in functionality and scope, showing room for improvement toward full implementation. Transit facilitation measures, which are important to CAREC member countries as they are mostly landlocked, were partially implemented.

Efficient transit facilitation and digital trade facilitation also offer great potential in effectively reducing border-crossing time and responding to crisis. Digitalization offers seamless processing, speeds up border procedures, enhances transparency, and increases participation of countries in the global economy. For example, the implementation of electronic sanitary and phytosanitary certificates by Uzbekistan (Lazaro et al. 2021) and the launching of the national single window in Tajikistan (WTO 2022) eased traffic congestions in borders and sped up information exchange. Improving connectivity within CAREC countries, with special focus on soft infrastructure, is also important. Thus, it is in the best interest of each CAREC country to accelerate efforts at digital transformation through deeper cooperation to create a digitally connected community. This is exceptionally important during times of crisis to expedite the flow of essential goods across borders. It is also timely to establish trade facilitation plans for those countries that have not yet started to prepare for future crises.

The CAREC CPMM TFIs provide BCP-level measures that are very useful for monitoring and assessing CAREC trade facilitation issues in a timely manner. However, there are data limitations in conducting a more in-depth analysis. CPMM TFIs are BCP-specific, while other trade-related variables are available at the country level. Future studies will significantly benefit from having information at the BCP level, such as the trade/transit flow, the level of modernization and automation, the number of employees, and the existence of sanitary and phytosanitary inspection facilities at the BCPs.

APPENDIXES

Appendix 1: Descriptive Statistics and Robustness Tests

Table A1.1: Data Description and Sources

Variable	Description	Time Period	Source
Time at border crossing points—inbound and outbound (TFI1)	Number of hours it takes to move cargoes across a border-crossing point—exit from country *i* and enter country *j*.	Jan 2020 to Dec 2021	CAREC CPMM
OxCGRT COVID-19 Stringency Index	Calculated mean score of the nine stringency metrics, taking the value between 0 (most lenient) to 100 (most stringent).	Jany 2020 to Dec 2021	Hale et al. (2021)
Internal restrictions	Measures policies on internal movements from 0 (no measures) to 2 (restrictions movement of citizens).	Jan 2020 to Dec 2021	Hale et al. (2021)
International restrictions	Measures policies on international travel controls from 0 (no measures) to 4 (total border closure).	Jan 2020 to Dec 2021	Hale et al. (2021)
Public transportation restrictions	Measures policies on public transport closures from 0 (no measures) to 2 (requires closing or prohibit most citizens from using it).	Jan 2020 to Dec 2021	Hale et al. (2021)
Workplace closures	Measures policies on workplace closures from 0 (no measures) to 3 (require closing or work from home of all but essential workplaces).	Jan 2020 to Dec 2021	Hale et al. (2021)
COVID-19 cases	COVID-19 daily cases gathered from official country sources and the World Health Organization with 2 days lag.	Jan 2020 to Dec 2021	Dong, Du, and Gardner (2020)
Bilateral goods exports	Nominal value (in US dollars) of goods exports from source country *i* to destination country *j*. The export values are in terms of free-on-board.	Jan 2020 to Dec 2021	IMF DOTS
Google mobility reports	Shows how visits and length of stay at various places change compared to a baseline which is the median value of a corresponding day of the week of 3 January to 6 February 2020.	Feb 2020 – Dec 2021	Google LLC

CAREC = Central Asia Regional Economic Cooperation, COVID-19 = coronavirus disease, CPMM = corridor performance measurement and monitoring, IMF DOTS = International Monetary Fund's Direction of Trade Statistics, OxCGRT = Oxford COVID-19 Government Response Tracker, TFI1 = Trade Facilitation Indicator 1, US = United States.

Source: Authors' compilation.

Table A1.2: Summary Statistics

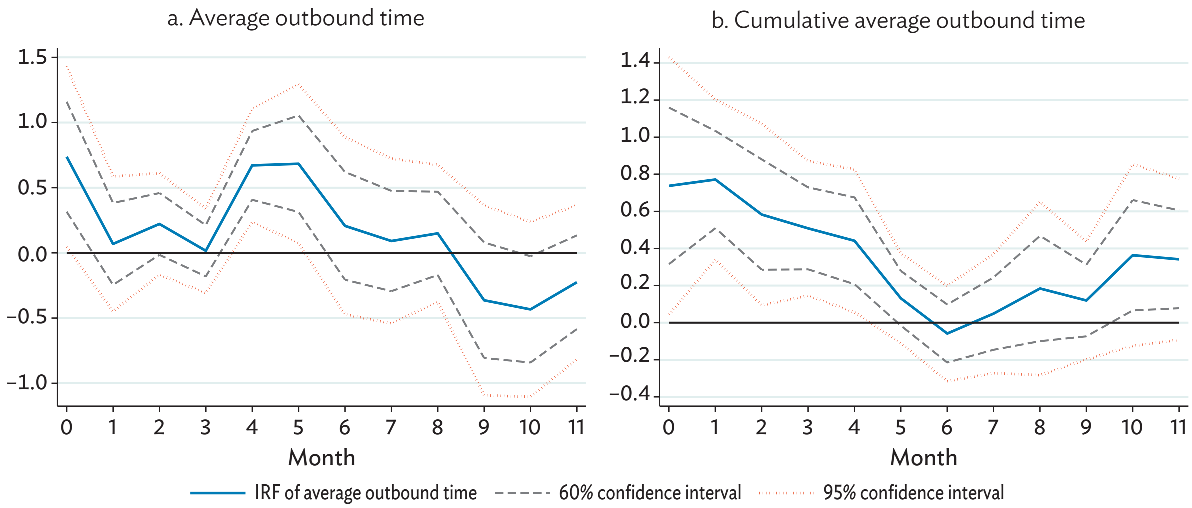
Variable	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
TFI1 – outbound, hours	778	12.32	22.11	.08	213.29
TFI1 – inbound, hours	776	6.99	10.77	.08	120.00
Oxford stringency index – outbound, 0-100	717	58.76	19.01	8.33	99.51
Oxford stringency index – inbound, 0-100	701	56.91	19.25	8.33	99.51
Internal restrictions – outbound, 0-100	778	50.98	43.47	0	100.00
Internal restrictions – inbound, 0-100	776	49.97	43.80	0	100.00
International restrictions – outbound, 0-100	778	64.37	26.53	0	100.00
International restrictions – inbound, 0-100	776	69.11	27.35	0	100.00
Public transportation restrictions – outbound, 0-100	778	35.58	38.11	0	100.00
Public transportation restrictions – inbound, 0-100	776	32.43	37.96	0	100.00
Workplace closures – outbound, 0-100	778	51.23	32.35	0	100.00
Workplace closures – inbound, 0-100	776	48.31	29.80	0	100.00
COVID-19 cases per million – outbound	717	1,606.75	3,966.72	0	50,606.11
COVID-19 cases per million – inbound	701	2,334.21	5,889.19	0	62,566.94
Exports – outbound, US dollar	702	228,300,000	379,900,000.00	1,952	1,918,000,000
Exports – inbound, US dollar	649	301,400,000	444,600,000	1,952	1,918,000,000
Grocery, Google mobility index – outbound	447	10.17	31.12	–61.98	147.03
Grocery, Google mobility index – inbound	502	10.48	34.65	–61.98	171.96
Transit stations, Google mobility index – outbound	447	1.29	30.57	–70.05	90.29
Transit stations, Google mobility index – inbound	502	4.42	34.59	–70.05	111.05
Workplaces, Google mobility index – outbound	447	–17.83	15.00	–61.46	27.99
Workplaces, Google mobility index – inbound	502	–17.77	16.17	–61.46	71.34

COVID-19 = coronavirus disease, TFI1 = Trade Facilitation Indicator 1.

Note: inbound (outbound) refers to inbound (outbound) BCP for TFI1, otherwise, to inbound (outbound) country.

Source: Authors' calculations.

Figure A1.1: Robustness Test: Effects of a Unit Increase in Stringency Index on Outbound Time in CAREC (%)

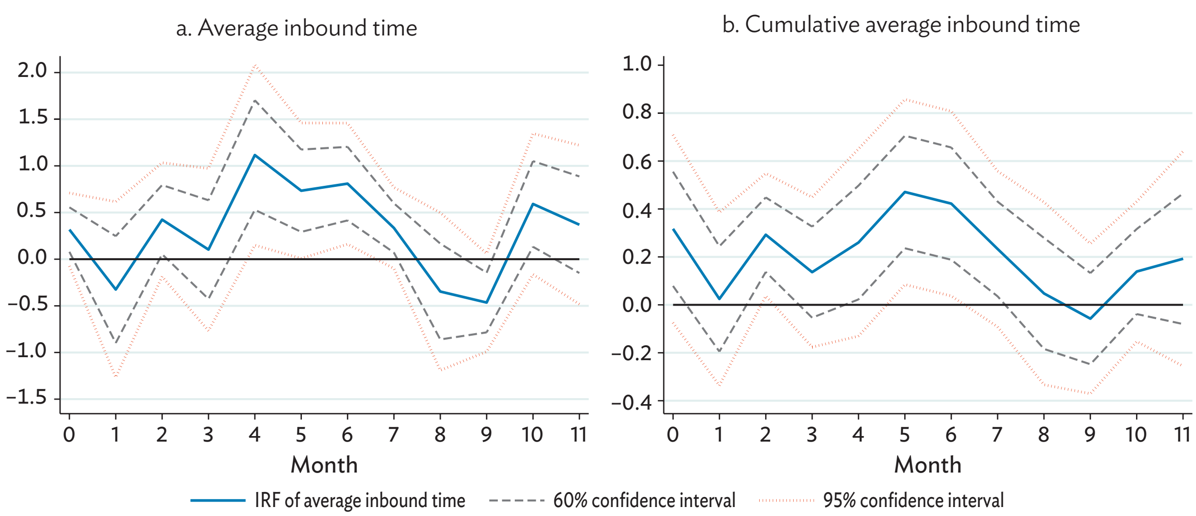


CAREC = Central Asia Regional Economic Cooperation, IRF = impulse response function.

Note: Impulse response functions estimated from the fixed effect panel regression model.

Source: Authors' calculations based on Teulings and Zubanov (2014).

Figure A1.2: Robustness Test: Effects of a Unit Increase in Stringency Index on Inbound Time in CAREC (%)



CAREC = Central Asia Regional Economic Cooperation, IRF = impulse response function

Note: IRF estimated from the fixed effect panel regression model.

Source: Authors' calculations based on Teulings and Zubanov (2014).

Appendix 2: Estimation of Impulse Response Functions Using Local Projection

To estimate the impulse response functions (IRFs) using the local projection (Jordà 2005), we use a fixed effects panel regression model, specified as follows:[1]

$$TFI1_{i,t+h} = {}^{\circ}\alpha_i + \beta_1 TFI1_{i,t-1} + \sum_{z=0}^{1} \gamma_z \tau_{i,t-z} + \sum_{z=0}^{1} \delta_z X_{i,t-z} + \sum_{z=0}^{1} \theta_z C_{i,t-z} + \rho G_{i,t} + \vartheta_t T_t + \varepsilon_{i,t+h}$$

Where $TFI1_{i,t+h}$ is the logarithm of the average time taken at either inbound or outbound border-crossing point (BCP) pair i at time t and the forecast horizon $h = \{0, ..., 11\}$; for the following explanatory variables, i represents a country pair corresponding to the BCP pair; $\tau_{i,t-z}$ is the contemporary Oxford COVID-19 Government Response Tracker (OxCGRT) Stringency Index of either an own (reporting) country or its trading partner and the lag where $z = \{0, 1\}$; $X_{i,t-z}$ is the contemporary logarithm of bilateral exports and its lag; $C_{i,t-z}$ is the contemporary logarithm of new COVID cases per million people and its lag; $G_{i,t}$ is a vector containing the google mobility indices; and T_t is a vector of time dummy variables for quarter and year.

To estimate the IRF, the local projection method requires an estimation of coefficients separately at each h-step ahead period. For example, the TFI1's response to the stringency index at horizon $h = 0$ is the estimate for δ_0 when regressing $TFI1_{i,t}$ on $X_{i,t}$ and the remaining explanatory variables. Then the impulse response at horizon $h = 1$ is the coefficient δ_0 estimated for $TFI1_{i,t+1}$ given $X_{i,t}$ and the other explanatory variables. This is repeated until the coefficient δ_0 is estimated for $h = 11$. Alternatively, we also measure the impact on cumulative average time given the horizon. For example, for $h = 3$ with January as the initial month, the dependent variable is replaced with the average of logarithm of time taken in January, February, March, and April, regressing on the same explanatory variables. To test the existence of heterogeneous impact responses at the national level, the same specification is used for a few CAREC countries with relatively large number of observations.

[1] The main findings do not change when the random effect models are used instead.

REFERENCES

Alesina, A. F., D. Furceri, J. D. Ostry, C. Papageorgiou, and D. P. Quinn. 2020. Structural Reforms and Elections: Evidence from a World-Wide New Dataset. *NBER Working Papers.* No. 26720. http://www.nber.org/papers/w26720.ack.

Asian Development Bank. 2021. *CAREC Corridor Performance Measurement and Monitoring Annual Report 2020*. Manila. https://www.carecprogram.org/uploads/carec-cpmm-annual-report-2020-en.pdf.

Barbero, J., J. J. de Lucio, and E. Rodriguez-Crespo. 2021. *Effects of COVID-19 on Trade Flows: Measuring their Impact through Government Policy Responses*. https://doi.org/10.1371/journal.pone.0258356.

Caselli, F. G., and A Roitman. 2019. Nonlinear Exchange-Rate Pass-Through in Emerging Markets. *International Finance.* 22 (3): pp. 279–306. https://doi.org/10.1111/infi.12344.

De, P. 2020. Trade Facilitation in Times of Pandemic: Practices from South and South West Asia. *ARTNet Working Paper Series.* 198. https://www.econstor.eu/bitstream/10419/224784/1/1733514929.pdf.

Deb, P., D. Furceri, J. Ostry, and N. Tawk. 2022. The Economic Effects of COVID-19 Containment Measures. *Open Economies Review.* 33: pp. 1–32. https://doi.org/10.1007/s11079-021-09638-2.

Dong, E., H. Du, and L. Gardner. 2020. An Interactive Web-Based Dashboard to Track COVID-19 in Real Time. *The Lancet Infectious Diseases*. 20 (5): pp. 533–534. https://doi.org/10.1016/S1473-3099(20)30120-1.

Fu, J. 2020. Trade Facilitation in Times of Pandemic: Practices from East and North-East Asia. *ARTNet Working Paper Series.* 196. https://www.econstor.eu/bitstream/10419/224782/1/1733513566.pdf.

Furceri, D., P. Loungani, and A. Zdzienicka. 2018. The Effects of Monetary Policy Shocks on Inequality. *Journal of International Money and Finance*. 85: pp. 168–186. https://doi.org/10.1016/j.jimonfin.2017.11.004.

Goldstein, P., E. L. Yeyati, and L. Sartorio. 2021. Lockdown Fatigue: The Diminishing Effects of Quarantines on the Spread of COVID-19. *Covid Economics: Vetted and Real-Time Papers*. 67. https://cepr.org/node/390712.

Google LLC. 2022. Google Community Mobility Reports (accessed May 2022, pp. 1–6). https://www.google.com/covid19/mobility/.

Hale, T., N. Angrist, R. Goldszmidt, B. Kira, A. Petherick, T. Phillips, S. Webster, E. Cameron-Blake, L. Hallas, S. Majumdar, and H. Tatlow. 2021. A Global Panel Database of Pandemic Policies (Oxford COVID-19 Government Response Tracker). *Nature Human Behaviour*: *5* (4): pp. 529–538. https://doi.org/10.1038/s41562-021-01079-8.

Holzhacker, H. 2020. *The COVID-19 Economic Implications for the CAREC Region*. 26 February. Urumqi: CAREC Institute. https://www.carecinstitute.org/wp-content/uploads/2020/02/CI-HH-Economic-Impact-of-Coronavirus-CAREC-26-Feb-2020.pdf.

International Monetary Fund. Direction of Trade Statistics Database. https://www.imf.org/en/Data (accessed 5 April 2022).

Jordà, Ò. 2005. Estimation and Inference of Impulse Responses by Local Projections. *American Economic Review*. 95 (1): pp. 161–182. https://doi.org/10.1257/0002828053828518.

Jordà, Ò., M. Schularick, and A. M. Taylor. 2013. When Credit Bites Back. *Journal of Money, Credit and Banking*. 45 (2). https://doi.org/10.1111/jmcb.12069.

Jordà, Ò., and A. M. Taylor. 2016. The Time for Austerity: Estimating the Average Treatment Effect of Fiscal Policy. *Economic Journal*. 126 (590): pp. 219–255. https://doi.org/10.1111/ecoj.12332.

Kim, K., P. Mariano, and J. Abesamis. 2021. Trade Impact of Reducing Time and Costs at Borders in the Central Asia Regional Economic Cooperation Region. *Emerging Markets Finance and Trade*. 00 (00): pp. 1–18. https://doi.org/10.1080/1540496X.2021.2007877.

Kpodar, K., S. Quayyum, V. Gammadigbe, and M. Mlachila. 2021. Defying the Odds: Remittances During the COVID-19 Pandemic. *IMF Working Papers*. (186), 1. https://doi.org/10.5089/9781513578453.001.

Lazaro, D., G. Samad, L. de Dios, and A.R. Tafgar. 2021. Expanding Agri-Trade in Central Asia through the Use of Electronic Certificates. *ADB Briefs.* No. 184. Manila: Asian Development Bank. https://www.adb.org/sites/default/files/publication/743001/adb-brief-184-agri-trade-central-asia.pdf.

Organisation for Economic Co-operation and Development (OECD). 2020. *Leveraging Digital Trade To Fight the Consequences of COVID-19*. https://read.oecd-ilibrary.org/view/?ref=135_135517-02bikxyksj&title=Leveraging-Digital-Trade-to-Fight-the-Consequences-of-COVID-19.

Ramey, V. A., and S. Zubairy. 2018. Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data. *Journal of Political Economy*. 126 (2). https://doi.org/10.1086/696277.

SANEM. 2020. SANEM Thinking Aloud. *South Asian Network on Economic Modeling*. 7 (4). https://sanemnet.org//wp-content/uploads/2020/09/Thinking-Aloud_V7_N4.pdf.

Teulings, C. N., and N. Zubanov. 2014. Is Economic Recovery A Myth? Robust Estimation of Impulse Responses. *Journal of Applied Econometrics*. 29 (3): pp. 497–514. https://doi.org/10.1002/jae.2333.

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). 2021a. Trade Facilitation in Times of Crisis and Pandemic: Practices and Lessons from the Asia-Pacific Region. https://www.unescap.org/sites/default/d8files/knowledge-products/Regional%20report-Trade%20facilitation%20in%20times%20of%20crisis%20and%20pandemic_0.pdf.

———. 2021b. Digital and Sustainable Trade Facilitation in Central Asia Regional Economic Cooperation (CAREC). https://www.unescap.org/sites/default/d8files/knowledge-products/CAREC_report_2021_Low%20res_0.pdf.

United Nations Conference on Trade and Development (UNCTAD). 2022. Sustainable and Resilient Transport and Trade Facilitation in Times of Pandemic and Beyond: Key Challenges and Opportunities. https://unctad.org/system/files/official-document/cimem7d26_en.pdf.

Vassilevskaya, Y. 2020. Trade Facilitation in Times of Pandemic: Practices from North and Central Asia. *ARTNeT Working Paper Series.* 197. https://www.unescap.org/sites/default/d8files/knowledge-products/AWP%20197%20Yelena%20Vassilevskaya.pdf.

World Trade Organization (WTO). 2022. Trade Policy Review: Tajikistan Draft Minutes of the Meeting. https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=t:/WT/TPR/W203.docx&Open=True.

The Impact of COVID-19 Mobility Restrictions
on Trade Facilitation at Borders in the Central Asia Regional Economic Cooperation Region

Using monthly bilateral time measures at borders in the Central Asia Regional Economic Cooperation (CAREC) countries, this paper investigates the impact of COVID-19 mobility measures on the time for cargo to clear borders. The impulse response function estimation suggests that time could increase up to 70% when the most stringent level of mobility restrictions was imposed. The results suggest that outbound border-crossing points were more affected by measures than inbound points, but were more resilient in that impact was short-lived. We find that both inbound and outbound times increased when mobility restrictions in a trading partner tightened.

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