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Can a path to peace promote export growth? Evidence from Pakistan and its trading partners

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Abstract

This study has investigated the connection between peace and performance of Pakistan's export sector. The interstates conflicts, terrorist activities and war elements disturb the industry supply chain, damage the means of transportation, and increase the security measures and regulations, which make trade more expensive. On the other hand, encouragement of the peace process lowers military conflicts, promotes diplomatic cooperation, and hence trade among the nations. The purpose of the study is to test whether domestic peace in Pakistan relative to its trading partners promotes its exports. For empirical analysis, we use panel data for Pakistan and its 26 trading partners in export over the period 2007–2018. After controlling the impacts of economic size, market size, infrastructure, and exchange rate, we found that peace in Pakistan relative to its trading partners is important to promote its export sector, which is directly linked with local industries and the wellbeing of individuals. The economic size and market size of the exporting nations relative to Pakistan also positively contributed towards the exports. The depreciation of Pakistan's exporting countries' currencies relative to its currency lowers the volume of exports. Besides, it is also observed that a major portion of Pakistan's exports is routed in a specific region or few countries. Therefore, it is suggested that the government should take active measures to reduce the internal as well as external conflicts, terrorists' attacks, and war elements to promote the volume of exports.

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1 Introduction

Motivated by the literature, there is a positive link between trade and a peaceful environment. Especially, for a trading partner—whether at individual or government levels, not only removing trading barriers are important but also a peaceful environment encourages them to trade more (Tinbergen 1962; and Pöyhönen 1963). Additionally, it is evident from the socio-political research that interdependence between trading partners, the emergence of international organizations, and the rising number of democratic states and global peace successfully restricted interstate conflicts (Jervis 2002; Gleditsch 2008). The current study specifically addresses this issue by analyzing the relationship between exports and peace-promoting process for the economy of Pakistan.

The export growth not only promotes local industry but also enhance the wellbeing of individuals connected with the export's sector through the cottage and small-scale industries (for detail, see Chaudhary and Naveed 2003; WBR 2017). Since December 1979, Pakistan's economy was deadly affected by the Soviet invasion of Afghanistan and henceforth a huge influx of Afghan refugees. These refugees not only influenced the socio-economic and political environment but also posed an alarming threat to Pakistan's security. Besides, these promoted sectarianisms, Kalashnikov culture, corruption, and endless law & order problems in the country (Hilali 2002). Thus, Pakistan emerged as a 'front-line' state among the major players of the game by playing a principal role in channelizing the world's assistance to the Afghan Mujahedeen (holy warriors) because Soviet expansion was one of the major causes of worldwide anxiety. Therefore, it is expected that the promotion of peace will not only enhance the trade but also solve many local issues related to the public and their affairs through economic growth.

The historical perspective of the peaceful environment in Pakistan is highly dynamic. In the 1970s when Marxist take over Afghanistan, which leads to the creation of local resistance groups and then subsequently violent clashes between the Afghan forces and the resistance groups started. As a result, many peoples migrated from Afghanistan to different countries. The neighboring countries, particularly Pakistan accommodated 3 to 4 million Afghan refugees. Resultantly, Pakistan's economy faced several socioeconomic and political problems. In many areas of the country, the refugees destroyed the ecological balance, causing desertification and consequent soil erosion, promoted drug culture and its trafficking, fueled religious clashes, and urged sectarianism. All these issues adversely affected the economic performance of Pakistan and incurred a huge direct and indirect cost amounted to about US$ $123 billion for the war on terror during the period 2001–2017. In addition, Pakistan faced a loss in exports of US$1.26 billion only in two years 2013–14 resulting from terrorist attacks (for detail see, Pakistan Economic Survey: 2015).

Theoretical and empirical literature documented that most of the studies used a gravity trade model to analyze the phenomena of trade flows. Tinbergen (1962) and Pöyhönen (1963) identified the national economic strength measured by the GDP and distance between trading nations as a key determinant of trade flows. Linnemann (1966) introduced the demographic determinant of trade flows and predicted that an increase in the population of the trading country adversely affects the trade flows while Brada and Mendez (1983) reported opposite findings. Leitao (2010) used the augmented gravity model and predicted the positive impact of GDP, population, FDI, per capita income differential, and border sharing on trade flows, and their negative association with the distance between trading nations. Hatab et al. (2010) mentioned the direct effect of the real exchange rate

and per capita income of trading partners on Egyptian agricultural exports, while it proved negative with distance.

Some studies focused on the neglected version of commercial liberalism, how trade helps in promoting peace between trading countries. It is argued that the promotion of trade reduces military conflicts and encourages the peace process between nations (Polachek 1980; Domke, 1988; Oneal and Russett 1999; Russett and Oneal 2001; McDonald 2004). Bandyopadhyay and Sandler (2014) did not support this view and argued that terrorism can either demote or promote trade, depends on critical factors, how terrorism impacts the factor intensively used in the production of exports or imports. Selim et al. (2020) documented that dialogues among the states and people, decentralization of the veto power of the five nations, initiating trade among the nations currently engaged in wars or disputes or going through built-up tensions, inter-state exchange of prisoners, and paying fair compensation to innocent victims help to stop madness across the borders. Shang (2020) investigate the impact of terrorism on bilateral trade between China and its five trading partners from Asia. Their results show that the number of terrorist activities is negatively linked with trade. Chen (2021) investigated the impact of extended dependence on the occurrence of interstate military conflict incidence over the period 1951–2010. All these studies either focused on the gravity trade model or investigated the impact of trade on the cultivation of the peace process. There is hardly any study that tried to explore the impact of the encouragement of the peace process on the export performance of the country considering the gravity trade model. Besides, none of the studies has investigated how a relative change in either economic size, market size, or infrastructure influence the country's exports. Therefore, the current study contributes to the literature in the following ways: First, we find that the promotion of peace in Pakistan relative to its trading partners is essential to promote the performance of Pakistan's export sector. Second, the relative economic and market size, and infrastructure of trading partners to Pakistan's economy have positive impact on its export's performance. Especially, the effect of economic size (measured by GDP) on exports is larger than market size and infrastructure. The depreciation of foreign currency relative to Pakistan's currency hurts Pakistan's exports because of the price effect. Third, results related to different trading partners (high share and low share export partners) have a similar effect of peace on exports. However, the effect of economic size, market size, infrastructure, and real exchange rate heterogeneous across different trading partners.

The rest of the study is organized as follows. Section 2 briefly presents the theoretical and empirical background. Section 3 contains the empirical methodology and data information. Results are offered in Sect. 4. Finally, Sect. 5 concludes the study.

2 Theoretical and empirical background

The methodology of the study is primarily based on the gravity model, generally used to explain the economic flows between countries. It describes that the volume of economic flows between the larger economies is greater than the smaller ones, and distance between the states adversely impacts these flows. Here, distance not only indicates the geographical distance between countries but also includes transportation costs and different trade barriers. Following the concept of Ravenstein (1885), Isard and Pack (1954) and Beckerman (1956) used a model closer to the standard gravity equation to analyze trade flows and concluded that geographically close regions exhibited greater trade flows. Tinbergen (1962) and Pöyhönen (1963) further improved the model and predicted that economic strength

measured by the GDP and distance between trading partners are the key factors to determine trade flows. Initially, it was believed that economic strength has a positive impact on trade flows whereas distance is negatively associated with it. The gravitational trade model was criticized due to its lack of theoretical foundation and Anderson (1979) used constant elasticity of substitution (CES) utility function to provide microeconomic foundations to gravity equation. He demonstrated how the gravitational trade model fits into an optimization framework. Bergstrand (1985, 1989) extended microeconomic foundations and incorporated complex prices term in the model to establish a relationship between the trade theory and bilateral trade flow through demand and supply-side factors. The GDP of an importing country indicates market demand and the output of the exporting country shows supply capacity, whereas the distance between the trading countries reflects transportation cost. Anderson and Wincoop (2001) further extended the theoretical foundations and introduced methods to deal with the complicated price term in the model.

The gravitational trade model is commonly used to empirically analyze trade flows due to its high explanatory power and strong theoretical foundations. Linnemann (1966) introduced demographic variables in the gravity model to explore the impacts of economies of scale and concluded that an increase in the trading partner's population lowers the trade flows. On the other hand, Brada and Mendez (1983) reported a positive impact of the population on trade flows. Leamer (1974) modified the model by introducing per capita income and exchange rate and used it to analyze the interaction between trade and its use, while used the gravitational version to examine the role of factor endowments and other national characteristics determining trade flows. Graci and Prewo (1977) applied this model to analyze the bilateral trade flows in OECD countries and found that trade barriers-tariff structures significantly reduced the volume of trade between these countries. Baier and Bergstrand (2001) argued that 67 percent of the trade among OEDC countries was determined by relative economic growth, 25 percent by trade barriers, and only 8 percent by transportation cost. Leitao (2010) used the augmented gravity model to analyze trade flows from the USA to European Union, NAFTA, and ASEAN. The empirical findings reported a positive impact of GDP, population, FDI, per capita income differential, and border sharing on trade flows, while distance negatively affects these flows. The positive association between per capita income differential and trade flow also supports the Linder hypothesis for the USA. Hussain and Xue (2013, 2014) used the gravity framework to explore the factors responsible for low intra-regional trade in the ECO region, using data on exports from Pakistan to nine ECO (Economic Cooperation Organization) countries. The results of the study indicated that distance, tariff rates, and exchange rates harm trade in this region.

Hatab et al. (2010) analyzed the Egyptian agricultural export using a gravity model and documented the positive impact of the real exchange rate and per capita income of trading partners, while the negative impact of distance on export flows. Nguyen (2010) used a static and dynamic panel augmented gravity trade model to investigate Vietnam's export flows. The empirical findings indicate that export flows have a positive association with its lag value, income of exporting and importing countries, and real exchange rate. While distance has a significant negative effect on export flows. Rahman (2010) applied a generalized gravity model to examine the Bangladesh export flows and reported positive contribution of the exchange rate, the output of trading partners, and trade openness, whereas the contribution of transportation cost was not different from zero.

McDonald (2004) explored the neglected version of commercial liberalism rooted in the classical writings of Cobden (1870) and Schumpeter (1919), how trade or free trade creates peace between countries. The empirical findings of the study argued that the promotion

of free trade, rather than trade alone, reduces the military conflicts between nations. Similar findings were also reported by previous studies (Polachek 1980; Domke 1988; Mansfield 1995; Oneal and Russett 1999). Nitscha and Schumacher (2004) explored the linkage between terrorism and large-scale violence and trade flows. The findings of the study support the hypothesis that terrorist activities hurt trade flows. Apart from this conventional view, terrorism increases risks and hence, hurts trade flows; Bandyopadhyay and Sandler (2014) used a factor supply approach to prove that, this hypothesis is not necessarily correct. They argued that terrorism can either demote or promote trade, depends on critical factors, how terrorism impacts the factor intensively used in the export sector or import sector. The study concluded that a nation's adjustment of its counterterrorism level in response to a greater terrorist threat may moderate the impact of terrorism on trade.

Oneal and Russet (2010) tested the hypothesis, whether trade promotes peace or not, concluded that commerce and trade promote peace and aggression has a cost. Besides, it is argued that interstate conflicts and violence hinder the trade, commerce, and prosperity of a country. In this modern globalized world, economic relations and interdependence of states marginalized the risk of war and conflicts between countries (Barbieri, 2002). Anderton and Carter (2001) argued that interstates conflict and war adversely affected trade and commerce. Mamoon and Mansoob (2008) documented that trade between Pakistan and India can be increased through a reduction in military expenditures and hostility between these states.

The most recent studies have explored how jointly economic linkages and security institutions, domestic political institutions and cooperative reputation of states can reduce interstate conflicts, and thereby deepen trade cooperation, and the World Trade Organization forum helps to promote international peace. Chen (2021) investigated how the occurrence of interstate military conflict incidence is determined by extended dependence, which is the potential challenger's trade dependence on the defensive allies of the target state, using data over the period 1951–2010. The results of the study predicted that states more economically dependent on the allies of the potential target are less likely to pledge military conflict. Selim et al. (2020) documented that dialogues among the states and people, decentralization of the veto power of the five nations, initiating trade among the nations currently engaged in wars or disputes or going through built-up tensions, inter-state exchange of prisoners, and paying fair compensation to innocent victims may go a long way to stop madness across the borders. Chen et al. (2019) used survey experiments and indicated that respondents prefer to trade with democratic states over the non-democratic ones by large margins. In addition, the study also concluded that democratic nations proved more commitment-fulfilling trading partners. Mollaian, (2019) tried to explore the importance of WTO in the maintenance of international peace through continued international trade, by looking at the history of GATT-1947 and the WTO. The study reported that instead of promoting peace, trade is used as a weapon-by the use of Article XXI—security exception of GATT-1994.

As concerned as Pakistan, few notable studies tried to analyze the export flows of Pakistan. For example, Khan and Mahmood (2000) used the gravity model to investigate the behavior of trade flows of Pakistan and documented the positive impact of domestic output and output of trading partner, real exchange rate, and common language on trade flows, while distance, trade barriers, and border dummy have a significant negative impact on Pakistan's trade. Butt (2008) also documented similar findings. Achakzai (2006) utilized the augmented gravity model to examine Pakistan's trade flows with nine ECO countries and suggested greater scope for regional integration. Gul and Yasin (2011) reported the expected theoretical predictions except for the negative estimate of the border dummy

variable, which indicates political tension with border-sharing neighbors. Abbas and Waheed (2015) investigated the behavior of Pakistan's export flows using panel data for 40 trading partners of Pakistan. The results indicate that the domestic supply capacity (GDP of Pakistan) and partner countries' demand potential (GDP of importing country), market size (population of importing country), and relative price positively contributed to Pakistan's export flow, while the contribution of distance is negative. The contribution of the common language dummy variable is also positive to export flows, whereas the border dummy has shown a negative contribution to Pakistan's exports.

The above-mentioned literature analyzed the behavior of trade flows in the light of economic, demographic, geographical, and political factors; as Standard gravity model and its augmented versions are used to predict the relationship between economic flows (trade and capital flows) and the size of economies (measured by the GDP), distance (geographical distance and costs of transportation), infrastructure, population, exchange rate and trade agreements between the trading partners (Bougheas et al. 1999; Endoh 2000; Martinez-Zarzoso and Nowak-Lehmann 2003; Batra 2006; Nguyen 2010 and Rahman 2010). Empirical findings of previous studies predict that an increase in the economic size (GDP), market size (population) of both trading partners encourage, whereas the distance between the two countries harms the trade flows. But none of the studies has tested how relative peace between the states impacts the volume of trade between the states. This study has transformed the gravity equation to investigate the impact of peace in Pakistan and its trading partners on the exports of Pakistan. It is hypothesized that peace in exporting and importing countries will positively affect the exports because war seriously disrupts trade flows (Barbieri and Levy 1999; Kastner 2007). After all, strong political ties between the states promote trade flows between them (Morrow 1999).

3 Empirical methodology and data

The empirical approach to estimate the contribution of peace to Pakistan's exports can be summarized as follows:

$$Export_{ijt} = \alpha + \beta Peace + \delta Z + \varepsilon \tag{1}$$

where, we regress the log of Pakistan's exports (i) to its trading partners (j) at the time (t) on the measure of peace (global peace index) and a set of other conditioning variables Z, which potentially influence the volume of exports with ε being a well-behaved residual. The control variables in vector Z belong to the gravity trade model that is a long-established and empirically tested framework to the model of trade flows. All variables are measured in relative terms such as the presence of peace in Pakistan relative to its trading partners. Hence regression used for estimation is as follows:

$$lnExport_{ijt} = \alpha + \beta RP_{ijt} + \delta_1 RES_{ijt} + \delta_2 RMS_{ijt} + \delta_3 RIF_{ijt} + \delta_4 REE_{ijt} + \mu_{ij} \tag{2}$$

where Export is the dependent variable shows the value of exports between country i (Pakistan) and j (trading partner) in time (t), RP is used to predict the impact of the relative peace (measured as the value of global peace index of Pakistan) on export. We rescale the global peace index (GPI) variable by subtracting the value of GPI from its maximum value-5 to indicate the direct relationship between GPI value and the presence of peace. RES measure the effect of relative economic size measured by the GDP of Pakistan' trading partner to its GDP, RMS measure the impact of relative market size measured by the population of

Fig. 1 Volume of exports and peace in Pakistan relative to its trading Countries
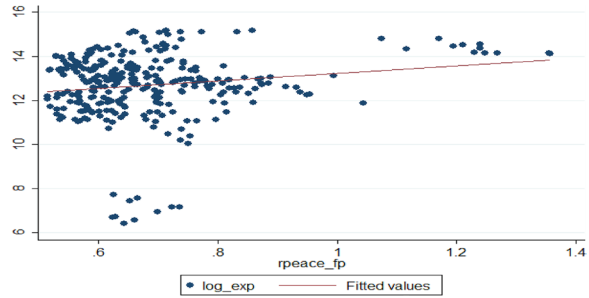
Pakistan's trading partner to its population, RIF indicates the impact of the relative size of the infrastructure measured by Pakistan's trading partner to its infrastructure, REE shows the ratio between the real effective exchange rate of Pakistan's trading partner to its real effective exchange rate to measure the relative change in the value of Pakistan's currency to its trading countries. For estimation purposes, we use a panel data model to explore the impact of peace on exports of Pakistan. It is highly plausible that peace is endogenous in its relationship to exports which may create an endogeneity issue (Oneal and Russett 2010). In this context, explanatory variables correlate with the error term that creates endogeneity issues and produced biased and inconsistent estimates. Additionally, the estimated results may provide wrong signs and misleading interpretations (Ketokivi and Mcintosh 2017). In the presence of different sources of endogeneity (e.g., unobserved heterogeneity, simultaneity, and dynamic endogeneity), system GMM provides consistent estimates (Wintoki et al. 2012). Moreover, GMM estimators are more efficient than OLS in the presence of heteroscedasticity (Cragg 1983; Lu and Wooldridge 2020). Additionally, the system GMM estimator uses internal time lags as instruments for each endogenous regressor and treats all explanatory variables (including control variables) as being endogenous (for detail see, Blundell and Bond 1998). On the other hand, GMM also has a limitation in the form of weak instruments for dynamic panel data models (Bun and Windmeijer 2010).

To estimate Eq. (2), we used panel data for Pakistan and its 26 trading partners[1] in exports over the period 2007–2018, which is collected from WDI (World Development Indicator) World Bank. The dependent variable is exports measured as a log of the total value of exports in US\$. The main independent variable is peace, which is measured as the value of the global peace index (GPI). To control for observed heterogeneity between Pakistan and its trading partners, we use a set of control variables consists of the size of the economy, market size, infrastructure, and real effective exchange rate. The economic size is measured as the GDP of Pakistan' trading partner to its GDP, market size is measured as the population of Pakistan' trading partner to its population, infrastructure as the total infrastructure expenditures of Pakistan' trading partner to its expenditures on infrastructure, exchange rate by the ratio between the real effective exchange rate of the trading partner to Pakistan's real effective exchange rate in the same period.[2]

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[1] For the list of these countries see appendix Table 6.

[2] For details of variables and respective data sources see appendix Tables 3 and 4.
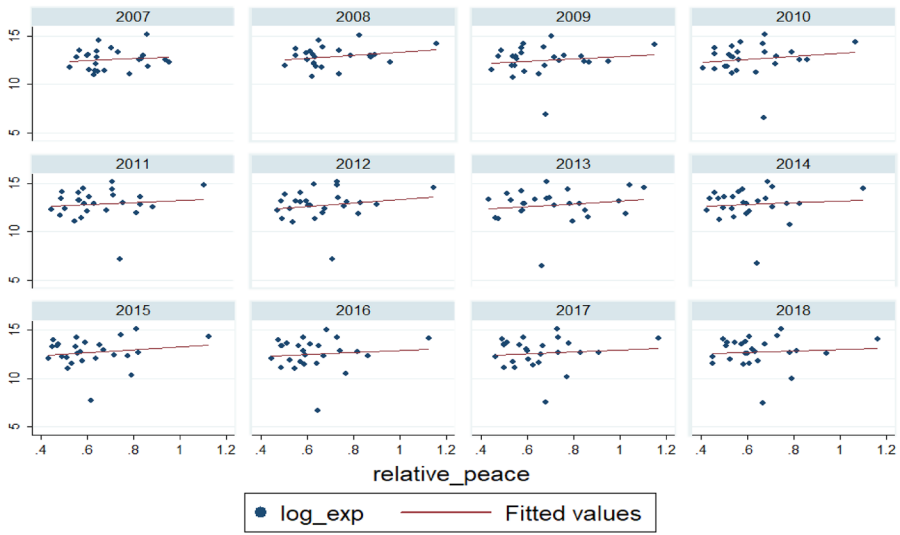
Fig. 2 Yearly relationship between exports and relative peace

Table 1 Pakistan's export sector performance and peace

Variable	Dependent variable: log of exports of Pakistan				
	1	2	3	4	5
	OLS	System GMM	System GMM	System GMM	System GMM
Peace	0.087*	0.089***	0.157***	0.052***	0.036***
	(1.79)	(5.14)	(4.67)	(3.08)	(5.51)
Economic Size	0.314***	0.204***	0.105***	0.029	0.037***
	(8.28)	(2.65)	(2.83)	(0.65)	(4.44)
Market Size	0.209***		0.041***	0.129***	0.022**
	(4.37		(2.87)	(6.28)	(2.4)
Infrastructure	0.364***			0.237***	0.012
	(3.52			(8.51	(0.78)
Real Eff. Ex. Rate	−0.099**				−0.039***
	(−2.04)				(−2.75)
Lag of log (Exports)		0.900***	0.913***	0.816***	0.985***
		(58.74)	(40.4)	(29.34)	(118.4)
R-square	0.342				
No. of groups		26	26	25	25
No. of Instruments		15	12	15	24
N	270	284	284	247	247

All explanatory variables are in relative terms, Standardized beta coefficients; t statistics in parentheses = "*$p<0.10$, **$p<0.05$, ***$p<0.01$"

4 Results and discussion

Preliminary analysis of data indicates that peace, economic size, market size, and infrastructure (all are in relative terms) have a positive impact on the volume of exports of Pakistan as shown by the correlation coefficients presented in Table 5 in the appendix. Besides, a scatter plot between Pakistan's exports and relative peace is presented in Figs. 1 and 2, which confirms a positive association between the two variables.[3]

The estimated coefficients of the transformed gravity model are reported in Table 1. We use log of Pakistan's export as a dependent variable to predict the impact of the promotion of peace in Pakistan relative to its trading partners on it. We reported beta (standardized) coefficients in the table that are achieved after standardizing the estimates of the regression that implies the variances of dependent and explanatory variables are equal to 1. Thus, the interpretation of beta coefficients refers to how many standard deviations in the dependent variable will occur because of one standard deviation change in each explanatory variable. Additionally, advocates of beta coefficients argue that the coefficients ignore the explanatory variable's scale of the unit to make comparison easy (for detail, see Kim et al., 1976; Greenland et al. 1991). We reported OLS results in column (1) of Table 1, which indicate a positive impact of peace on exports. All control variables are significant and have expected signs as per theory. But the reliability of the OLS results is questionable due to the plausible endogeneity between the variables, peace and exports. We used system GMM estimation technique to overcome the issue of endogeneity, and estimated coefficients are reported in columns (2–5) of Table 1. The estimated coefficient of the interest variable-peace remains positive and significant in all columns. The results reported in columns (2–4) indicate the sensitivity of the dependent variable with addition to the new control variables. So, the addition of economic size, market size and infrastructure do not affect the significance of the peace coefficient, and all three variables are also having a significant and positive impact on exports except economic size in column (4). Column (5) of the table adds all the covariates (control variables) and presents the more general results that are further discussed.

The estimated coefficient of peace shown in column (5) indicates that one standard deviation increase in peace in Pakistan (relative to its trading partner) increases the volume of Pakistan's exports by 0.036 standard deviations. This implies that reduction in inter-states conflicts (promotion of peace) significantly reduce the spending on military weapons and personals and provide leverage to the government to increase the budget for development and, hence, increase the potential for exports. Besides, reduction in military expenditure also leads to an increase in investment in human capital essential for the promotion of volume of exports. This stance is supported by Pollins (1989), reduction in interstates conflicts encourage diplomatic cooperation that increases the volume of bilateral trade. Additionally, literature has documented that terrorism may lead to changes in a country's consumption and production patterns because it directly affects tourism and shopping habits, and willingness to travel by public transport. An increase in terrorist's activity needs more security measures and strong security regulations that make the trade more expensive (Nitsch and Schumacher 2004), and the war discourages the trade and especially the volume of dyadic trade (Barbieri and Levy 1999). Similar findings are also reported by Barbieri (1996) and Anderton and Carter (2001). In the same stance, Mamoon and Mansoob (2008) predicted that a reduction in the conflicts between Pakistan and India will help to promote trade between the states.

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[3] For descriptive statistics see appendix Table 4.

Table 2 Results of high versus low shared trading partners in exports

Variable	Low share partners	High share partners
Peace	0.153**	0.197**
	(2.43)	(2.01)
Economic Size	0.027	0.591***
	(0.54)	(6.78)
Market Size	0.230***	0.185
	(4.15)	1.57
Real Effective Exchange Rate	−0.058	−0.247**
	(−1.03)	(−2.37)
Infrastructure	0.484***	0.394***
	(3.4)	(4.25)
N	204	66
R-square	0.201	0.646

All explanatory variables are in relative terms, Standardized beta coefficients; t statistics in parentheses

"*$p < 0.10$, ** $p < 0.05$, ***$p < 0.01$"

The coefficient of relative economic size indicates a direct relationship between the volume of exports and relative change in Pakistan's GDP to its trading partners. An increase in the output of Pakistan indicates more availability of goods and services for exports whereas a rise in the output of trading partners generates more demand for imports. Results are shown in column (5) indicate that one standard deviation increase in market demand encourages the volume of exports by 0.037 standard deviations. A similar increase in the population in the trading nation relative to Pakistan promotes the volume of exports by 0.022 standard deviation due to expansion in market size. Thus, an increase in economic size or market size encourages the volume of exports as documented the Brada and Mendez (1983).

The infrastructure expenditure is another key determinant that has a significant impact on international competitiveness because the quality of infrastructure determines the distribution and capacity of the logistics facilities in a country, which plays an essential role in designing the business strategies to boost the nation's share in the international market (Bensassi et al., 2015). The results of the study partially support this argument because the coefficient of infrastructure variable is significant and positive as per results shown in column (4), but insignificant in column (5). Park (2020) also reported a direct relationship between infrastructure and volume of exports. In the theoretical and empirical literature, it is advocated that depreciation/devaluation of domestic currency encourages exports and hurts imports. (Mundell, 1971; Dornbusch, 1973; Frenkel and Rodriguez, 1975). Kemal and Qadir (2005) documented a positive association between real exchange rate and export. This study investigated the impact of variations in the real effective exchange rate of trading countries relative to Pakistan on its exports. The estimates of the study indicate that depreciation of Pakistan's trading nation's currency relative to its currency by one standard deviation reduces the volume of exports of Pakistan by 0.039 standard deviation, which is consistent with previous literature (Upadhayaya et al. 1999). We have also explored the connection between exports and peace by disaggregating data into high and low shared countries in Pakistan's exports, and discussed in the next section.

4.1 Results of high versus low shared trading partner in exports

The study has also investigated the impact of peace on exports by classifying the trading partners into two groups: high share and low share countries based on the mean value of the exports share by country. The results of OLS for high share countries and low share countries are reported in Table 2. It is again confirmed that relative peace in Pakistan promotes its exports as indicated by the positive and significant coefficient for both high and low share trading partners in exports.

The effect of economic size is significant for high-share partners only. Suggesting that demand induced effect from a big economy and is consistent with our core findings and literature (Brada and Mendez, 1983). The market size is measured by the population which has a positive and significant effect on export for low-share export partners. The reason could be that they have a higher population compare to low-share partners which result in high demand for Pakistan's exports (demand-side effect). The effect of the real exchange rate is negative and significant for high share partners only. It suggests that depreciation of foreign currency relative to Pakistan's currency reduces the volume of exports as we have found in our full panel results of Table 1 and is consistent with the findings of Upadhayaya et al. (1999). The coefficients of infrastructure variable is significant and positive in both groups, which implies that the quality of transport infrastructure and logistics is an important determinant of comparative advantage, as predicted by Park (2020). Because the study has considered the transport infrastructure and logistics services as essential input factors in the supplying of goods abroad and the sourcing of intermediates.

5 Conclusion and implication

In this study, we try to examine the relationship between export and peace. In particular, we investigated the impact of peace in Pakistan relative to its exporting countries on the volume of exports. We used panel data on the exports of Pakistan and its 26 trading partners over the period 2007–2018. After controlling for economic size, market size, infrastructure, and real effective exchange rate, this study has the following results and contributions:

First, we find that peace (measured by the global peace index) is an important determinant of export growth in Pakistan. It suggests that reduction in interstates conflicts and war elements lower the military expenditures, which allows the government to increase the development budget and especially, for human capital, which is essential to promote export-oriented activities. From a policy perspective, the presence of peace builds the local and foreign investors' trust to invest in the export promotion projects.

Second, the relative economic size of the country, market size, and infrastructure positively affect the exports of Pakistan. The impact of economic size (measured by GDP) on exports is proportionally large as compared to market size and infrastructure. This supports the argument that an increase in trading partners-exporting countries' output generates more demand for imports. The results also indicate that a major proportion of Pakistan's exports is routed to either a specific region or a small number of countries. The depreciation of foreign currency relative to Pakistan's currency harms Pakistan's exports because of the price effect (exports become expensive for export trading partners).

Third, we also analyzed the effect of peace on exports by classifying the trading partners into high share and low share export partner groups. The effect of peace on export is positive and significant for both groups. However, the effect of economic size is strong and

significant for high-share partners only. It suggests that trade with big economies support domestic export because of the demand side effect. Concerning market size, which is based on population, is larger for low-share export partners who have a high population and again linked with the demand-side effect. The effect of the real exchange rate is negative and significant for high share partners only. It suggests that depreciation of foreign currency relative to Pakistan's currency reduces the volume of exports as predicted by our core model.

In sum, the findings of this study are highly relevant for developing countries like Pakistan which is facing internal and as well as external conflict. It provides a new direction of research by arguing that free trade and reduction in trade barriers are not the only remedies to promote export sectors. However, peace is an important determinant to lift export and attracts global trading partners in developing countries like Pakistan. Moreover, export promotion and peace not only help to increase trade flow but are also connected to the well-being of individuals.

From a policy perspective, it is important to focus on solving interstate conflicts and confrontations to maintain peace in the region. The export promotion will be an initial step that many enhance local as well as regional peace. For future work, it would be interesting to analyze such links between the nearest trading partners, such as Afghanistan, Bangladesh, China and India.

Appendix

See Tables 3, 4, 5, 6.

Table 3 Variable, definition, and data source

Variable	Definition	Data Source
Pakistan's total exports (US$ Thousand)	Log (exports)	https://wits.worldbank.org/
GDP-Trading Partners (GDP)	GDP (current US$)	https://databank.worldbank.org/
GDP-Pakistan (GDP-P)	GDP (current US$)	https://databank.worldbank.org/
Relative economic size (RES)	RES = GDP/GDP-P	
Population of trading partner (TP)	Population, Total	https://databank.worldbank.org/
Population of Pakistan (PK)	Population, Total	https://databank.worldbank.org/
Relative market size (RMS)	RMS = TP/PK	
GPI of trading partner (GPI)	Global peace Index	http://visionofhumanity.org/
GPI of Pakistan (GPI-P)	Global peace Index	http://visionofhumanity.org/
Relative peace (RP)	RP = GPI/GPI-P	
Infrastructure index of trading partner* (INF)	Infrastructure	
The infrastructure of Pakistan (INF-P)	Infrastructure	
Relative infrastructure (RIF)	RIF = INF/INF-P	
Real effective exchange rate of trading partner (REER)		https://databank.worldbank.org/
Real effective exchange rate of Pakistan (REER-P)		https://databank.worldbank.org/
Relative exchange rate (RER)	RER = REER/REER-P	

*The index for quality of overall infrastructure includes quality of all means of communications. This index includes the quality of infrastructure of road, railroads, ports, air transport, available airline seats, quality of electricity supply, mobile telephone subscribers, and fixed telephone lines. Global Competitiveness Report (2017)

Table 4 Descriptive statistics

Variable	Obs.	Mean	Std. Dev	Min	Max
Exports	312	12.65333	1.561169	6.41861	15.16448
R. Eco. Size	311	8.970918	15.97577	0.059917	95.00651
R. Peace	309	0.685383	0.146208	0.513844	1.357597
R. Market Size	312	0.890352	1.894885	0.00742	8.219675
R. Infrastructure	272	1.475843	0.344547	0.557985	2.171893
R. EER	297	1.030887	0.187175	0.578178	1.643757

Table 5 Correlation Coefficients Matrix

	Exports	R. Eco. Size	R. Peace	R. Market Size	R. Infrastructure	R. EER
Exports	1					
R. Eco. Size	0.4292	1				
R. Peace	0.166	−0.0085	1			
R. Market Size	0.2027	0.3882	0.196	1		
R. Infrastructure	0.401	0.1981	−0.3666	−0.296	1	
R. EER	−0.1453	−0.0412	0.2356	0.2137	−0.2959	1

Table 6 List of 26 Countries included in the sample

Afghanistan	Italy	Saudi Arabia
Bangladesh	Japan	Singapore
Belgium	Korea, Rep.	Spain
China	Kuwait	Sri Lanka
France	Malaysia	Turkey
Germany	Nepal	United Arab Emirates
India	Netherlands	United Kingdom
Indonesia	Oman	United States
Iran, Islamic Rep.	Qatar	

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