

# Dissecting the Impact of Violence on Trade Flows of South-Asian Countries: A Gravity Model Approach

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## Abstract

*Using an augmented gravity model, this paper dissects the impact of political violence on bilateral trade flows of South Asian countries. In particular, we explore violence-trade interplay by distinguishing between different types of inter-state and intra-state conflicts including militarized disputes, diplomatic crises, civil conflicts and terrorism and integrating robust measures on them into a unified empirical framework. The study compiles a dyadic panel dataset of selected countries of South Asia, viz. Bangladesh, India, Pakistan and Sri Lanka between 2003 and 2012 and estimate gravity equations using multiple fixed-effect methods that address omitted variable bias and heterogeneity among countries. Results show that militarized disputes and diplomatic crises between countries hurt trade. The estimates report that civil conflicts and terrorism restrict bilateral trade flows. Further, the study examines that inter-state disputes are more detrimental to trade than intra-state conflicts. Our disaggregated version of the gravity model also confirms these results. The findings of this paper reveal that violence restricts bilateral trade flows by worsening economic ties between countries.*

**Keywords:** Militarized disputes, Civil war, Terrorism, Trade flows, South Asia

**JEL Classification:** F14; F15; D74; O14

## 1. Introduction

Over the last few decades, the world has witnessed numerous instances of violent armed disputes, intense civil conflicts and vicious terrorist attacks. In fact, violence is a major threat to globalization today (Acemoglu & Yared, 2010). Violence decelerates economic activities by damaging infrastructure, stimulating unfriendliness among countries and deteriorating the business environment (Blomberg & Hess, 2006; D'Souza & Amponsah, 2013; Muhammad et al., 2018). Further, evidence reveals that violence imposes a high economic cost on countries (Smith, 2014) that has now escalated to 11.6 percent of global GDP or US\$1942 per person (GPI, 2021). Although the violence-trade nexus is established in existing literature, only a few studies simultaneously assess the effect of various forms of political violence on bilateral trade flows. Further, despite the presence of a variety of violent conflicts, the violence-trade interplay has not been well explored in the case of South Asia. Using an augmented gravity model, our paper simultaneously investigates the impact of various inter-state and intra-state conflicts including war, diplomatic crisis, civil conflicts and terrorism on trade flows of South Asian countries.

The case of South Asia is important in this regard. South Asia is the least integrated region as compared to other developing regions. For example, statistics show that the trade to GDP ratio in South Asia is 35.2 percent in 2020 compared to Sub-Saharan Africa's (SSA) 42.9 percent and East Asia and Pacific's 56.7 percent (WDI, 2020). Why the most populous region of the world is so poorly integrated? A possible reason may be the presence of political violence in the region. The global peace index explains that South Asia is the second-least peaceful region of the world following the MENA region (GPI, 2021). Decades of armed disputes, diplomatic crises, terrorism and civil conflicts in member states have made them highly vulnerable to political violence. Thus, an empirical investigation of the relationship between violence and trade in South Asia is critical.

A substantial body of literature identifies the channels through which violence deters trade. Ahsan and Iqbal (2020) find that political violence not only decreases the likelihood of a firm to export but also it

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decreases the export price because importers demand compensation for the risk of missed shipments. Glick and Taylor (2010) report that armed conflicts among states restrict trade directly by blocking the domestic transport routes and hardening the borders. Qureshi (2013) and Feldman and Sadeh (2018) investigate that violent conflicts in neighbouring countries can affect trade indirectly by extending uncertainty about trade and investment activities in the whole region. Further, civil conflicts increase transaction costs by damaging infrastructure, interrupting the production processes and increasing the likelihood of violent activists attacking consignments which makes traders adopt enhanced security measures, restricting the flow of bilateral trade (Bayer & Rupert, 2004; Martin et al., 2008; Rauschendorfer & Shepherd, 2021; Soares, 2006).

Besides, Collier (1999) examines that civil conflicts cause destruction of resources, disruption of social order and misallocation of foreign investment, decelerating overall economic growth. Cook (2014) argues that violence spreads fear, worry and anxiety in society causing the mortality rate to increase and overall life expectancy to decrease which in turn harms economic activities. Gupta et al. (2019) report that new and existing risks created by violent conflicts raise the cost of private agents' engagement in international business. Further, successful terrorist attacks also have an adverse effect on economic activities including international trade (Mirza & Verdier, 2014). For example, Blomberg et al. (2004) and De Sousa et al. (2018) find that, in a terrorism-hit territory, businesses ensure extended security measures and allocate plentiful resources to acquire counter-terrorism apparatus which increases overall trading costs and hurt bilateral trade flows.

The extant literature on the relationship between political violence and international trade can be classified into two broad strands. The first strand is focused on assessing the spillover effects of regional conflicts on trade flows of neighbouring countries. In this regard, Glick and Taylor (2010) argue that war generates negative externality by restricting trade with neutrals. Qureshi (2013) examines that regional conflicts have a significant negative spillover effect on trade of neighbouring states. Pharm and Doucouliagos (2017) find that the effect of terrorist activities in a country spillover to its neighbours restricting bilateral trade. Feldman and Sadeh (2018) argue that war reduces trade with enemy-friendly countries which are not directly involved. Pinar and Stengos (2021) report that higher civil conflicts and lower political stability in neighbouring countries decrease the likelihood of foreign investment in the host country. The other strand of relevant literature investigates the direct impact of violence on international trade. Our paper is related to this part of the literature.

Numerous studies find that violence originating from militarism and civil conflicts has a significant negative impact on trade. Pollins (1989) and Anderton and Carter (2001) examine that international conflicts and militarized disputes disrupt trade among countries. Blomberg and Hess (2006) assess the traditional and non-traditional distortionary costs of trade pertinent to internal and external conflicts identifying that the non-traditional cost is more harmful to trade and its presence is equivalent to a 30% tariff rate on trade. Martin, Mayer, and Theoning (2008) examine that globalization has reduced the possibility of multilateral conflicts, but at the same time, it has also decreased the trade dependence of a pair of countries. The study (2008) finds that mutual conflicts with the neighbouring states now observe low lost-the-trade cost that leads to increased regional conflicts and decreased bilateral trade. Glick and Taylor (2010) measure the direct and indirect cost of war on the volume of trade finding that warfare has a persistent negative impact on trade between belligerent states. Muhammad et al. (2013) study the eruption of violence and political instability during Kenya's presidential elections in 2007 and estimate its effect on Kenya's cut-flower exports to EU countries. The study (2013) finds that the EU's import of cut flowers, ahead of violence, fell to a level equivalent to 18.6 per cent of the tariff rate. Karam and Zaki (2016) adopt a comprehensive approach by using distinctive measures of war and conflicts to investigate the effect of violence on MENA region trade. They (2016) found the negative effect of war and civil conflicts to be equivalent to a 5% tariff on trade. Gupta et al. (2019) measure the effect of geopolitical risks as originating from militarized disputes, diplomatic crises and others on trade finding that geopolitical risks negatively affect bilateral trade flows. In a recent study, Rauschendorfer and Shepherd (2021) measure the effect of political violence on different types of trade

suggesting that security-related trade costs have a heterogeneous effect on international trade and that informal trade is more sensitive to civil conflicts.

Besides, existing literature reveals that terrorism, as a significant driver of political violence, adversely affects trade and investment decisions because terrorist activities spread panic, chaos and fear in the economy (De Sousa et al., 2018; Nitsch & Schumacher, 2004), as well as these incidents, create uncertainty about the overall business environment (Fратиanni & Kang, 2006; Gaibullov & Sandler, 2019). For instance, Nitsch and Schumacher (2004) measure the effect of terrorism and large scale violence on trade finding that doubling the incidents of terrorism decreases bilateral trade by 4%. Mirza and Verdier (2008) examine that transnational terrorism lowers international trade through three channels; Firstly, by increasing transaction costs, secondly by adopting and implementing counter-terrorism policies and finally, through terrorism's adverse effect on real GDP. In another study, Mirza and Verdier (2014) identify that terrorism affects trade by enhancing the cost of security measures. Constructing a model of trade costs arising from domestic and transnational terrorism, Bandyopadhyay et al. (2018) estimate the effect of terrorist activities on the trade volume of primary and manufactured commodities examining that domestic and transnational terrorism dampen overall trade of manufactured products. In a recent study, Meierrieks and Schneider (2021) find that terrorism restricts the scope of international economic policies, especially in a small country.

This paper estimates an augmented gravity model on a dyadic dataset of selected countries in South Asia, viz. Bangladesh, India, Pakistan and Sri Lanka over the period 2003-2012. The variables on different forms of political violence are classified into inter-state and intra-state conflicts. The inter-state conflicts are measured by militarized inter-state disputes and diplomatic crises between countries while the intra-state conflicts are assessed by measuring the presence of terrorism and civil conflicts in a country. Following extant literature on violence and trade (Bair & Bergstrand, 2009; Qureshi 2013), the gravity equation is estimated using multiple fixed-effect methods including country-fixed-effect (CFE), country-year fixed-effect (CYFE) and country-pair fixed-effect (CPFE) methods. We also investigate the relative impact of violence on trade at the country level. To this end, we estimate a disaggregated version of the gravity model for individual countries using the OLS method. The sensitivity of the results is also checked using different methods.

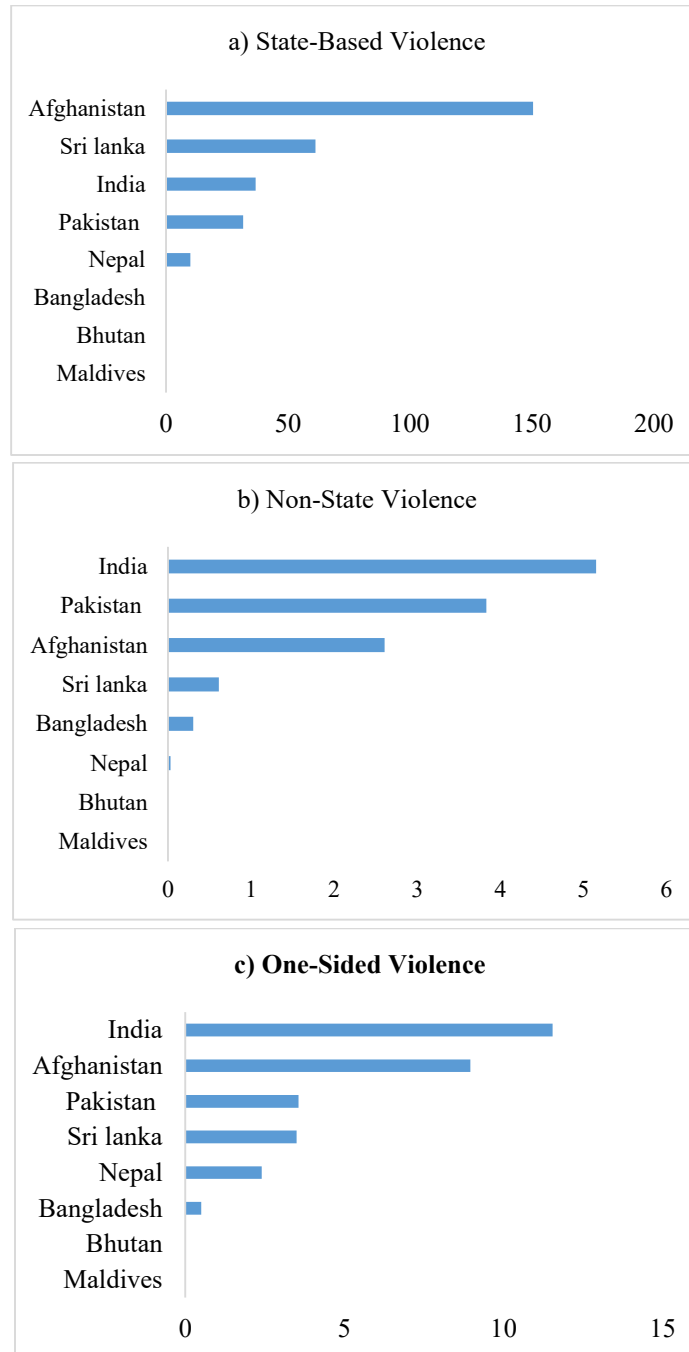
Our results show that violence restricts bilateral trade flows between South Asian countries. Interstate militarized disputes and diplomatic crises have a significant and negative impact on bilateral trade flow. In addition, terrorist activities and civil conflicts within states dampen trade. Further, we find that inter-state conflicts have a relatively greater detrimental effect on trade than intra-state conflicts. Our results are consistent with the findings of previous studies (Bayer & Rupert, 2004; De Sousa et al., 2018; Gaibullov & Sandler, 2019; Glick & Rose, 2002; Glick & Taylor, 2010; Karam & Zaki, 2016; Martin et al., 2008; Qureshi, 2013; Rauschendorfer & Shepherd, 2021). The contribution of this paper to the existing literature is twofold. First, the study explores the violence-trade interplay in South Asia. Previously, studies that link political violence to trade in the South Asian region are scarce despite the fact that the region has witnessed numerous instances of violent conflicts and it is one of the least integrated regions. Our study incorporates almost all types of political violence expanding within the South-Asian region. It increases our understanding of the relationship between violence and trade in less integrated developing countries. Second, we measure the relative impact of the different types of inter-state and intra-state conflicts on bilateral trade flows by integrating robust measures on them into a unified empirical framework. Most of the previous studies measure the separate effect of violence on trade.

The paper is organized as follows. The next section provides a brief overview of violence and trade in the South Asia region. Section 3 presents the empirical methodology and describes the construction of variables and data. Section 4 discusses the empirical results and section-5 provides the conclusion and policy implications.

## **2. An Overview of Political Violence, Trade Flows and Regional Integration in South-Asia**

South Asia is the most populous region of the world sharing nearly one-fifth of the global population. It is also among the least developed regions of the world (GPI, 2021). The possible reason may be the presence of different types of conflicts for decades.

**Figure 1. a) No. of deaths in state-based violence, 1989-2015. b) No of deaths in non-state violence, 1989-2015, and c) No of deaths in one-sided non-state violence.**



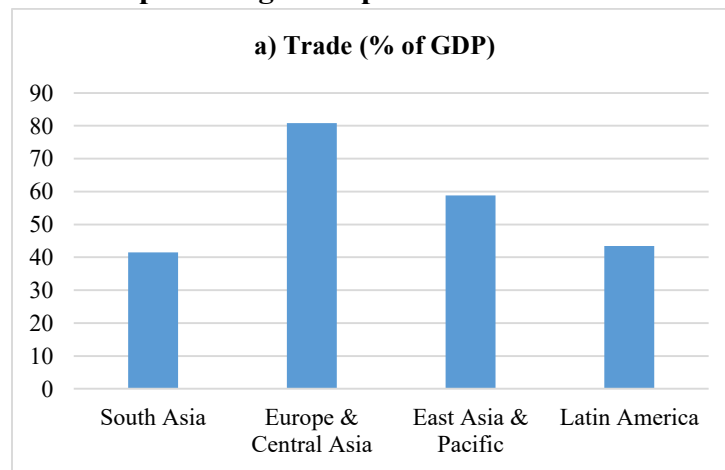
Source: Author's own calculation based on UCDP database.

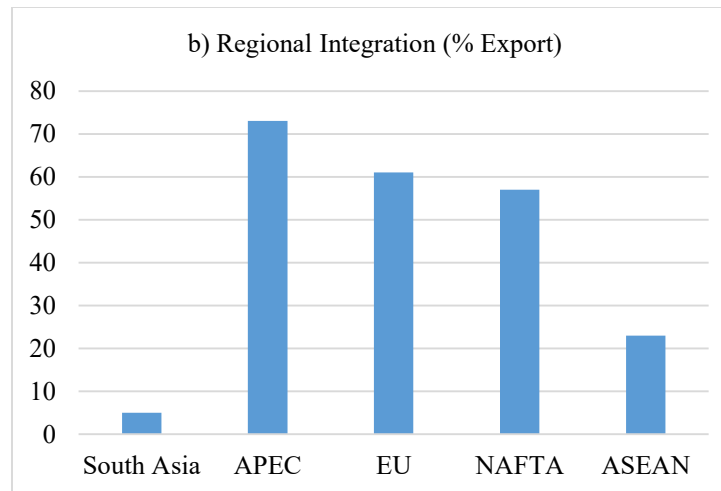
South-Asian countries are adversely affected by the intense waves of political violence. Figure 1, (a) to (c) records deaths that resulted in state-based violence, non-state violence and one-sided non-state violence in South Asian countries from 1989 to 2015. The following points discern easily from the given figure.

First, most of the violent conflicts have occurred in four countries including Afghanistan, India, Pakistan and Sri Lanka. These conflicts include longstanding warfare in Afghanistan and militarised conflicts between two major economies including Pakistan and India. Bangladesh and Sri Lanka have faced several episodes of political instability and civil war. Second, different South Asian countries face different types of conflicts. For example, Afghanistan has faced the highest state-based violence during the sample period. Figure 1a shows that 52 per cent of the total deaths from state-based violence in the region belong to Afghanistan. Indeed, the dominance of conflicts and violence has originated from continuing war in the country. Similarly, 21 per cent of deaths from state-based violence have been recorded in Sri Lanka. This can be linked to the civil unrest caused by the conflict between the Sri Lankan government and the Liberation Tigers of Tamil Eelam (LTTE), one of the longest civil wars in Asia. Further, India has seen the largest number of deaths in non-state violence and one-sided violence followed by Pakistan. Numbers reveal that India and Pakistan record 41 per cent and 30 per cent of deaths from non-state violence and 37 per cent and 11 per cent of deaths from one-sided violence in the region. In fact, India and Pakistan have had many episodes of armed conflicts, border tensions and the diplomatic crisis since independence in 1947. The territorial disputes between the two countries have led to war in 1948 and 1965 and limited armed conflicts in 1999. Bangladesh has witnessed relatively fewer incidents of civil conflicts and political instability. Third, countries including Maldives, Bhutan and Nepal are rarely involved in such types of violent conflicts. But these countries constitute a small proportion of GDP, population and the overall resource endowment of South Asia.

Different conflicts have imposed a high economic cost and have restricted trade and investment activities in the region. Figure-2a shows that the share of trade in the GDP is 41 percent in South Asia as compared to other developing regions such as 55 percent in Sub-Saharan Africa, 59 percent in East Asia and the Pacific and 81 per cent in Europe and Central Asia. It reveals that violence has inflicted the loss of welfare associated with trade.

**Figure 2. a) Inter-Regional Trade as a percentage of GDP, 2015. b) Regional Trade Integration as a percentage of export. 2015.**





Source: Author's calculation based on the data from World Development Indicators (WDI), database

Regional economic integration promotes peace and accelerates economic growth through the mechanism of conflict resolution among countries (Polachek, 1980). The charter of a regional body named the South Asian Association for Regional Cooperation (SAARC) was signed by member countries in 1985. The main objective of establishing SAARC was to strengthen ties between member states, promote peace in the region and initiate a joint effort for economic development. But this organisation has achieved a few of its desired objectives. Figure 2b shows that the ratio of regional trade integration as a percentage of total exports is the lowest in South Asia compared to the ratio in Asia-Pacific Economic Cooperation (APEC), European Union (EU), North American Free Trade Agreement (NAFTA) and Association of the Southeast Asian Nations (ASEAN). The conflicts between member states may cause economic disintegration in the region.

### 3. Methodology, Variables, and Data

#### 3.1. Empirical Methodology

The empirical analysis presented in this paper is based on the gravity model which draws on the work of Tinbergen (1962), Poyhonen (1963), Linnemann (1966), and Anderson (1979). Over the years, the theoretical and empirical improvements in the model specification have made it an essential tool that can efficiently predict the determinants of bilateral trade flows (Anderson and van Wincoop, 2001; Feenstra, 2002; McCallum, 1995; Silva and Tenreyro, 2011).

Our estimation equation takes the following form.

$$\begin{aligned} \ln EXP_{ij} = & \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln GDPpc_{it} + \beta_4 \ln GDPpc_{jt} + \beta_5 \ln DIST_{ij} \\ & + \beta_6 CONG_{ij} + \beta_7 COF\_LANG_{ij} + \beta_8 CM\_LANG_{ij} + \beta_9 COLONY_{ij} + \beta_{10} CCOL_{ij} + \beta_{11} PTA_{ij} \\ & + \beta_{12} MID_{ijt} + \beta_{13} INTCONF_{ijt} + \beta_{14} CIVCONF_{ijt} + \beta_{15} TERROR_{ijt} + \delta_{ij} + \lambda_t + \eta_{ijt} \dots \dots \dots (1) \end{aligned}$$

Where  $EXP_{ij}$  represents bilateral trade flow from country  $i$  to  $j$  at time  $t$ ,  $GDP_{it}$  and  $GDP_{jt}$  show GDPs of country  $i$  and  $j$  at time  $t$ ;  $GDPpc_{it}$  and  $GDPpc_{jt}$  denote GDP per capita of country  $i$  and  $j$  at time  $t$ ,  $DIST_{ij}$  measures the great circle distance between country  $i$  and  $j$ ;  $CONG_{ij}$ ,  $COF\_LANG_{ij}$ ,  $CM\_LANG_{ij}$  represent dummy variables which takes the value of 1 if the two countries share a common border and hold same official and major languages respectively;  $COLONY_{ij}$  and  $CCOL_{ij}$  represent dummy variables which take the value of 1 if the two countries have a similar colonial history or have common colonizer;  $PTA_{ijt}$  shows an intact preferential trading arrangement;  $INTCONF_{ijt}$  reveals a dummy variable which equals 1 if trading partners involved in some type of diplomatic crisis;  $CIVCONF_{ijt}$ ,  $TERROR_{ijt}$ ,  $MID_{ijt}$  represent categorical variables which measure the presence of civil conflicts, terrorism and militarized conflicts between countries,

respectively.  $\delta_{ij}$ , reflect country-pair specific effect  $\lambda_t$ , represent time-specific effect which is common for all countries and  $\eta_{ijt}$  reflect normally distributed error term. Subscripts i and j represent home and partner countries respectively.

Following extant literature, we estimate equation (1) using panel Fixed effect (FE) methods (Rose, 2002). For robustness and to deal with certain features of a dyadic dataset, we incorporate three types of fixed effects in the gravity equation. First, we tackle heterogeneity among countries by including a separate dummy for each country in equation (1) and call it the Country fixed effect (CFE) model. Second, Anderson and van Wincoop (2004) examine that the time dimension of panel data may cause omitted variable bias that can be removed by incorporating the country fixed effect for every year in the estimation equation. We also include the country fixed effects for each year in equation (1) and term it Country-Year Fixed Effect (CYFE) model. Third, Glick and Rose (2002) note that CFE and CYFE models do not resolve the problem of omitted variable bias in the dyadic dataset suggesting that country-pair specific fixed effects should also be incorporated in the estimation equation. Thus, we include a separate dummy variable for each country pair and name the model Country-Pair Specific Fixed Effect (CPFE) model. Thus, equation (1) is estimated using CFE, CYFE and CPFE methods.

### 3.2. Data and Variables

We collected bilateral trade data disaggregated at HS 2-digit product level for major exporting products of South Asian countries over the period 2003-2012. The selection of countries reveals the presence of political violence and the availability of data. Section 2 describes that, over the sample period, most of the violent conflicts have occurred in five countries including Afghanistan, India, Pakistan, Sri Lanka and Bangladesh. We find sufficient observations in data for all the mentioned countries except Afghanistan. The selection of the sample period is based on the fact that selected South Asian countries has witnessed relatively more intense violent conflicts in this period (As discussed in section 2 above). Thus, we restrict our analysis to the mentioned period to avoid selection bias.

#### 3.2.1. Measurement of Bilateral Trade

Specifying a robust measure of bilateral trade depends upon the methodology used in the study, availability of the data and the type of analysis. Following Karam and Zaki (2016), we use Exports ( $EXP_{ijkt}$ ) flow from the home country to the partner country as a measure of bilateral trade. Using this type of measure, which specifies the direction of trade flow from the source country to the destination country (e.g., Pakistan to Sri Lanka), has the advantage of avoiding the “Silver Medal Error” noted by Baldwin and Taglioni (2007). They (2007) examine that gravity theory suggests one-way trade, like exports flow of home country to its partner country specifying the exact direction of flow. The data on export flows are taken from the *UN Comtrade database*.

#### 3.2.2. Measurement of Political Violence

The construction of the variables which measure political violence is discussed below.

##### 3.2.2.1. Militarized interstate disputes (MIDs)

We collect data on *MIDs* from The Correlates of War (COW) project. In the COW project, militarized interstate disputes ( $MID_{ijt}$ ) are defined as the conflicts that involve threat, display or use of military force by one state toward another state or party. The *MIDs* variable used in this study is coded with fatality level ranging from 0 to 5 (0= no fatalities, 1= 1-25 deaths, 2= 26-100 deaths, 3= 101-250 deaths, 4= 251-500 deaths, 5=501-999 deaths). The  $MID_{ijt}$  variable is expected to have a negative sign.

##### 3.2.2.2. Terrorism

Global terrorism database (GTD) defines terrorism as “*the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation*”. The terrorism ( $TERROR_{ijt}$ ) variable in this paper is a categorical variable that is coded with terrorism presence levels ranging from 0 to 2 (0= terrorism not present, 1= terrorism present in one country, 2= terrorism present in both the trading partners). We collect data on terrorism from the Global

Terrorism Database (GTD) maintained by the University of Maryland. The  $TERROR_{ijt}$  variable is expected to have a negative sign.

### 3.2.2.3. Civil War

Civil war is defined as violent conflicts between a state and one or more non-state organized groups. The civil war ( $CIVCONF_{ijt}$ ) variable counts the intensity of civil conflicts within a state and ranges between 0 to 2 where 2 denotes the worst form of civil conflicts. Data on civil wars is taken from the Centre for Systematic Peace, Major Episodes of Political Violence dataset. The  $CIVCONF_{ijt}$  variable is expected to maintain a negative sign.

### 3.2.2.4. International Conflict

International conflicts are ( $INTCONF_{ijt}$ ) specific acts of states or non-state elements that tend to increase the likelihood of engaging the states in military hostilities. These conflicts inculcate unfriendliness and mutual distrust among states. The international conflict ( $INTCONF_{ijt}$ ) is a dummy variable that takes the value of one if both the trading partners face said conflict. The data of this variable is collected from the Centre for Systematic Peace, Major Episodes of Political Violence dataset. The  $INTCONF_{ijt}$  variable is expected to hurt trade.

### 3.2.3. Control Variables

This paper includes several gravity variables including GDPs of home ' $GDP_{jt}$ ' and partner country ' $GDP_{it}$ ', GDP per capita of home ' $GDPpc_{it}$ ' and partner country ' $GDPpc_{jt}$ ' and the great circle distance between two trading partners ' $DIST_{ij}$ '. Further, several control variables are also provided including sharing a common border ' $CONG_{ij}$ ', common official language ' $COF\_LANG_{ij}$ ', common majority language ' $CM\_LANG_{ij}$ ', colonial link ' $COLONY_{ij}$ ', common colonizer ' $CCOL_{ij}$ ' and signatory to a common preferential trading arrangement ' $PTA_{ijt}$ '. Data on GDPs and GDPs per capita is collected from the database of world development indicators (WDI). Data on Distance and remaining variables is taken from The 'Centre d'Études Prospectives et d'Informations Internationales' (CEPII) database. The description of the variables is provided in Table 1.

## 4. Results and Discussions

Drawing on the preceding discussion, we begin by estimating equation (1) using panel methods including CFE, CYFE and CPFE and the results are presented in Table 2 columns 1-3. For brevity, the estimated results of the CPFE method are discussed and then compared with the estimates of the CFE and CYFE methods. The coefficient estimates provided in column 3 show that the  $GDP$  and  $GDPpc$  of the trading partners  $i$  and  $j$ ,  $PTA$ , contiguity ( $CONG$ ), common language variables ( $COF\_LANG$ ,  $CM\_LANG$ ), colonial link ( $COLONY$ ) and common colonizer ( $CCOL$ ) variables have a significant positive effect on bilateral trade while the distance between countries ( $DIST$ ) have a significant negative impact on trade flows. This result confirms the basic proposition of the gravity model that trade is a positive function of the GDPs of trading countries and a negative function of the distance between them. The results are in line with the findings of previous studies including Nitsch and Schumacher, (2004), Blomberg and Hess (2006), Qureshi (2013), Feldman and Sadeh (2018), Gupta et al. (2019) and others.

As far the effect of different measures of political violence on trade, the estimated coefficient of the ' $MIDS$ ' variable show that a one scale point increase in the index of fatalities resulted in militarized interstate disputes decreases the volume of bilateral trade by 0.87 percent. It reveals that war is detrimental to trade and the economic cost of war between trading partners is substantial. In fact, militarized disputes lead to tightening the domestic security situation, hardening the borders and restricting the transportation of goods (Soares, 2006). Similarly, lack of mutual trust and unfriendliness cause the imposition of various traditional and non-traditional trade barriers (Qureshi, 2013). Besides, the coefficient estimate of the ' $INTCONF$ ' variable is significant and negative which indicates that the diplomatic conflicts of South-Asian countries with neighbours and other countries have restricted their trade potential. In terms of magnitude, trade partners' involvement in international disputes decreases trade by 0.93 percent. Indeed, international conflict makes belligerent states restrict the exchange of goods and services by imposing duties and trade restrictions



**Table 1. Description of variables**

Acronym	Variable Description	Scale Description	Data Source
$EXP_{ijk}$	Export of product k from country i to j	US\$.	UN Comtrade
$GDP_i$	Gross Domestic Product of country i	US\$.	WDI
$GDP_j$	Gross Domestic Product of country j	US\$.	WDI
$GDPpc_i$	GDP per capita of country i	US\$.	WDI
$GDPpc_j$	GDP per capita of country j	US\$.	WDI
$DIST_{ij}$	Distance between trading partners i and j	Kilo meters	Great Circle Distance from CEPII
$CONG_{ij}$	Contiguity	1, if both countries i and j share common border, 0 otherwise	CEPII
$COF\_LANG_{ij}$	Common Official Language	1, for common official language in country i and j, 0 otherwise	CEPII
$CM\_LANG_{ij}$	Common Majority Language	1, if a language is spoken by at least 9% of population in both countries i and j, 0 otherwise	CEPII
$COLONY_{ij}$	Colony	1, if trading partners i and j have some colonial links, 0 otherwise	CEPII
$CCOL_{ij}$	Common Colonizer	1 if countries i and j share common colonizer, 0 otherwise	CEPII
$PTA_{ij}$	Preferential Trading Arrangement	1 if countries i and j are under same regional trade agreement, 0 otherwise	CEPII
$INTCONF_{ijt}$	This variable measures trading partner's involvement in International conflict in time t	1 if countries i and j are involved in international conflict in time t, 0 otherwise	Major Episodes of Political Violence (MEPV)
$MID_{ijt}$	This variable records death in Militarized Interstate Disputes (MIDs)	0 None 1 1-25 deaths 2 26-100 deaths 3 101-250 deaths 4 251-500 deaths 5 501-999 deaths	Correlations of War (COW) project

$CIVCONF_{ijt}$	This variable measures the presence of civil conflicts in both or any of the trading partner i and j in time t	0, If none of the countries i and j have civil conflicts in time t 1, If only one country in the trading pair ij is inflicted by civil conflict in period t 2, If both the countries in the trading pair ij are inflicted by civil conflict in time t	Major Episodes of Political Violence (MEPV)
$TERROR_{ijt}$	This variable measures the happening of successful terrorist attacks for any given year of the sample period.	0, if none of the countries i and j face terrorist attacks in period t 1, if any of the countries in the pair ij face successful terrorist attack in period t 2, if both the countries in the pair ij face successful terrorist attack in period t.	Global Terrorism Database (GTD)

Source: Authors' own calculation

which result in the interruption of trade (Blomberg & Hess, 2006). These estimates of *MIDs* and *INTCONF* also reveal that inter-state conflicts are detrimental to trade

The estimated coefficient of the '*TERROR*' variable is negative and significant. It reveals that political violence as originated from terrorist activities adversely affects trade. In terms of magnitude, the coefficient estimates provided in Table 2 column 3 show that the occurrence of successful terrorist attacks in the home and partner countries reduces bilateral trade volume by 0.95 percent. The economic theory reveals that terrorism influences international trade by increasing transaction costs through adopting and implementing counter-terrorism policies and via its adverse effect on real GDP (Mirza and Verdier, 2008). Similarly, the estimated coefficient of the '*CIVCONF*' variable shows a negative and significant effect on trade. It explains that civil wars are harmful to exporting activities. Estimates show that the presence of civil conflicts within member countries restricts trade flows by 0.79 percent. Surely civil unrest creates anxiety, chaos and uncertainty in society, restricting private sector investment and international trade (Blomberg et al., 2004). The estimates of *TERROR* and *CIVCONF* variables confirm that intra-state conflicts have an adverse effect on trade.

Besides, we estimate equation (1) for all the countries in the sample separately. This is critical to assess the relative influence of political violence on trade volume at the country level. For this purpose, we estimate our disaggregated version of the gravity model for Bangladesh, India, Pakistan and Sri Lanka separately using the OLS method and the results are presented in Table-3. The empirical estimates provided in columns 1 to 4 show that inter-state, as well as intra-state conflicts, have a significant negative impact on the export volume of a country. It suggests that different forms of political violence affect the trade potential of nations. As for the magnitude of the effect of inter-state conflicts on trade, the estimated coefficient of '*MIDs*' variable reveals that a one scale point increase in the index of fatalities resulted in militarized interstate disputes of Bangladesh, India, Pakistan and Sri-Lanka restrict their trade volume by 0.32 percent, 0.99 percent, 0.57 percent and 0.77 percent respectively. Similarly, the estimated coefficient of the '*INTCONF*' variable indicates that the involvement of Bangladesh, India, Pakistan and Sri Lanka in a diplomatic crisis with the trading partners disrupts their trade volume by 0.12 percent, 0.60 percent, 0.90 percent and 0.57 percent respectively. .

**Table 2. Panel country fixed effect (FE), country-year fixed effect (CYFE) and Country-pair fixed effect (CPFE) estimates of the gravity model**

Regressors	1	2	3	4	5	6	7	8	9
	CFE	CYFE	CPFE	CFE	CYFE	CPFE	CFE	CYFE	CPFE
<i>lnGDP<sub>it</sub></i>	0.871*** (0.276)	0.783** (0.298)	0.602** (0.259)	0.328*** (0.046)	0.526*** (0.154)	0.738*** (0.126)	--	--	--
<i>lnGDP<sub>jt</sub></i>	0.122** (0.056)	0.769*** (0.132)	0.774** (0.356)	0.321* (0.189)	0.325* (0.178)	0.405*** (0.147)	0.972*** (0.142)	0.517*** (0.194)	0.861*** (0.159)
<i>lnGDP<sub>pcit</sub></i>	0.445*** (0.157)	0.969** (0.478)	0.412** (0.191)	--	--	--	--	--	--
<i>lnGDP<sub>pcjt</sub></i>	0.887*** (0.119)	0.253*** (0.061)	0.531*** (0.149)	--	--	--	0.378*** (0.146)	0.519*** (0.205)	0.194*** (0.066)
<i>DIST<sub>ij</sub></i>	-0.695* (0.396)	0.795*** (0.279)	-1.367*** (0.287)	1.384*** (0.135)	-1.225** (0.578)	1.224*** (0.315)	0.976*** (0.228)	-1.393*** (0.169)	1.412*** (0.178)
<i>MIDS<sub>ijt</sub></i>	-0.854*** (0.198)	0.876*** (0.178)	-0.865** (0.303)	0.932*** (0.143)	0.335*** (0.138)	-0.299** (0.139)	-0.450** (0.222)	-0.201* (0.120)	0.642*** (0.161)
<i>INTCONF<sub>ijt</sub></i>	-0.882 (0.667)	0.981*** (0.175)	-0.933*** (0.075)	-0.811** (0.358)	-0.985** (0.430)	-0.135 (0.179)	0.516*** (0.209)	0.171** (0.077)	0.608*** (0.133)
<i>TERROR<sub>ijt</sub></i>	-0.289 (0.247)	0.781*** (0.205)	-0.949*** (0.303)	0.939*** (0.149)	0.451*** (0.145)	-0.897* (0.499)	0.511*** (0.151)	0.739** (0.324)	0.367*** (0.136)
<i>CIVCONF<sub>ijt</sub></i>	-0.655*** (0.033)	-0.397** (0.191)	-0.794*** (0.299)	-0.612** (0.292)	0.963*** (0.298)	-0.5251* (0.314)	0.706*** (0.164)	-0.701*** (0.137)	-0.229 (0.145)
<i>PTA<sub>ij</sub></i>	0.849** (0.450)	0.632 (0.652)	0.447*** (0.145)	0.331** (0.138)	0.517*** (0.136)	0.519 (0.491)	0.300** (0.144)	0.490 (0.372)	0.884*** (0.353)
<i>CONG<sub>ij</sub></i>	0.873 (0.535)	0.827*** (0.052)	0.301 (0.341)	0.963*** (0.117)	0.602 (0.529)	0.938*** (0.311)	0.635** (0.271)	0.290*** (0.118)	0.639 (0.349)
<i>COF_LANG<sub>ij</sub></i>	0.755*** (0.174)	0.616*** (0.147)	0.966*** (0.316)	0.281** (0.137)	0.232 (0.182)	0.523*** (0.102)	0.388* (0.265)	0.499 (0.265)	0.931 (0.508)

<i>CM_LANG<sub>ij</sub></i>	0.634*** (0.180)	0.699** (0.154)	0.423 (0.256)	0.244* (0.144)	0.804 (0.618)	0.460** (0.210)	0.301* (0.151)	0.227* (0.162)	0.070* (0.426)
<i>COLONY<sub>ij</sub></i>	--	--	--	--	--	--	0.692* (0.394)	0.281* (0.147)	0.301 (0.184)
<i>CCOL<sub>ij</sub></i>	--	--	--	--	--	--	0.361*** (0.026)	0.859* (0.468)	0.479*** (0.145)
<i>N</i>	97841	97841	97841	97841	97841	97841	97841	97841	97841
<i>R2</i>	0.469	0.432	0.603	0.435	0.477	0.422	0.221	0.474	0.556

Note: The standard errors are presented in the parentheses. \*\*\*, \*\* and \* represent 1 per cent, 5 per cent and 10 per cent level of significance.

Further, given the results provided in Table 3, we can examine that the estimated coefficients of *MIDs* and *INTCONF* variables are relatively larger in magnitude in the case of India and Pakistan. It reveals that inter-state conflicts are relatively more harmful to the trade flows of these South-Asian countries.

The estimates on the intra-state conflicts depict that terrorism and civil conflicts hinder trade. For example, the estimated coefficient of the *TERROR* variable reports that the presence of terrorist activities in Bangladesh, India, Pakistan and Sri Lanka reduce their trade volume by 0.67 percent, 0.64 percent, 0.15 percent and 0.67 percent respectively. Further, the estimated value of the '*CIVCONF*' variable reveals that a one-point increase in the index of civil war in Bangladesh, India, Pakistan and Sri Lanka decreases their trade volume by 0.49 percent, 0.48 percent, 0.22 percent and 0.83 percent respectively. The results also report that intra-state conflicts have a relatively stronger negative impact on the trade volume of Bangladesh and Sri Lanka. Besides, The point estimates of the gravity-related variables including *GDP*, *PTA*, contiguity (*CONG*), common languages (*COF\_LANG*, *CM\_LANG*), colonial link (*COLONY*) and common colonizer (*CCOL*) variables show an expected positive impact on trade while the distance (*DIST*) measures the negative impact on export volume. The results of the disaggregated version of the gravity model also postulate that trade is a positive function of the GDPs of two trading partners and a negative function of the distance between them. Further, our results of the disaggregated version of the gravity model are in line with the panel estimates.

The following points can be discerned from the above results. First, all types of political violence discussed in this paper have a significant negative impact on bilateral trade. This result portrays that the economic benefit of a peaceful country is in utilizing its full trade potential and improving the welfare of the economic agents. Second, in the case of panel estimates, the estimated coefficients of *MIDs* and international conflict variables are either more significant or larger in magnitude than that of terrorism and civil war variables. It reveals that inter-state conflicts are relatively more detrimental to trade than intra-state conflicts. Our results of the disaggregated version of the gravity model also confirm that trade relations of India and Pakistan are relatively more severely affected by inter-state conflicts including militarized inter-state disputes and diplomatic crises and the trade potential of Bangladesh and Sri Lanka is relatively more adversely affected by civil conflicts and terrorist activities. Thus, countries can expand trade volume by sticking to different means of conflicts resolution. Third, our estimates show that trade is a positive function of the economic mass of countries such as GDPs and an inverse function of the distance between them. This result confirms the validity of the gravity model for international trade studies. Based on our findings, we argue that political violence has a similar negative impact on trade as it is in the case of distance. However, unlike geographical distance, this type of distance can be decreased by conflict resolution and by keeping eye on the economic cost of violence.

#### 4.1. Sensitivity Analysis

The validity of estimates is associated with consistency in different circumstances. A sensitivity analysis of panel estimates discussed above is conducted to check the robustness of our estimated results. For this purpose, we examine how the sign and magnitude of the estimated coefficients respond to changes in the estimation methods and model specification. First, the coefficient estimates of the CPFE method are compared with the estimated coefficients of CFE and CYFE methods provided in the first two columns of Table 2. These estimates are broadly consistent with the CPFE except for the coefficient of the '*PTA*' variable which becomes insignificant in the CYFE model. It reveals that our results are not sensitive to changes in estimation methods. Also, we check whether our estimates are robust to change in the specification of the estimation equation. To this end, we drop the '*GDP per capita*' variables of home and partner countries and re-estimated equation 1. The results are presented in columns 4 to 6 of Table 2. The sign and magnitude of the estimated coefficients witness no significant changes except the '*INTCONF*' and '*PTA*' variables which becomes insignificant in CPFE models. It confirms that our estimates are also consistent with the changes in model specification. Further, we again omitted the '*GDP*' and '*GDP per capita*' variables of the home country and included variables on *colonial links* and *common colonizer* and re-estimated equation 1.

Table 3. OLS estimates of the disaggregated version of the gravity model

Regressors	1	2	3	4	5	6	7	8	9	10	11	12
	BD	IND	PAK	SL	BD	IND	PAK	SL	BD	IND	PAK	SL
<i>lnGDP<sub>it</sub></i>	0.934*** (0.395)	0.931*** (0.362)	0.275*** (0.107)	0.824** (0.419)	0.458*** (0.073)	0.635*** (0.269)	0.903** (0.403)	0.317*** (0.066)	--	--	--	--
<i>lnGDP<sub>jt</sub></i>	0.242* (0.131)	0.863*** (0.199)	0.301 (0.187)	0.941*** (0.383)	0.744* (0.424)	0.695* (0.379)	0.418** (0.189)	0.385*** (0.161)	0.810*** (0.308)	0.644** (0.281)	0.395*** (0.061)	0.319 (0.198)
<i>lnGDPPc<sub>it</sub></i>	0.281* (0.144)	0.861 (0.737)	0.669*** (0.262)	0.853*** (0.088)	--	--	--	--	--	--	--	--
<i>lnGDPPc<sub>jt</sub></i>	0.553*** (0.172)	0.720*** (0.072)	0.472*** (0.197)	0.517* (0.304)	--	--	--	--	0.997*** (0.164)	0.219** (0.107)	0.169* (0.102)	0.784*** (0.278)
<i>DIST<sub>ij</sub></i>	-1.899*** (0.719)	-1.811*** (0.426)	-1.860*** (0.367)	-1.798** (0.794)	-1.109** (0.438)	-1.760* (0.973)	-1.669*** (0.262)	-1.555*** (0.304)	-1.482*** (0.365)	-1.255*** (0.209)	-1.355*** (0.304)	-1.389*** (0.525)
<i>MIDS<sub>ijt</sub></i>	-0.323* (0.169)	-0.999* (0.585)	-0.565*** (0.199)	-0.768*** (0.216)	-0.219 (0.196)	-0.856** (0.38)	-0.393* (0.200)	-0.871*** (0.328)	-0.386** (0.169)	-0.704*** (0.193)	-0.528*** (0.194)	-0.425*** (0.159)
<i>INTCONF<sub>ijt</sub></i>	-0.123* (0.074)	-0.605*** (0.225)	-0.905** (0.417)	-0.566*** (0.134)	0.154 (0.095)	-0.514* (0.262)	-0.253* (0.137)	-0.190** (0.088)	-0.905*** (0.242)	-0.498*** (0.172)	-0.403*** (0.145)	-0.561 (0.363)
<i>TERROR<sub>ijt</sub></i>	-0.673*** (0.275)	-0.642*** (0.176)	-0.151* (0.088)	-0.673*** (0.275)	-0.207* (0.118)	-0.908** (0.418)	-0.471*** (0.197)	-0.432*** (0.085)	-0.759** (0.352)	-0.321*** (0.059)	-0.877*** (0.284)	-0.482** (0.245)
<i>CIVCONF<sub>ijt</sub></i>	-0.494*** (0.108)	-0.478*** (0.072)	-0.223 (0.165)	-0.885*** (0.176)	-0.573** (0.277)	-0.339** (0.155)	-0.396** (0.194)	-0.480*** (0.173)	-0.452*** (0.146)	-0.607*** (0.168)	-0.673* (0.364)	-0.925** (0.406)
<i>PTA<sub>ij</sub></i>	0.847*** (0.119)	0.425*** (0.163)	0.162*** (0.027)	0.793*** (0.104)	0.393*** (0.081)	0.375*** (0.149)	0.124 (0.080)	0.623*** (0.318)	0.827* (0.482)	0.551*** (0.125)	0.701* (0.361)	0.924** (0.411)
<i>CONG<sub>ij</sub></i>	0.558*** (0.179)	0.195*** (0.016)	0.313* (0.168)	0.151* (0.083)	0.537*** (0.176)	0.226** (0.106)	0.319* (0.179)	0.882*** (0.288)	0.811*** (0.195)	0.489*** (0.169)	0.327** (0.158)	0.741 (0.568)
<i>COF_LANG<sub>i</sub></i>	0.915*** (0.357)	0.686*** (0.202)	0.241*** (0.098)	0.631*** (0.236)	0.812*** (0.268)	0.964** (0.484)	0.579** (0.260)	0.618*** (0.203)	0.963*** (0.302)	0.923*** (0.165)	0.697*** (0.227)	0.615*** (0.158)
<i>CM_LANG<sub>ij</sub></i>	0.439*** (0.145)	0.700** (0.284)	0.409*** (0.125)	0.341*** (0.105)	0.282* (0.159)	0.894*** (0.140)	0.723*** (0.233)	0.960*** (0.200)	0.255 (0.181)	0.255 (0.181)	0.731*** (0.205)	0.615*** (0.158)
<i>COLONY<sub>ij</sub></i>	--	--	--	--	--	--	--	--	0.438*** (0.174)	0.997*** (0.219)	0.429 (0.281)	0.455*** (0.143)
<i>CCOL<sub>ij</sub></i>	--	--	--	--	--	--	--	--	0.812*** (0.137)	0.377** (0.185)	0.893*** (0.362)	0.210*** (0.077)
<i>Constant</i>	0.987** (0.488)	0.229*** (0.069)	0.773*** (0.286)	0.842 (0.915)	2.408** (0.884)	1.518** (0.718)	1.263** (0.453)	1.415*** (0.261)	2.289** (1.099)	5.708*** (0.672)	5.405*** (2.349)	1.835* (1.073)
<i>R2</i>	0.515	0.371	0.581	0.630	0.692	0.202	0.226	0.673	0.423	0.689	0.563	0.510

BD= Bangladesh, IND=India, PAK=Pakistan, SL=Sri-Lanka.

Note: The standard errors are presented in parentheses. \*\*\*, \*\* and \* represent 1 percent, 5 percent and 10 percent levels of significance

Results provided in columns 7 to 9 of Table 2 fail to report any significant changes except the '*civil conflict*' and '*official language*' variables which become insignificant in the CPFE model. It once again confirms the validity of our estimates.

We also carried out a sensitivity analysis of OLS estimates by repeating the same procedure. To do this, we omitted the '*GDP per capita*' variables of countries *i* and *j*, re-estimated equation 1 and reported results in Table-1 (columns 5-8). The signs and magnitude of the estimated coefficients observe no significant changes except the '*INTCONF*' variable which changes its sign in the case of Bangladesh only and the '*PTA*' variable which becomes insignificant in the case of Pakistan only. It shows that our disaggregated estimates are also consistent with the changes in model specification. Further, we drop the '*GDP*' and '*GDP per capita*' variables of the home country and include the '*COLONY*' and '*CCOL*' variables in equation 1. The results presented in columns 9 to 12 of Table 3 show no significant changes in signs and magnitude of the estimated coefficients except the '*COLONY*' variable and '*CONG*' variable which becomes insignificant in the case of Pakistan Only. It reveals that our estimates are robust to several changes in the specification of equation 1.

## 5. Conclusion

Political violence substantially impacts international trade. The effect of political violence on trade involves multiple channels. On one hand, inter-state militarized disputes and diplomatic conflicts stimulate unfriendliness, mutual distrust and hostility among countries, leading to trade restrictions and embargoes. On the other hand, intra-state civil conflicts and terrorist activities adversely affect the domestic security situation, restricting the movement of goods and increasing transportation costs by blocking the transport routes and damaging the infrastructure including highways. Further, political violence causes deterioration of the business environment and stagnation of trade and investment activities. A substantial body of literature measures the effect of violence on trade. However, most of these studies separately measure the impact of the different forms of political violence on bilateral trade flows. The authors simultaneously incorporate different types of inter-state and intra-state conflicts into a unified framework to explore violence-trade interplay. Further, despite the presence of a variety of violent conflicts, the violence-trade interplay has not been well explored in the case of South Asia. This paper intends to investigate the impact of different types of conflicts including war, diplomatic crisis, civil conflicts and terrorism on trade flows of South Asian countries.

The study estimates an augmented gravity model on a dyadic dataset of selected South-Asian countries. The variables on different forms of violence are classified into inter-state and intra-state conflicts. The inter-state conflicts are measured by militarized inter-state disputes and diplomatic crises between countries while the intra-state conflicts are measured by calculating the presence of terrorism and civil conflicts in a country. Following extant literature on violence and trade (Bair & Bergtrand, 2009; Qureshi, 2013), the gravity equations are estimated using panel fixed-effect methods. Further, a disaggregated version of the gravity model is also estimated to check the country-level effect of violence on trade. Our results show that political violence significantly restricts bilateral trade flows of South-Asian countries. Inter-state militarized disputes and diplomatic crises have a significant and negative impact on bilateral trade flows. In addition, terrorist activities and civil conflicts within states adversely affect bilateral trade. Further, we find that inter-state conflicts have a relatively greater detrimental effect on trade than intra-state conflicts.

South Asia holds one-fifth of the world's population. A peaceful business environment can help domestic and foreign enterprises to take advantage of plentiful untapped business opportunities in such a large market. The region can also attract abundant private sector investment if mutual disputes are resolved, the conflict-led uncertainty associated with the business environment is eradicated and the economic interdependence of member countries is enhanced. This argument is also in line with the results of previous studies suggesting that deeper trade ties and mutual dependence of countries inhibit the onset of conflicts and their escalation to violence (Polachek, 1980; Martin et al., 2008; Russett, 2010; Goldsmith, 2013). Besides, by employing an effective conflict resolution mechanism, South Asian countries can lead a joint effort to remove non-traditional trade barriers and exploit the benefit of the endowment of almost unlimited cheap labour. It can also help establish the capability of performing assembly trade operations as maintained by the Newly Industrialized Economies (NIEs) of the ASEAN

region in the early stages of industrialization. Further, deepening regional economic integration and liberalizing investment flows are necessary to promote peace and accelerate economic activities. In addition, the role of a competent body that can engage South-Asian countries in peacemaking is inevitable. Although SAARC was established to strengthen economic ties between member countries, it has not succeeded to promote peace and mutual trust in the region. For example, many of the Organization's proposed projects such as 'South Asia Preferential Trading Arrangement (SAPTA)' signed in 1993, 'South Asian Development Fund' and 'South Asian Food Reserve' are not yet operationalized. Although, SAARC have some favourable projects on its credit such as 'The Regional Convention on Suppression of Terrorism, 'SAARC Agriculture Information Centre' at Dhaka and 'SAARC Audio Visual Exchange program (SAVE)'. Referring to the remarks of the prime minister of Bhutan in the 16<sup>th</sup> summit of SAARC held at Thimphu, Bhutan on 28-29 April 2010, SAARC needs deeper conflict resolution than just functioning as "a talk shop". India and Pakistan, being two major economies of South Asia, can play a vital role to promote peace and harmony among member countries and embarking on a collective effort for economic development.

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