Michael F. Harsch, Tyler Y. Headley, and Maximilian M. Meduna, "Do Incentives Matter? Resilience and Reliability of Force Deployments to UN Peacekeeping Operations," Working Paper, October 2019.

Online Appendix

I. Tables

Table A.1. *UN Troop Contributing Countries by Group.*

Troop-contributing countries included in the Western group

Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States of America.

Troop-contributing countries included in the non-Western group

Civil War: Algeria, Bangladesh, Bosnia-Herzegovina, Burundi, Cambodia, Cameroon, Chad, China, Colombia, Congo-Brazzaville, Côte d'Ivoire, Djibouti, Democratic Republic of the Congo, Egypt, El Salvador, Ethiopia, Georgia, Guatemala, Guinea, Guinea-Bissau, India, Indonesia, Iran, Jordan, Kenya, Lesotho, Liberia, Libya, Malaysia, Mali, Mauritania, Mexico, Moldova, Mozambique, Myanmar, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Peru, Philippines, Russia, Rwanda, Senegal, Serbia, Sierra Leone, Sri Lanka, Tajikistan, Thailand, Trinidad and Tobago, Uganda, Ukraine, Venezuela, Yemen.

Low GDP: Albania, Armenia, Benin, Bhutan, Bolivia, Burkina Faso, Cape Verde, Gambia, Ghana, Guyana, Honduras, Kyrgyzstan, Madagascar, Malawi, Mongolia, Morocco, Paraguay, Tanzania, Timor-Leste, Togo, Tunisia, Vanuatu, Vietnam, Zambia, Zimbabwe.

Mid/High GDP: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belarus, Botswana, Brazil, Brunei, Chile, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Fiji, Gabon, Jamaica, Kazakhstan, Kuwait, Macedonia, Montenegro, Namibia, Palau, Qatar, Saudi Arabia, Singapore, South Africa, Suriname, United Arab Emirates, Uruguay.

Notes: Western group: did not experience civil war in the period from 1990–2017; average GDP per capita of more than 2,000 U.S. dollars from 1990–2016; EU and/or NATO members (until the sixth round of NATO enlargement in 2009) or close US allies. Non-Western do not meet one or more of these criteria. Turkey is a borderline case due to internal conflict. Given Turkey's NATO membership since 1952, however, we include it in the group of Western countries.

Sources: UN DPKO / IPI Peacekeeping Database; UCDP / PRIO; World Bank.

Table A.2. *Selected Operations Led by Regional Organizations, 1991–2017.*

Organization	Country	Acronym / Name
NATO	Afghanistan	ISAF/RSM
	Bosnia and Herzegovina	IFOR/SFOR
	Kosovo	KFOR
	Macedonia	xFOR, Operation Amber Fox, Operation Essential Harvest, Operation Allied Harmony
EU	Bosnia and Herzegovina	EUFOR Althea
	Central African Republic	EUFOR RCA, EUFOR Tchad/RCA, EUTM RCA
	DR Congo	Operation Artemis, EUFOR RD Congo
	Macedonia	EUFOR Concordia
	Mali	EUTM Mali
	Mediterranean Sea	EUNAVFOR MED / Operation Sophia
	Somalia	EUNAVFOR / Operation Atalanta, EUTM Somalia
AU	Burundi	AMIB
	Central African Republic	MISCA
	Comoros	AMISEC, MAES
	Côte d'Ivoire	ECOMICI
	Guinea-Bissau	ECOMOG, ECOMIB
ECOWAS	Liberia	ECOMOG, ECOMIL
	Mali	AFISMA
	Regional*	AU-led RTF
	Sierra Leone	ECOMOG
	Somalia	AMISOM
	Sudan	AMIS
	The Gambia	ECOMIG
CIS	Georgia	CIS Georgia
	Tajikistan	CCPFT (CPF)

Source: SIPRI.

*Uganda, South Sudan, DR Congo, Central African Republic.

Table A.3. *Gap Analysis: Sample of Missions.*

Selected Major UN Peacekeeping Operations, 1990–2017 (in chronological order of authorization)

Acronym	Country	Mission start	Mission end	Max deployment	Fatalities
UNIFIL	Lebanon	Mar 78	*ongoing*	13,539	127
UNIKOM	Iraq/Kuwait	Apr 91	Oct 03	1,183	18
UNPROFOR	Croatia/Bosnia	Feb 92	Dec 95	39,025	213
UNTAC	Cambodia	Feb 92	Sep 93	15,555	82
ONUMOZ	Mozambique	Dec 92	Dec 94	7,218	26
UNOSOM II	Somalia	Mar 93	Mar 95	28,559	160
UNMIH/UNSMIH	Haiti	Sep 93	July 97	6,091	9
UNAMIR I/ UNAMIR II	Rwanda	Oct 93	Mar 96	7,651	27
UNAVEM III/MONUA	Angola	Feb 95	Jun 97	7,054	63
UNPREDEP	Macedonia	Mar 95	Feb 99	1,203	4
UNTAES	Croatia	Jan 96	Jan 98	5,104	11
MINURCA	CAR	Apr 98	Feb 00	1,488	2
UNAMSIL	Sierra Leone	Oct 99	Dec 05	17,388	192
UNTAET/UNMISET	Timor-Leste	Oct 99	May 05	8,582	47
MONUC/MONUSCO	DR Congo	Nov 99	*ongoing*	20,078	253
UNMEE	Eritrea/Ethiopia	Jul 00	Jul 08	4,209	20
UNMIL	Liberia	Sep 03	Mar 18	15,070	190
UNOCI	Côte d'Ivoire	Apr 04	Jun 17	9,618	135
MINUSTAH	Haiti	Jun 04	Oct 17	8,930	181
ONUB	Burundi	Jun 04	Dec 06	5,568	24
UNMIS/UNMISS	Sudan/S-Sudan	Mar 05	*ongoing*	12,969	96
UNAMID	Sudan	Dec 07	*ongoing*	18,096	218
MINURCAT	Chad	Sep 07	Dec 10	3,555	9
UNISFA	Sudan	Jun 11	*ongoing*	4,545	19
MINUSMA	Mali	Apr 13	*ongoing*	11,969	49
MINUSCA	CAR	Apr 14	*ongoing*	10,683	2

Notes: Missions are *ongoing* if they remained in place by 12/2017; data on fatalities covers the period 11/1990–06/2015. A major peacekeeping operation has 1,000+ military personnel and is deployed for a period of 1+years; subsequent missions in the same country are treated as one continuous deployment. We exclude operations that either lack clearly defined deployment ceilings (UNFICYP), or were designed for troop withdrawal rather than deployment (MONUA; UNMISET; UNTMIH). Due to missing or insufficient data on ceilings, we only partially include UNIKOM (02/1993–10/2003) and UNIFIL (since 08/2006).

Table A.4. *Descriptive Statistics: Missions, 1990–2017.*

	Total sample (Nov 1990 - Dec 2017)		
	Mean	Min	Max
No. of missions (total)	83	–	–
No. of missions (per month)	8.82 (2.21)	1	11
Average mission duration (months)	112 (138.2)	12	326
Average mission size (troops)	6,220 (2,531)	1,531	10,417
No. of unique contributors	96 (23)	37	128
Average deployment gap	0.13 (0.06)	0	0.36
Average share of non-Western troops	0.76 (0.19)	0.36	0.95
No. of observations (months)	326	–	–

Notes: Monthly averages across all missions. Standard deviations in parentheses. Deployment gap is calculated based on a subsample of missions used in the gap analysis.

Table A.5. *Casualty Tolerance: Total Group Fatalities.*

|	*Dependent variable:* ΔPK_t^{CG}				
	Western group			**Non-Western group**	
	Model 1	Model 2	Model 3	Model 4	Model 5
Fatalities$_{(t-1)}^{CG}$	20.427 (27.628)	22.865 (27.153)	1.056 (24.332)	20.551 (14.480)	21.989 (13.851)
Fatalities$_{(t-2)}^{CG}$	−11.657 (40.145)	−15.869 (41.429)	−30.881 (39.658)	8.611 (11.862)	12.689 (11.819)
Fatalities$_{(t-3)}^{CG}$	5.906 (19.533)	6.624 (19.532)	−4.581 (18.363)	34.545** (15.183)	35.276* (14.611)
Fatalities$_{(t-4)}^{CG}$	3.783 (23.981)	4.541 (24.728)	−9.981 (21.559)	−15.603 (16.135)	−17.634 (16.074)
Fatalities$_{(t-5)}^{CG}$	−30.202** (13.704)	−25.365** (12.721)	−36.765** (15.007)	−9.962 (14.569)	−11.316 (14.935)
Fatalities$_{(t-6)}^{CG}$	−51.113 (37.235)	−45.686 (36.578)	−52.303 (35.277)	−38.524** (19.334)	−36.261* (19.299)
Fatalities$_{(t-7)}^{CG}$	−40.586** (16.385)	−41.995** (16.504)	−39.039*** (14.121)	−1.398 (13.602)	−0.912 (13.434)
$\Delta Authorization_t$	0.047*** (0.017)	0.041*** (0.015)	0.033** (0.015)	0.059*** (0.018)	0.050*** (0.018)
$\Delta Unique_t$	–	109.7** (52.197)	80.773 (50.341)	–	171.9** (68.642)
ΔROT_t^{CG}	–	−0.003 (0.002)	−0.005 (0.004)	–	− 0.092** (0.042)
Break (Sep. 1995)	–	–	−1140.466*** (357.3)	–	–
Trend	−2.485**	− 2.269**	0.130	0.475	0.668
Cons	601.7**	527.8**	1249.0***	199.7	103.3
R^2-adj.	0.585	0.592	0.626	0.052	0.078
N	289	289	289	289	289

Notes: The period of investigation is 11/1990–06/2015. Heteroskedasticity and autocorrelation robust standard errors in parentheses. CG stands for country group, where $CG = \{$West, non-West$\}$
*$p < .10$.
**$p < .05$.
***$p < .01$.

II. Figures
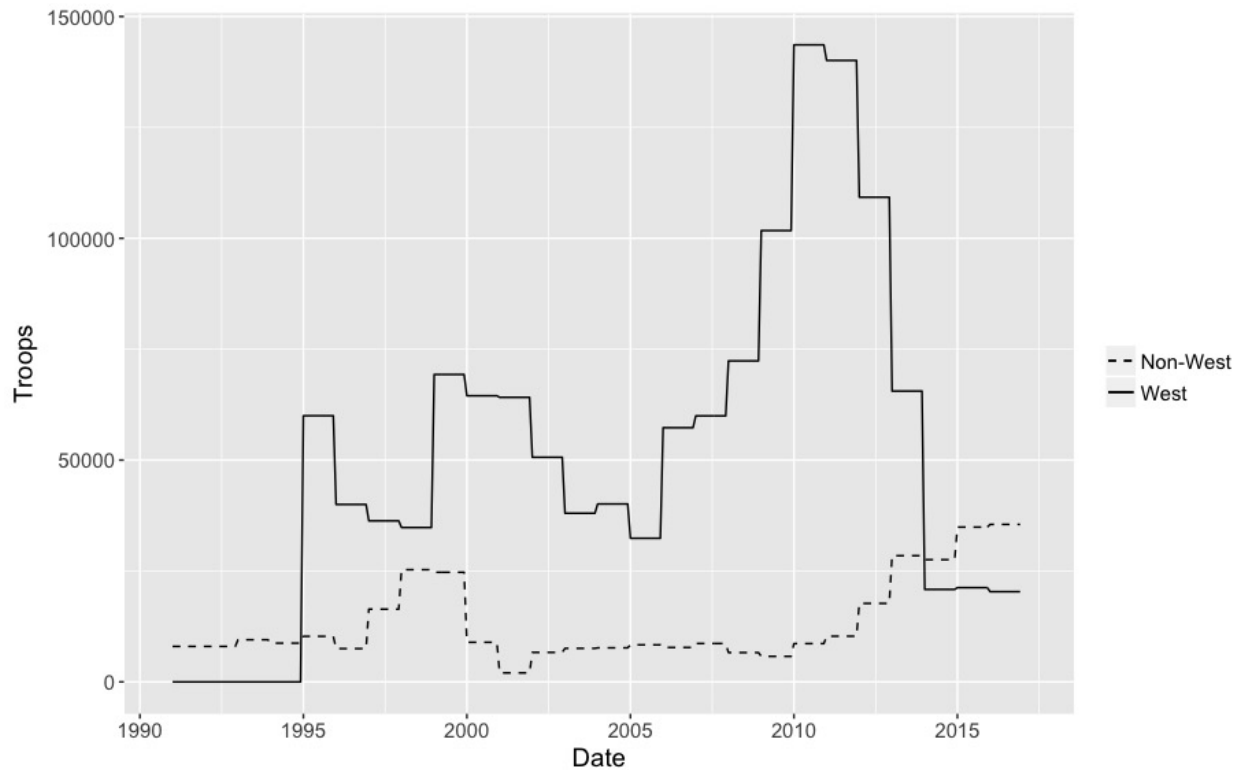
Notes: Western deployments include peace operations led by major *Western* regional organizations, specifically NATO and the EU. Non-Western deployments include peace operations led by major *non-Western* regional organizations, specifically the AU, ECOWAS, and CIS. The dataset starts in 1991.

Source: SIPRI.

Figure A.1. *Troops deployed to missions by regional organizations, 1991-2017.*
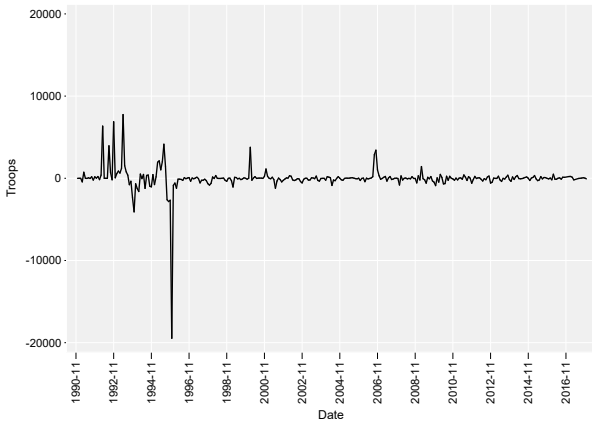
(a) *Western group*
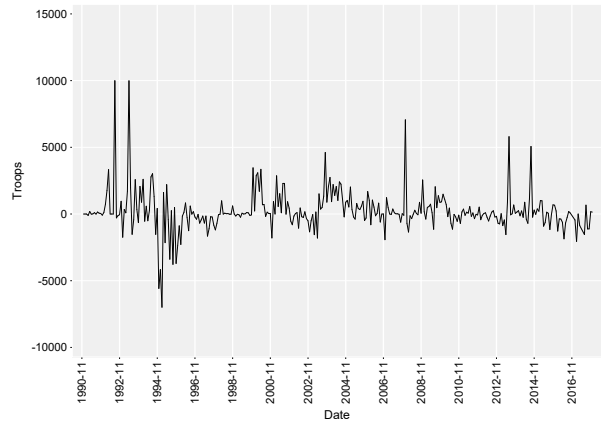
(b) *Non-Western group*
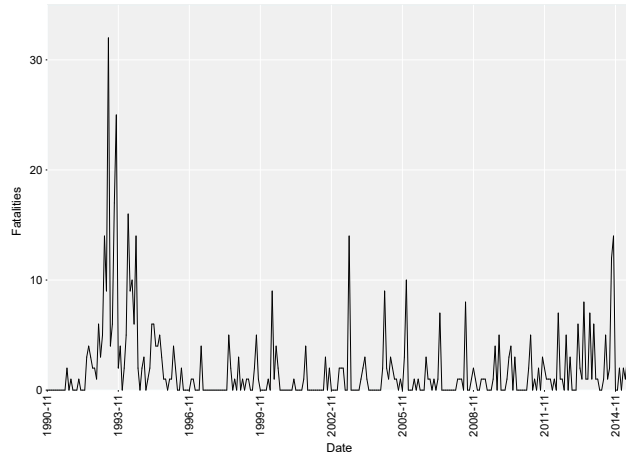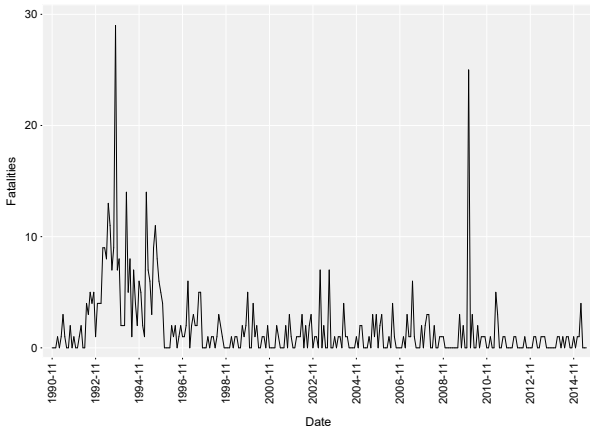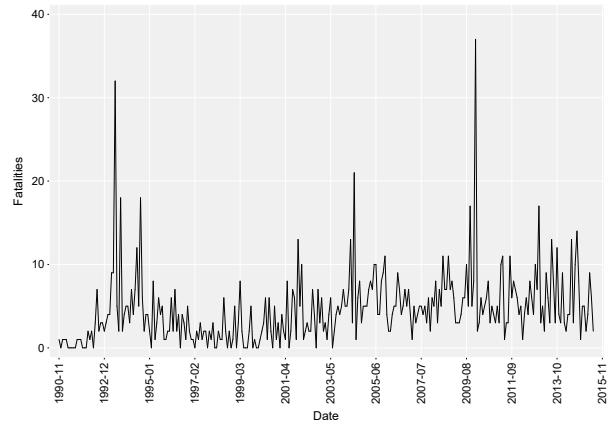
Figure A.2. *Change in deployment.*

Figure A.3. *Total malicious fatalities.*

(a) *Western group*

(b) *Non-Western group*

Figure A.4. *Group fatalities (all causes).*

III. Data

Peacekeeping deployments (PK_t^{CG})

We use the International Peace Institute (IPI) Peacekeeping Database for monthly deployment numbers (available at: <http://www.providingforpeacekeeping.org/contributions>. Accessed on July 5, 2019). This database draws from archival UN records and is regularly updated based on reports by the DPKO. In a small number of cases, we correct obvious errors in the IPI database by consulting the original UN spreadsheets.

Peacekeeping fatalities ($Fatalities_t$)

We rely on Henke's dataset, which contains declassified UN DPKO data on monthly peacekeeping fatalities up to June 2015 (Henke 2017). In our sample, we include all categories of fatalities (malicious acts, accidents, illness, and other), incurred by all types of peacekeeping personnel (military, military observers, police, international and local civilians). For the sake of analytic clarity, we exclude one small category of fatalities: local civilian personnel from countries which do not deploy military personnel to peacekeeping operations. One example would be a Haitian civilian killed while working for MINUSTAH. As Haiti does not send troops to peacekeeping operations, its nationals are not part of a group of contributors and their death may have no or a weaker effect on contributing countries.

Authorized troop ceilings ($Authorization_t$)

We create a new dataset on troop ceilings, which contains the monthly number of military personnel authorized by the UNSC for all major peacekeeping missions in the period from 1990–2017. The dataset draws on a variety of UN documents, in particular reports of the UN Secretary-General and budget documents released by the UN General Assembly.

It is important to note that prior to 1998, the UNSC generally saw reaching full deployment as an aspirational goal and did not invest significant political capital in member states' compliance. This changed in the second half of the 1990s, when a growing group of scholars, diplomats and UN officials began to argue that insufficient resources were an important reason for the failures of the peacekeeping missions in Somalia, Rwanda, and Bosnia (see Feil 1998; Jett 1999; Jones 1999). They urged the P-5 to "take steps to prevent gaps from occurring between the authorized size of the operation and the situation in the field," and "place diplomatic pressure on other member states to convince them to contribute" (Bratt 1997, 54).

Today, troop ceilings result from the UN's mission planning and force generation procedure, which heavily relies on technical assessments of the situation in the host country. The UN's formal mission planning process begins with the deployment of a Technical Assessment Mission to the field. Its findings inform a report of the UN Secretary-General to the UNSC. The Council then passes a resolution authorizing the deployment, which typically includes the troop ceilings suggested by the Secretary-General's report. DPKO subsequently sends *notes verbales* to request troop contributions. Based on recommendations from the DKPO Office of Military Affairs, the UN Under-Secretary-General for Peacekeeping Operations finally decides on which pledges to accept (Smith and Boutellis 2013).

Deployment rate (DR_t)

The deployment rate is the ratio of authorized troops over total deployment. To calculate the deployment rate, we draw from our dataset on troop ceilings and from the IPI Peacekeeping Database. The data used

to compile Figure 5 and estimate the results shown in Table 2 starts in January 1998 when troop ceilings became more meaningful.

Troop deployments by regional organizations (ROT_t^{CG})

Annual figures for deployment by regional organizations are from the Stockholm International Peace Research Institute's (SIPRI) Yearbooks (for 1991–1999) and Multilateral Peace Operations Database (for 2000-2017).

IV. Empirical Strategy

Stationarity

All variables used for estimating the empirical models of casualty tolerance and the deployment gap are stationary. To check the stationarity of the time series, we use the Augmented Dickey-Fuller (ADF) test (with drift and trend when necessary) and a more powerful version, the ADF-GLS test. According to the tests, in the casualty tolerance analysis, the deployments by the Western (PK_t^W) and the non-Western (PK_t^{NW}) country group, troop ceilings $(Authorization_t)$, the number of unique contributors (UC_t), and the troop deployments to regional organizations $(ROT_t^W$ and $ROT_t^{NW})$ are $I(1)$ processes. These variables are non-stationary in levels but stationary in the first differences. Fatalities incurred by the Western $(Fatalities_t^W)$ and the non-Western group $(Fatalities_t^{NW})$ and total malicious fatalities in both groups are trend-stationary. In the gap model, the deployment rate (DR_t) and the share of non-Western troops $(Share_t^{NW})$ are trend-stationary.

Lag length

In equation (1), we select the number of lags (or the order of the DL model) based on F-statistics and two information criteria—the Akaike information criterion (AIC) and the Bayes information criterion (BIC). We first estimate the model with 12 lags (one year). We then re-estimate it on a fixed sample, removing one lag at a time, and thereby generate values for the F-test, the AIC, and the BIC. As the two information criteria indicate a different number of lags (BIC yields a model with very few lags, likely underestimating the appropriate number of lags), we select the model's specification based on the F-statistics and AIC, which both suggest seven months for Western countries. We repeat the selection procedure separately for non-Western countries, and the tests point to six months as the optimal number of lags for the non-Western model. However, to ensure comparability between the two groups, we use seven lags in all models.

Outliers

The data on Western peacekeeping deployments (first difference) contains one significant outlier (see Figure A.2a). In December 1995, Western deployments drop by 19,465 soldiers. This sharp decline can be attributed to the termination of the UNPROFOR peacekeeping mission, whose number of peacekeepers decreased from 22,024 (Nov. 1995) to 2,433 (Dec. 1995). This decrease is extreme, compared to the time series mean value of -1.97 and its standard deviation equal to 1469. When estimating the empirical model for the casualty tolerance of the Western group, we account for the outlier by including an impulse variable with the value "1" for the month of December 1995, and "0" for all other periods.

The data on non-Western deployments (first difference) contains two outliers (see Figure A.2b). In August 1992 and May 1993, the number of forces deployed by this group jumped by approximately 10,000 troops compared to the preceding month. The August 1992 outlier can be attributed to the rapid growth of two large missions, UNTAC and UNPROFOR, which were established earlier that year. In May 1993, we can observe a significant increase of UNOSOM II. In the estimation of the non-Western group's casualty tolerance, we account for these outliers by including two impulse variables.

Structural break

The empirical model for estimating the casualty tolerance of the Western country group contains a structural break. We employ the Supremum Wald test for a structural break with unknown break date to obtain the break date which is determined as September 1995. To account for the break in the model, we introduce a break indicator, which equals "0" during the period from 11/1990–09/1995, and "1" from 10/1995–06/2015. This allows us to account for the break in the model's intercept.

Serial correlation

We test the presence of serial correlation in the error term using Durbin-Watson d statistics. The values of Durbin-Watson statistics for specifications (3) and (5) in Table 1 are equal to 1.745 and 1.665 respectively. As the values are not equal to 2, we reject the null hypothesis of no first-order serial correlation in errors. We use the Newly-West variance estimator to obtain heteroscedasticity and serial correlation consistent standard errors. Following Stock and Watson (2011) we assume a moderate degree of serial correlation and determine the values of the truncation parameter as $0.75N^{1/3}$, where N is the total number of observations. In our case, the value of the truncation parameter is set to 5.