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Fiscal Consequences of
Armed Conflict and Terrorism in
Low- and Middle-Income Countries

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Abstract

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

This paper analyses the fiscal effects of armed conflict and terrorism on low- and middle-income countries. An analysis of 22 conflict episodes shows that armed conflict is associated with lower growth and higher inflation, and has adverse effects on tax revenues and investment. It also leads to higher government spending on defense, but this tends to be at the expense of macroeconomic stability rather than at the cost of lower spending on education and health. Our econometric estimates are consistent with the hypothesis that conflict and terrorism have a significant negative impact on growth through changes in the composition of government spending. On the revenue side, the fiscal accounts are affected only through reduced real economic activity. Thus there is potential for a sizable "peace dividend" for countries that are able to resolve conflict and terrorism.

Contents

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I. INTRODUCTION

Contrary to expectations, the end of the Cold War has not been a harbinger of peace. There has been a proliferation of armed conflicts around the world over the past dozen years. In particular, terrorist groups have become increasingly sophisticated, daring, and destructive. More than 4 million people are estimated to have perished in violent conflicts between 1989 and 2000, and 37 million people have been displaced as refugees, either inside or outside their countries (World Bank, 2000). In 2000, there were 25 major armed conflicts around the world, of which 23 were intrastate conflicts (*SIPRI Yearbook 2001*).[3] International terrorist attacks increased from an average of about 342 a year between 1995 and 1999 to 387 a year between 2000 and 2001.[4] Most of the armed conflicts and terrorist activities have taken place in low- and middle-income countries. Between 1996 and 2000, almost 70 percent of the major armed conflicts, more than 20 percent of all international terrorist attacks, and over 70 percent of all casualties due to such attacks, took place in Asia and Africa.

Armed conflict and prolonged terrorist activities can strongly influence the revenues and expenditures of countries, and in turn affect their economic growth. Although armed conflict and terrorism are often treated as distinct phenomena, experience from different parts of the world shows that there is a close link between the two. This paper analyzes the effects of armed conflict and terrorism on fiscal balances and economic growth in low- and middle-income countries.

The remainder of this paper is structured as follows. Section II provides a brief overview of the literature, followed in Section III by a description of the channels through which armed conflict and terrorism can affect the fiscal accounts and economic growth. Section IV sets out the methodology for the empirical analyses presented in the paper. Section V compares the evolution of various macroeconomic variables and socioeconomic indicators before, after, and during 22 episodes of armed conflict in a number of low- and middle-income countries. Section VI estimates an integrated system of equations for real per capita income growth, government revenue, and government spending, to highlight the main channels through which armed conflict and terrorism affect the fiscal accounts. Section VII concludes.

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[3] The Stockholm International Peace Research Institute (SIPRI) publishes a yearly review of armaments, disarmament, and international security. A major armed conflict is defined in the *SIPRI Yearbook 2000* as "a contested incompatibility that concerns government and/or territory over which the use of armed force between the military forces of two parties, of which at least one is the government of a state, has resulted in *at least 1000 battle-related deaths* over the duration of the conflict." There is no consensus regarding how terrorism should be defined. Appendix I lists some of the common characterizations of terrorism.

[4] Data on terrorist activities and casualties are drawn from a report prepared by the U.S. Department of State (2002).

II. REVIEW OF THE LITERATURE

Several studies have assessed the economic costs of armed conflicts.[5] Richardson and Samarasinghe (1991) estimate that the total accumulated economic cost of the armed conflict in Sri Lanka in the five years between 1983 and 1988 was about $4.2 billion, or 68 percent of Sri Lanka's GDP in 1988. Arunatilake, Jayasuriya, and Kelegama (2000) perform a similar exercise for a longer period and estimate that the conflict between 1983 and 1996 cost Sri Lanka about twice the country's 1996 GDP. In a similar vein, several empirical studies, based on different techniques, approaches, and data, have found an inverse relationship between different measures of political instability and violence on the one hand, and growth or investment on the other (Veneiris and Gupta, 1986; Barro, 1991; Alesina and Perotti, 1993 and 1996; Alesina and others, 1996; and Rodrik, 1999).[6]

Addison, Chowdhury, and Murshed (2002) conclude that conflict can (1) adversely affect the process of financial deepening by undermining confidence in the domestic currency due to fear of inflation and depreciation; (2) encourage the movement of funds away from productive assets (bank deposits, capital) to nonproductive assets (gold); and (3) affect the regulation and supervision of the financial system. Their model, applied to 79 countries, shows that conflict significantly reduces financial development, and that the negative effect increases as conflict intensifies.

Prolonged terrorist activities, like armed conflict, also lower growth, both directly and indirectly. Abadie and Gardeazabal (2001) find that after the outbreak of terrorism in the 1970s, per capita GDP in the Basque region of Spain declined by about 10 percent relative to a "synthetic" control region, and that this gap widened in response to spikes in terrorist activity. Some studies have empirically assessed the impact of terrorism on tourism, both domestic and regional, and have found the expected negative effect (Drakos and Kutan, 2001; Enders and Sandler, 1991; and Enders, Sandler, and Parise, 1992). For example, in a study covering Greece, Israel, and Turkey, and using Italy as a "control variable," Drakos and Kutan (2001) found that the intensity (measured by number of casualties) of terrorist incidents has significant domestic and cross-country effects on the market shares of the affected countries, and that there are significant contagion effects from terrorism within the region.

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[5] Over and above the economic costs, prolonged armed conflicts can impose significant social and political costs that are difficult to estimate. For example, it is not possible to quantify the intangible costs of violence and insecurity, the human suffering and trauma, the breakdown in law and order, the animosity and mistrust that are created among warring parties, and the adverse effects of the reduced stock of health and education endowments on the long-run growth prospects of a country.

[6] Alesina and Perotti (1993), for example, use an index based on the number of politically motivated assassinations, coups, and deaths in cases of domestic mass violence to capture the degree of sociopolitical instability. They find that an increase in instability due to entrenched and rising income inequality lowered investment and hurt growth in a sample of 70 countries over the period 1960–85.

Terrorist threats raise the transaction costs of doing business and trade. Nitsch, Berlin, and Schumacher (2002) show that terrorist acts and large-scale violence adversely affected bilateral trade flows for more than 200 countries for the period 1960–93. A doubling of the number of terrorist incidents is associated with a decrease in bilateral trade by about 6 percent. Moreover, additional security measures put in place to deter terrorist attacks can impede the flow of goods and services. Walkenhorst and Dihel (2002) estimate the global welfare losses due to tighter security precautions which have been put in place following the attacks of September 11, 2001 at about $75 billion.

III. FISCAL EFFECTS OF ARMED CONFLICT AND TERRORISM: POTENTIAL CHANNELS

Armed conflict and terrorism can affect the fiscal accounts by disrupting economic activities, eroding the tax base, lowering the efficiency of tax administration, and distorting the composition of public spending. Tax receipts, for example, vary with the health of the economy. Economic downturns due to insecurity and violence can lead to a decline in tax revenues. Beyond their effects on real activity, armed conflict and terrorism (especially if prolonged) can destroy part of the tax base (through the destruction of business firms, for example) and weaken the efficiency of tax administration. For example, Ndikumana (2001) notes that, following the outbreak of armed conflict in two countries in Africa, not only did the tax base collapse, but tax administration was also hampered. With the return of peace and the resumption of normal production in one of the two countries, tax revenues recovered progressively, and by 1998 exceeded the preconflict level.

Military expenditures typically increase in response to conflict and terrorism, and tend to remain high even after cessation of violence.[7] Higher spending for security can also affect the composition of public spending by decreasing outlays for education, health, and other productive items. Moreover, the destruction of physical infrastructure and human capital due to violence, and the indirect effects on trade, tourism, and business confidence, all weaken the fiscal position and adversely affect economic growth, as noted earlier.

Shieh, Lai, and Chang (2002) illustrate the channels through which defense spending can affect the long-run sustainable growth rate and find both negative and positive effects. First, there is a "crowding out effect," whereby an increase in defense expenditures by the government reduces the resources available to the economy for private investment and for public spending on sectors that have a strong and positive impact on growth. Second, there is a "spin-off" effect from the positive supply-side spillover effects of defense expenditure on the nondefense sectors of the economy. This effect is likely to be small in low- and middle-income conflict-affected countries, since the majority of defense spending tends to be on imported armaments. Third, there is a "resource mobilization" effect on savings and

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[7] In Sri Lanka, for example, between 1983 and 1996, defense spending increased from 1.4 percent to 6 percent as a share of GDP, and from 4.4 percent to 21.6 percent as a share of total government spending (Arunatilake, Jayasuriya, and Kelegama, 2001).

investment: defense spending provides both internal and external security, and hence, boosts private savings and investment and attracts foreign investment. This has a positive effect on growth.[8]

Previous empirical studies by Benoit (1978) and others have suggested that defense spending has a positive effect on economic growth in less-developed countries. However, more recent empirical research shows that cutting military spending fosters economic growth (Arora and Bayoumi, 1993; Bayoumi, Hewitt, and Schiff, 1993; and Knight, Loayza and Villanueva, 1996). These papers argue that lower military spending can encourage growth by increasing capital formation and improving the efficiency with which resources are utilized in the economy. Cessation of conflict and terrorism can result in a "peace dividend," releasing fiscal resources to be used for lowering deficit, reducing taxes, or raising the allocation for spending in social sectors.[9]

IV. EMPIRICAL METHODOLOGY

The empirical analysis in this paper is based on two approaches.

The first approach assesses the impact of armed conflict *within* conflict-affected countries, by examining the evolution of macrofiscal and socioeconomic variables before, after, and during 22 episodes of conflict in 20 low- and middle-income countries.[10] The sample includes those episodes of armed conflict that either began or were ongoing in 1985 or later, and which ended by 1999, based on SIPRI's definition of major armed conflicts.[11]

SIPRI draws data on armed conflicts from the Uppsala Conflict Data Project of the Department of Peace and Conflict Research, Uppsala University, Sweden. The Uppsala Conflict Data Project divides armed conflicts into the following three categories based on the level of casualties:

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[8] This effect is likely to be highly nonlinear: up to a certain basic level of spending on defense, there is a positive impact on savings and investment, but after this threshold is passed, higher government spending on defense is unlikely to promote further private sector savings and investment.

[9] Conflict and violence can itself be affected by the perceived inequities in the distribution of the tax burden and in the pattern of public spending (Addison and Murshed, 2001a).

[10] Because of the problems of defining terrorism and of the sensitivity involved in classifying countries as victims or as perpetrators of terrorism, the preconflict, conflict and postconflict analysis is restricted only to countries that have experienced armed conflicts as defined by SIPRI. See Appendix II.

[11] See footnote 3 for the definition of armed conflict used in this paper. Appendix II lists the sample countries for this as well as for the subsequent econometric analysis.

- Minor armed conflict: At least 25 battle-related deaths a year and fewer than 1,000 battle-related deaths during the course of the conflict.

- Intermediate armed conflict: At least 25 battle-related deaths a year and an accumulated total of at least 1,000 deaths, but fewer than 1,000 in any given year.

- War: At least 1,000 battle-related deaths a year.

SIPRI's characterization of a major armed conflict covers the two most severe levels of conflict, that is, "intermediate" armed conflict and war (Gleditsch and others, 2001). This paper does not include "minor" armed conflicts, since these would not have *measurable* effects on the fiscal accounts and the economic growth of the affected countries.

One shortcoming of the SIPRI index is that it applies an absolute criterion for the number of battle-related deaths. Thus, a country with a large population will be classified as being in conflict even though the number of deaths may be small relative to its population. Moreover, the number of battle-related deaths may not adequately capture the economic impact of armed conflict; it is possible that a number of sporadic, low-intensity incidents affecting mainly the local population will have a different impact on business and consumer confidence and international perception of risk in the country concerned than a single dramatic event affecting mainly the tourist sector or key sectors linked to foreign trade. Despite these drawbacks, the SIPRI index is broadly consistent with the conflict index produced by the Heidelberg Institute for International Conflict Research (HIIK). [12]

The second approach followed compares the economic consequences of armed conflict and terrorism *across* countries by estimating an integrated system of equations for real per capita income growth, government revenue, and government spending. The International Country Risk Guide (ICRG) ratings on internal conflict are used as a proxy for the *combined risk from terrorism and conflict*.[13] The ICRG ratings provide an overall assessment of violence in a country due to civil war, terrorism, and civil disorder, and the actual or potential impact on governance. The highest rating is given to those countries "...where there is no armed opposition to the government and the government does not indulge in arbitrary violence,

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[12] Unlike SIPRI, the Heidelberg Institute does not consider a cut-off level of 1,000 conflict-related deaths to classify a country as being affected by conflict. It defines conflict broadly as "the clashing of overlapping interests (positional differences) around national values and issues (independence, self-determination, borders and territory, access to or distribution of domestic or international power); the conflict has to be of some duration and magnitude of at least two parties (states, groups of states, organizations, or organized groups) that are determined to pursue their interests and win their case."

[13] Since more than 90 percent of all major armed conflicts since 1990 have been internal (SIPRI Annual Yearbooks), only the ICRG internal conflict rating is used in the econometric estimation. The ICRG ratings are compiled by a U.S.-based consultancy service, the Political Risk Services Group. Details are available via the Internet: http://www.prsgroup.com/index.html

direct or indirect, against its own people." The lowest rating is given to a country embroiled in an ongoing civil war and/or facing terrorist attacks. Given the difficulty of reaching a consensus on a universally acceptable definition of terrorism as well as of measuring terrorist activities, separate risk ratings for terrorism are not available (see Appendix I). One advantage of the ICRG ratings is that they provide ratings of risk due to internal conflict and terrorism for a wide range of countries, and not just for those which have had major armed conflicts as defined by SIPRI. [14] The SIPRI index of armed conflicts (proportion of each five-year period during which there were armed conflicts) is used to check the robustness of the results. The SIPRI index has been used in other empirical studies, such as Davoodi, and others (2001).

V. MACROECONOMIC AND FISCAL VARIABLES AND SOCIOECONOMIC INDICATORS: PRECONFLICT, CONFLICT, AND POSTCONFLICT PERIODS

The results from comparing the conflict, preconflict, and postconflict phases of 22 episodes of armed conflicts in lower- and middle-income countries are presented in Figures 1–5 and Table 1. The data on real GDP are consistent with the hypothesis of a significant pickup in growth in the immediate postconflict years. There is a dramatic pickup in inflation during the conflict period, followed by a significant decline in the immediate postconflict period (see Figures 1 and 2). The data show a notable increase in the share of gross fixed-capital formation to GDP in the immediate postconflict years, particularly in the private sector (see Figure 3).

Figures 4–5 show the evolution of fiscal variables over the preconflict, conflict and postconflict periods. Due to data constraints, government revenue and foreign grants are used as a proxy for government revenue.[15] The available data for the sample of countries show that the share of government revenue in GDP tends to fall during the conflict period, and to pick up somewhat in the immediate postconflict period. On the expenditure side, there appears to be a significant increase in government expenditure and net lending as a percent of GDP during the conflict period compared with the preconflict period, followed by a notable decline in the immediate postconflict period. In particular, the available data suggest high government spending on defense during the conflict period and in the period immediately

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[14] Where ICRG internal conflict ratings are available for the corresponding episodes of the conflict, preconflict, and postconflict analysis (for 14 of the 20 countries), there is a broad match between low ICRG ratings (of about 8 or less) and countries that have been classified as conflict-affected by SIPRI and HIIK. The average ICRG internal conflict score for these 14 countries is 3.7 between 1984 and 1989, 6.4 between 1990 and 1994, and 8.2 between 1995 and 1999.

[15] Grants, on average, are much lower than revenue. For example, for a sample of 31 low-income countries with programs supported by the IMF since 1999, grants were only 3.5 percent of GDP, compared with revenue of about 18 percent of GDP (Gupta and others, 2002).
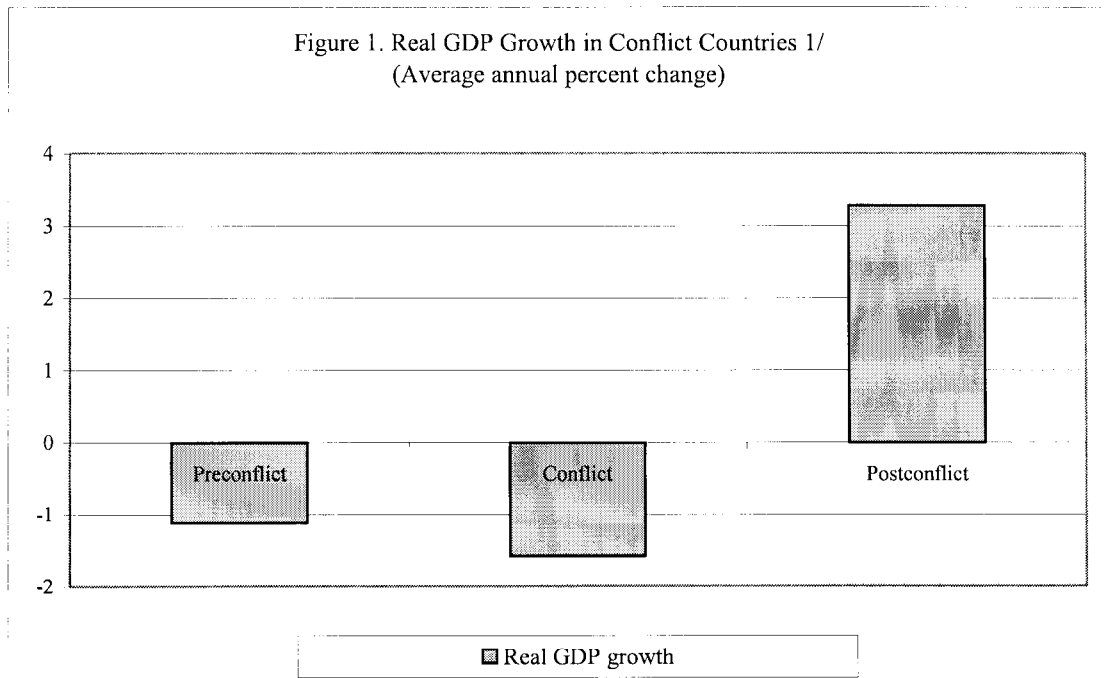
Figure 1. Real GDP Growth in Conflict Countries 1/
(Average annual percent change)

☐ Real GDP growth

Sources: IMF, *World Economic Outlook;* World Bank, *World Development Indicators 2001*; and IMF staff calculations.
1/ Based on a sample of 12 countries. The real GDP per capita growth corresponding to the preconflict, conflict, and postconflict periods are -3.7, -3.5, and 1.2 percent per annum, respectively.
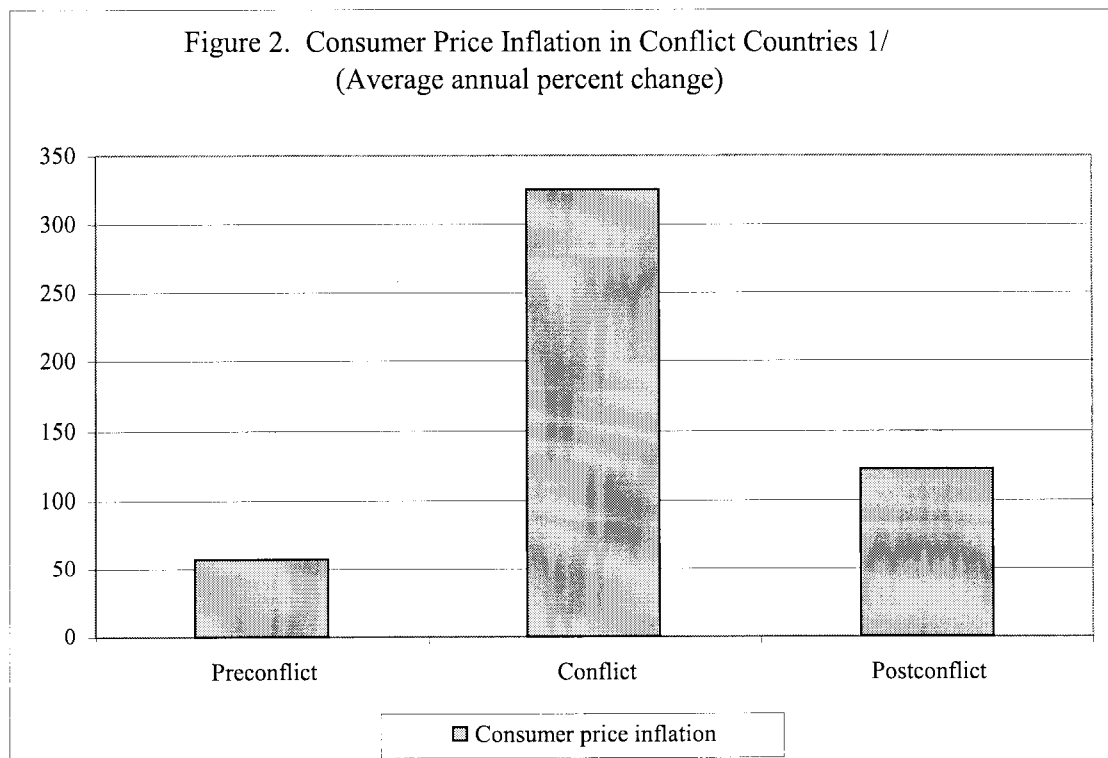
Figure 2. Consumer Price Inflation in Conflict Countries 1/
(Average annual percent change)

☐ Consumer price inflation

Sources: IMF, *World Economic Outlook;* World Bank, *World Development Indicators 2001*; and IMF staff calculations.
1/ Based on a sample of 9 countries.
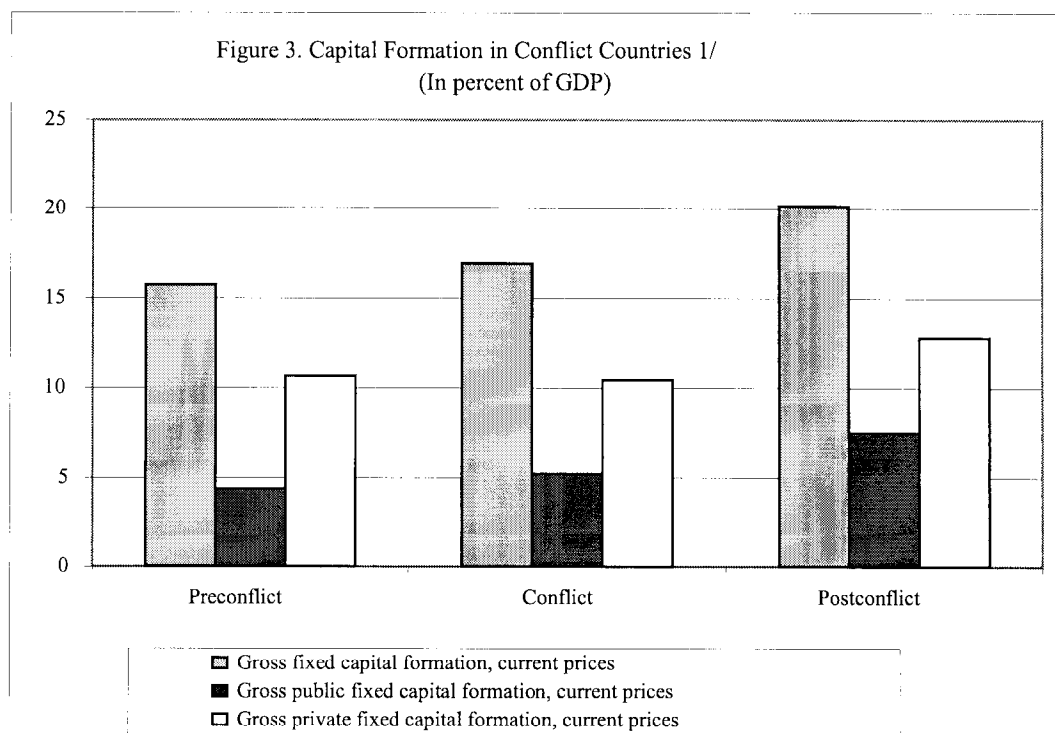
Figure 3. Capital Formation in Conflict Countries 1/
(In percent of GDP)

Gross fixed capital formation, current prices
Gross public fixed capital formation, current prices
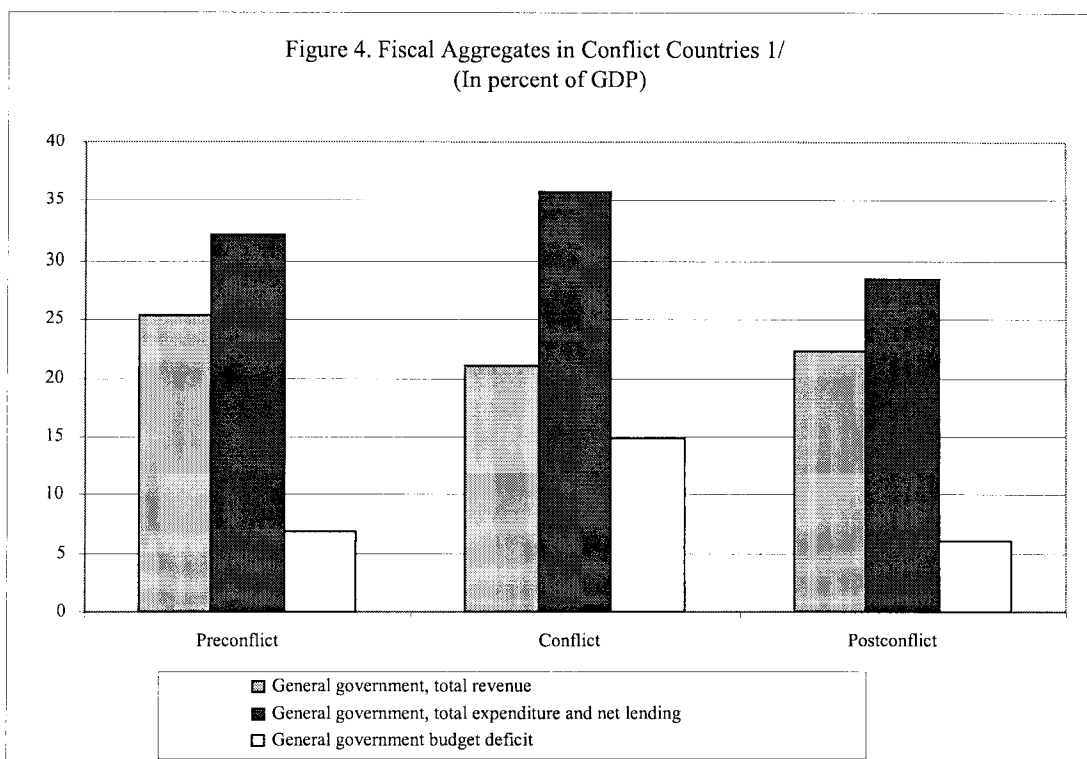Gross private fixed capital formation, current prices

Sources: IMF, *World Economic Outlook;* World Bank, *World Development Indicators 2001;* and IMF staff calculations.
1/ Based on a sample of 17 countries for gross fixed capital formation, and on 11 countries each for gross public and private capital formation.

Figure 4. Fiscal Aggregates in Conflict Countries 1/
(In percent of GDP)

General government, total revenue
General government, total expenditure and net lending
General government budget deficit

Sources: IMF, *World Economic Outlook;* World Bank, *World Development Indicators 2001;* and IMF staff calculations.
1/ Based on a sample of 14 countries.

Figure 5. Composition of Government Spending in Conflict Countries 1/
(In percent of GDP)

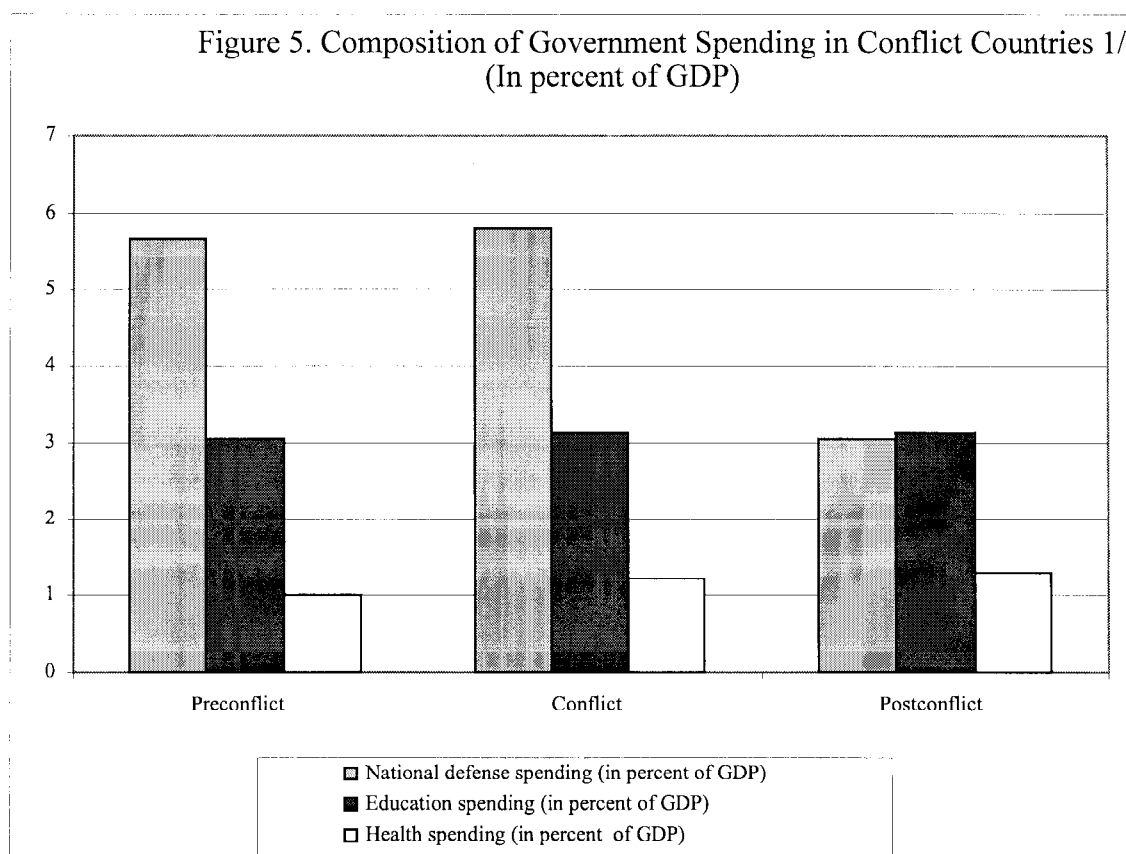| | National defense spending (in percent of GDP) |
| | Education spending (in percent of GDP) |
| | Health spending (in percent of GDP) |

Sources: IMF, *World Economic Outlook;* World Bank: *World Development Indicators 2001;* and IMF staff calculations.
1/ Based on a sample of 12 countries for defense expenditure, and on 6 countries each for education and health spending.

preceding it, followed by a significant fall in the immediate postconflict period. However, high defense spending during the conflict period and in the years immediately preceding it tends to be at the expense of macroeconomic stability (as reflected for example in higher budget deficits and a pickup in inflation) rather than at the cost of lower spending on education and health as a share of GDP. Nevertheless, since conflict is associated with lower real GDP growth, the implication is lower growth in real per capita government spending on education and health during conflict periods.

Turning now to the socioeconomic indicators, Table 1 shows a significant decline in the rate of improvement of life expectancy at birth during the conflict period, but the trend for improvement in life expectancy picks up again in the immediate postconflict period. There is also a significant deterioration in the rate of improvement of infant mortality during conflict years, but the deterioration continues into the immediate postconflict period. The available data also show a marked improvement in gross school enrolment rates (at all three levels—primary, secondary, and tertiary) following the end of armed conflict.

Table 1. Selected Social Indicators in Countries Experiencing Armed Conflicts 1/
(Average annual rates of change)

	Pre-conflict 2/	Conflict 2/	Post-conflict 2/	Number of Countries for Which Data Are Available
Life expectancy at birth, total (years)	0.4	-0.5	0.4	5
Mortality rate, infant (per 1,000 live births) 3/	3.8	0.6	0.0	7
Gross primary enrolment rate	..	2.6	3.2	9
Gross secondary enrolment rate	..	1.1	2.1	9
Gross tertiary enrolment rate	..	-1.5	2.1	9

Sources: IMF, *World Economic Outlook*; World Bank, *World Development Indicators, 2001*; and IMF staff calculations.

1/ Combines all the low income, lower-middle-income, and upper-middle-income countries affected by armed conflict as discussed in the paper. Countries are classified into income categories based on the World Bank's criteria in terms of level of 1998 GNP per capita—low income, $760 or less; lower-middle income, $761 to $3,030; and upper-middle income, $3,031 to $9,360.

2/ Conflict period refers to the period over which a country experienced armed conflict (as defined by SIPRI); preconflict refers to the average of three years preceding the conflict, and postconflict refers to the average of three years following the conflict (depending upon availability of data).

3/ Positive rates of growth signify an improvement in the variable.

While a useful exercise, the conclusions drawn from the before-during-after analysis should be interpreted with caution. This analysis does not control for other factors that affect macroeconomic and fiscal outcomes, independent of armed conflict and terrorism, which may have also changed over the periods of violence. To isolate more rigorously the effects of conflict and terrorism, the following section presents the econometric estimation of a system of interlinked equations covering a wider range of countries, including those not affected by conflict and terrorism.

VI. ECONOMETRIC ESTIMATES

As mentioned earlier, there are three main ways in which armed conflict and terrorism can affect the fiscal accounts: by influencing real economic activity (GDP) and therefore, government revenues; by adversely affecting both the tax base and the efficiency of the tax administration; and by changing the composition of government spending. These fiscal consequences can have repercussions on economic growth, which would further affect the public finances. To capture all these effects, a structural model with three equations is specified: the first for economic growth, the second for the ratio of government revenue to GDP, and the third for the composition of government spending measured by the share of defense spending in total government expenditure.

In the structural model, the equations for per capita income growth (equation (1)), government revenue to GDP (equation (2)), and defense expenditure as a share of total government spending (equation (3)) are specified as follows:

$$GRPCY_{it} = \alpha_r + \alpha_1 PCYINI_{it} + \alpha_2 GSECINI_{it} + \alpha_3 DEFEXPD_{it} + \alpha_4 AGEDEP_{it} + \alpha_5 CONF_{it} + \mu_{1it} \qquad (1)$$

$$GREVGDP_{it} = \beta_r + \beta_1 PCY_{it} + \beta_2 NONAGRX_{it} + \beta_3 CONF_{it} + \mu_{2it} \qquad (2)$$

$$DEFEXPD_{it} = \lambda_r + \lambda_1 DEFGDPN_{it} + \lambda_2 CONF_{it} + \mu_{3it}, \qquad (3)$$

where

GRPCY	=	growth of real per capita income (GDP).
PCYINI	=	real per capita income (GDP, in \$U.S.) in the initial year of the sample period.
GSECINI	=	gross secondary school enrolment rate in the initial year of the sample period.
DEFEXPD	=	share of defense expenditure in total government spending.
AGEDEP	=	age-dependency ratio.
CONF	=	a conflict variable (discussed below).
GREVGDP	=	government revenue as a ratio of GDP.
PCY	=	real per capita income (in \$US).
NONAGRX	=	share of nonagricultural exports in GDP.
DEFGDPN	=	(unweighted) average of neighboring countries' ratio of defense spending to GDP.

α_r, β_r, and λ_r are region-specific factors, and μ_{1it}, μ_{2it} and μ_{3it} are the usual error terms. The subscript (*it*) for the main explanatory variables refer to country and time period, respectively. The model is estimated using five-year averages of annual data for each country over four time periods: 1980–84, 1985–89, 1990–94, and 1995–99. Region and time dummies were included in the estimated equations.

Some authors have argued that conflict and terrorism are, in a sense, endogenous due to the possibility of reverse causation, i.e., that prolonged poor growth performance may help engender conflict. Violence and unrest may not only be a cause but may also arise from fluctuations in economic variables. Indeed, instrumental variable techniques have been used

in some of the studies to correct for reverse causation, but the validity of instruments in cross-country regressions has been questioned by some (Abadie and Gardaezabal, 2001). However, given the difficulty of empirically modeling conflict and terrorism, and in finding suitable instruments, they are taken as exogenous in line with a number of other studies (e.g., Davoodi and others, 2001; Gupta, de Mello, and Sharan, 2001; Hess and Pelz, 2002).

The above structural model was estimated using the Generalized Method of Moments (GMM) estimation technique so as to address the underlying problems of autocorrelation and heteroscedasticity that typically arise in estimating a structural panel model with endogenous variables. The instruments used in the estimation were all the exogenous variables of the structural model, as well as the ratio of value-added in agriculture to GDP, a corruption index compiled by ICRG, the urbanization ratio, and the ratio of private fixed capital formation to GDP. These instruments could be expected to be correlated with one or more of the endogenous variables in the model. For example, private investment should be positively correlated with growth; agricultural value added should be negatively correlated, and urbanization, positively correlated, with the revenue effort; and corruption negatively correlated with growth and revenues, but positively with defense spending.[16] All of the results presented below pass the Sargan test for validity of the instrument set.[17] The data used in estimation of the structural model were taken from the IMF's *World Economic Outlook,* the World Bank's *World Development Indicators 2001,* Yearbooks of the *Stockholm International Peace Research Institute* (SIPRI) and the *International Country Risk Guide.* Due to the limited availability of time series data on tax revenues, data on revenues and foreign grants are used as a proxy for domestic government revenues.

Model 1a (Table 2) uses the ICRG measure of internal conflict and terrorism. Note that a *higher* value of the ICRG conflict rating implies a *lower* risk of internal conflict and terrorism.[18] As in the standard Barro growth equations (Barro, 1991), the coefficient on the initial level of per capita income is negative and statistically significant at the 1 percent level. However, the coefficient on the initial stock of human capital (proxied by the gross secondary school enrolment rate) is not statistically significant. The implication is that, at least for the sample of countries included in this study, convergence toward a common level of real per capita income is not dependent on the initial stock of human capital. The age dependency ratio is also not statistically significant, and neither is the ICRG rating for

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[16] For a discussion of the impact of corruption on growth and defense spending, see Mauro (1995) and Gupta, de Mello, and Sharan (2001), respectively.

[17] Each of the instruments is correlated with at least one of the endogenous variables at a level of 0.24 or higher, and the correlations are statistically significant at the 5 percent level.

[18] For the sake of brevity, the estimates of the time dummy and regional dummy coefficients are not presented in Table 2.

Table 2. Regression Results 1/

Dependent Variable	Model 1a	Model 1b	Model 2
	Growth of Real Per Capita Income		Growth of Real Per Capita Income
Per capita income, initial	-0.0005 (-2.16)**	-0.0004 (-2.59)***	-0.0001 (-1.37)
Gross secondary enrolment, initial	-0.02 (-1.14)	-0.02 (-1.48)	0.0081 (1.40)
Ratio of defense spending to government expenditure	-0.22 (-2.03)**	-0.25 (-3.16)***	
Growth of real spending on education and health			0.53 (7.40)***
SIPRI rating for major armed conflicts		-1.77 (-2.53)***	-2.11 (-3.25)***
ICRG internal conflict rating (civil wars and terrorism)	0.078 (0.51)		
Age dependency ratio	-4.51 (-1.16)	-5.39 (-1.78)*	
R-squared	0.17	0.18	0.21

	Revenue (In percent of GDP)		Growth in Revenue (In Real Per Capita Terms)
Real per capita income	0.0012 (4.47)***	0.0013 (4.12)***	
Real per capita income growth			1.01 (4.05)***
Ratio of nonagricultural exports to GDP	0.30 (6.15)***	0.28 (6.04)***	
SIPRI rating for major armed conflicts		-1.10 (-1.04)	
ICRG internal conflict rating (civil wars and terrorism)	0.05 (0.23)		
R-squared	0.64	0.64	0.34

Dependent Variable	Model 1a	Model 1b	Model 2
	Defence Spending (In percent of Government Spending)		Growth in Real Education and Health Spending (In Real Per Capita Terms)
Growth in revenue			1.21 (7.17)***
Average defense spending of neighbors (in percent of GDP)	1.39 (3.03)***	1.61 (3.75)***	
SIPRI rating for major armed conflicts		3.50 (2.07)**	
ICRG internal conflict rating (civil wars and terrorism)	-0.84 (-3.61)***		
Number of observations	122	123	114
R-squared	0.61	0.61	0.10
P-values 2/	0.72	0.73	0.76

1/ White's heteroscedastic consistent t-statistics are in parentheses; (***), (**), and (*) denote significance at the 1, 5, and 10 percent levels, respectively.
2/ The p-values refer to the test of overidentifying restrictions implied by the exogeneity of instruments.

internal conflict and terrorism. Consistent with the hypothesis, the ratio of defense spending in total government expenditure has a negative effect on growth, and this effect is statistically significant at the 1 percent level.

The structural equation for the government revenue-to-GDP ratio is based on studies such as Bahl (1971), Tanzi (1992), and Ebrill and others (2001). The estimates are consistent with their findings that the share of government revenue in GDP in developing countries is a function of the stage of development (proxied by the level of real per capita income) and the openness of the economy (proxied by the ratio of nonagricultural exports to GDP). However, the internal conflict and terrorism variable does not have any significant effect on the government revenue-to-GDP ratio. One reason why stronger results are not obtained for this equation could be the inclusion of foreign grants in the measure of revenues; some of the structural variables explaining government tax revenues, for example, may not have an impact on grants in the same way.

The third equation for the share of defense in government expenditure is consistent with the finding in Davoodi and others (2001) that higher spending on defense by neighboring countries—which could be interpreted as a measure of regional tensions—is associated with a significantly higher share of defense in total government spending. Moreover, the coefficient for internal conflict and terrorism is positive and statistically significant at the 1 percent level.[19]

In summary, the empirical results using the ICRG rating for internal conflict and terrorism suggest that violence and insecurity raise the share of defense spending in total government expenditure, which in turn has a negative effect on growth by diverting resources away from spending on sectors (education, health, infrastructure) that promote economic growth over the long term. The risk from conflict and terrorism does not seem to have any additional negative impact on growth, over and above its impact on the composition of government spending. Moreover, conflict and terrorism do not seem to have any impact on government revenue, independent of their effect on growth and therefore, on the level of real per capita income.

To assess the robustness of the results, the above model is reestimated using a different measure of conflict—the proportion of years during each five-year period when the country was in conflict according to the SIPRI index. The results (Model 1b) are similar to those of Model 1a, except that the age dependency ratio now becomes statistically significant and the SIPRI-based measure of armed conflict has a statistically significant negative effect on

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[19] Collier and Hoeffler (2002b) find, based on data for the period 1960–99, that military expenditure by a country is strongly influenced by the level of military expenditure of its neighbors. They estimate that an initial exogenous increase in military expenditure by one country is more than doubled in both the originating country and its neighbors. Potentially, there is an offsetting public good effect if rebellions are deterred by military expenditure. However, instrumenting for military expenditure, Collier and Hoeffler find no deterrence effect of military spending on the risk of internal conflict. Hence, there appears to be no regional public good effect offsetting the public bad arising from a neighborhood arms race.

growth *separate* from its impact on the composition of government spending. The results using the SIPRI-based conflict index may be stronger than those using the ICRG rating for internal conflict and terrorism because the former is discrete for any given year (either 0 or 1). It may, therefore, be better in associating conflicts with their economic consequences as compared to the ICRG rating for internal conflict and terrorism, which is continuous, and varies only gradually with change in the risk from violence and insecurity.

Another issue of interest is whether conflict and terrorism affect real spending on education and health. While the results presented above suggest that countries allocate a higher share of spending on defense in response to conflicts and terrorism, one cannot directly infer that this comes at the expense of lower spending on education and health, since the model does not hold total government spending constant. To test the direct effects of conflict on these outlays, an alternative structural model linking per capita income growth (equation (4)), growth in government revenue in real per capita terms (equation (5)), and growth in real per capita government expenditure on education and health (equation (6)) is specified as follows:

$$GRPCY_{it} = \theta_r + \theta_1 PCYINI_{it} + \theta_2 GSECINI_{it} + \theta_3 GREDUHL_{it} + \theta_4 CONF_{it} + v_{1it} \tag{4}$$

$$GRGREV_{it} = \gamma_r + \gamma_1 GRPCY_{it} + v_{2it} \tag{5}$$

$$GREDUHL_{it} = \eta_r + \eta_1 GRGREV_{it} + v_{3it}, \tag{6}$$

where

GRPCY, PCYINI, GSECINI and CONF are as defined earlier.

GREDUHL = growth in real per capita government spending on education and health.

GRGREV = growth in government revenue, in real per capita terms.

θ_r, γ_r, and η_r are region-specific factors, and v_{1it}, v_{2it} and v_{3it} are the usual error terms.

The results are presented in Table 2 under Model 2. As in Model 1, due to data constraints, revenue and foreign grants are used as a proxy for domestic government revenues.

Estimating the above model using the ICRG measure of internal conflict and terrorism gave statistically insignificant results for all the three equations; better results were obtained with the SIPRI-based conflict measure, and these are presented here. The instrument set was broadly the same as that used in Model 1a, and for each of the endogenous variables there is at least one instrument that is significantly correlated with it at the 5 percent level. The empirical results indicate that armed conflict has a significant negative impact on per capita income growth, leading to a proportionate reduction in the growth of real per capita

government revenue. This in turn results in lower real per capita spending on education and health by the government. The latter has a further significant and negative impact on growth. These findings are consistent with those of Model 1.

VII. CONCLUSIONS

This study provides a cross-country examination of the fiscal effects of armed conflict and terrorism using two approaches. First, the evolution of various macroeconomic and fiscal variables and socioeconomic indicators during 22 episodes of conflict, and in the years immediately preceding and following the conflicts, was analyzed. Second, an integrated system of equations for real per capita income growth, government revenue, and government spending was estimated to examine the main channels through which armed conflict and terrorism affect the fiscal accounts.

The findings are consistent with the hypothesis that armed conflict and terrorism lead to a higher share of defense spending in total government expenditure, which has a negative effect on growth by diverting resources away from spending on socially and economically productive sectors that promote economic growth. There is also some empirical support for the hypothesis that armed conflict and terrorism, by negatively affecting the growth of real per capita income and thereby growth in government revenue in real per capita terms, result in lower growth of real per capita government spending on education and health. This in turn has an adverse impact on economic growth. The results using the SIPRI-based conflict measure also suggest that conflict has an additional and significant negative impact on growth, independent of its effect on the composition of government spending; however, with the ICRG measure for internal conflict and terrorism the empirical estimates were statistically insignificant. On the revenue side, conflict appears to affect the fiscal accounts only through its effects on real economic activity, and does not have an independent effect per se on revenues. The inclusion of foreign grants in the revenue series may have contributed to this result.[20]

The findings from the econometric estimation are generally consistent with the conclusions of the before-during-after conflict analysis. The share of government revenue in percent of GDP tends to fall during the conflict period, and to pick up somewhat in the immediate postconflict period. This analysis also suggests that armed conflict leads to higher government spending on defense, but this tends to be at the expense of macroeconomic stability (reflected, for example, in significantly higher budget deficits and a pickup in inflation) rather than at the cost of lower spending on education and health—at least when measured as a percent of GDP. However, since conflict is associated with lower real GDP growth, the result is lower growth in real per capita government spending on education and health during conflict periods. Not surprisingly, the data are consistent with an increase in the share of investment in GDP in the immediate postconflict period, and in the share of private

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[20] However, as noted in footnote 15, grants are on average much lower than revenue.

sector investment. The available data also show a dramatic pickup in inflation during the conflict period, followed by a significant decline in the immediate postconflict period.

The results suggest sizable economic gains in terms of economic growth, macroeconomic stability, and the generation of tax revenues to support poverty-reducing spending, for countries that end conflicts and tackle terrorism. Ending violence and restoring security can be expected to lower the share of the budget allocated to military spending. These results confirm those of earlier studies, underscoring the potential for the "peace dividend" to contribute to economic development. For example, a recent study by Hess and Pelz (2002) finds that the pure economic welfare losses from conflict are quite large. The authors estimate that these losses are typically four times larger than the welfare costs of business cycles as calculated by Lucas (1987), and that, on average, individuals would give up over 6 percent of their current annual level of consumption as a one-time payment in order to live in a world of perpetual peace.

Successful reconstruction after conflict involves rebuilding damaged institutions and infrastructure, renewing the social contract, generating a sense of trust among the warring parties, and ensuring that grievances due to economic disparities or perceived biases in fiscal policies are addressed. All this takes time. The continued involvement (and not just one-shot assistance) of the donors and the international community is therefore critical, especially in countries that have experienced prolonged conflicts.[21]

International institutions (such as the IMF) have been involved in lending for reconstruction to postconflict countries. As part of its emergency assistance facility to help members emerging from conflicts rebuild capacity and recover economic stability, the IMF, for example, has provided $300 million over the period 1995–2000 to seven postconflict countries. The findings of this paper have implications for the design of macroeconomic and fiscal policies for countries emerging from conflicts. In particular, the results suggest that conflict- and terrorism-affected countries are likely to experience a pickup in government tax revenues and a reduction in military spending (albeit with a lag) following the cessation of violence, and this would help in restoring macroeconomic stability.

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[21] This is emphasized by Collier and Hoeffler (2002a), who find that during the first three postconflict years, absorptive capacity on average is no greater than normal, but that in the rest of the first postconflict decade, it is approximately double its normal level. Thus, ideally, aid and donor involvement should be phased over several years following the end of the conflict. Collier and Hoeffler find that historically, aid has not been higher on average in postconflict societies, and indeed it has tended to taper off over the course of the decade following the cessation of conflict.

Defining Terrorism

No single definition of terrorism has gained universal acceptance so far. Since the United States has taken the lead in forging a coalition against terrorism following the attacks of September 11, 2001, the definition provided in Title 22 of the United States Code, Section 2656f(d) is presented here first:

- The term "terrorism" means premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience.

- The term "international terrorism" means terrorism involving citizens or the territory of more than one country.

- The term "terrorist group" means any group practicing, or that has significant subgroups that practice, international terrorism.

The U.S. government has employed this definition of terrorism for statistical and analytical purposes since 1983.

Some other definitions of terrorism include the following:

- The *Columbia Encyclopedia,* 6th Edition, 2001, defines terrorism as "the threat or use of violence, often against the civilian population to achieve political ends. Terrorism involves activities such as assassinations, bombings, random killings, hijackings, and skyjackings. It is used for political, not military purposes, and by groups too weak to mount open assaults."

- The Resolution adopted by the U.N. General Assembly (A/RES/54/109) in February 2000 on the "International Convention for the Suppression of the Financing of Terrorism" regards as terrorism any act that constitutes an offence within the scope of the nine conventions mentioned below, plus any other act intended to cause death or serious bodily injury to a civilian, or to any other person not taking an active part in the hostilities in a situation of armed conflict, when the purpose of such act, by its nature or context, is to intimidate a population, or to compel a government or an international organization to do or to abstain from doing any act.

The nine International Conventions are

- *Convention for the Suppression of Unlawful Seizure of Aircraft, done at The Hague on December 16, 1970.*

- *Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation, done at Montreal on September 23, 1971.*

- *Convention on the Prevention and Punishment of Crimes Against Internationally Protected Persons, including Diplomatic Agents, adopted by the General Assembly of the United Nations on December 14, 1973.*

- *International Convention against the Taking of Hostages, adopted by the General Assembly of the United Nations on December 17, 1979.*

- *Convention on the Physical Protection of Nuclear Material, adopted at Vienna on 3 March, 1980.*

- *Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation, supplementary to the Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation, done at Montreal on 24 February, 1988.*

- *Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation, done at Rome on 10 March, 1988.*

- *Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms located on the Continental Shelf, done at Rome on 10 March, 1988.*

- *International Convention for the Suppression of Terrorist Bombings, adopted by the General Assembly of the United Nations on December 15, 1997.*

Sample Countries

For the preconflict, conflict, and postconflict analysis, a sample of 20 countries (22 episodes of major armed conflicts based on SIPRI data) where conflict began or was ongoing after 1985, but ended by 1999, is used. The sample includes 15 low-income countries (Armenia, Azerbaijan, Bangladesh, Cambodia, Chad, the Republic of Congo, Georgia, Guinea-Bissau, the Lao People's Democratic Republic, Mozambique, Nicaragua, Senegal, Tajikistan, Uganda, and the Republic of Yemen), 3 lower-middle-income countries (Albania, El Salvador, and Guatemala) and 2 upper-middle-income countries (Croatia and Lebanon).

Where ICRG country ratings on internal conflict are also available for the corresponding episodes (for 14 of the 20 countries), there is a broad match between low ICRG ratings of 8 or less (the lower the ICRG rating, the higher the risk of internal conflict) and countries that have been classified as conflict-affected by SIPRI.[22] The average ICRG internal conflict score (where available) for these 20 countries is 3.7 between 1984 and 1989, 6.4 between 1990 and 1994, and 8.2 between 1995 and 1999. This is a reflection of the fact that in most of these 20 countries, the conflicts took place mainly during the 1980s (or before) and during the first half of the 1990s.

For the econometric analysis, a larger set of 60 countries including conflict and nonconflict, low- and middle-income countries is used (see list on following page). Of these 60, the following countries—Azerbaijan, Croatia, El Salvador, Guatemala, Mozambique, Nicaragua, Senegal, and Uganda—were classified by SIPRI as countries experiencing major armed conflicts. Problems of data availability, which are particularly severe for countries affected by armed conflict, constrained the sample considerably.

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[22] On the 0–12 ICRG scale, 0 denotes Very High Risk of Conflict and 12 denotes Very Low Risk. For example, Liberia had an average ICRG (Internal Conflict) rating of 2.1 between 1990 and 1994.

Sample of Countries Used in the Econometric Analysis

1. Albania
2. Argentina
3. Azerbaijan
4. Bolivia
5. Brazil
6. Bulgaria
7. Cameroon
8. Chile
9. Colombia
10. Costa Rica
11. Côte d'Ivoire
12. Croatia
13. Czech Republic
14. Ecuador
15. Egypt
16. El Salvador
17. Estonia
18. Ethiopia
19. Gabon
20. Gambia, The
21. Guatemala
22. Guinea
23. Honduras
24. Hungary
25. India
26. Jordan
27. Kazakhstan
28. Kenya
29. Latvia
30. Lithuania
31. Madagascar
32. Malaysia
33. Mali
34. Mexico
35. Moldova
36. Morocco
37. Mozambique
38. Nicaragua
39. Niger
40. Nigeria
41. Oman
42. Paraguay
43. Peru

44. Philippines
45. Poland
46. Romania
47. Saudi Arabia
48. Senegal
49. Slovak Republic
50. South Africa
51. Sri Lanka
52. Syrian Arab Republic
53. Thailand
54. Tunisia
55. Turkey
56. Uganda
57. Uruguay
58. Venezuela
59. Zambia
60. Zimbabwe

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