Fiscal Dimensions of Armed Conflict in Low- and Middle-Income Countries*

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I. INTRODUCTION

Armed conflict can have important consequences for both government revenues and expenditures of a country. These fiscal consequences, in turn, can have repercussions on economic growth, both in the short run and over the medium and long term. For example, armed conflict may encourage higher defense expenditures at the expense of lower public spending in socially and economically productive sectors, such as basic health and education services and infrastructure. Moreover, the potential channels through which armed conflict can affect economic activity are many, varied and usually interlinked: they include investment, the nation’s infrastructure, trade volumes, and (as mentioned above) the fiscal accounts. This paper analyses the fiscal repercussions of armed conflict and, in turn, examines how these fiscal effects can indirectly affect economic growth for a sample of low and middle-income economies.

A number of empirical studies have assessed the impact of socio-political instability in a country on investment and on growth, both in developing and in advanced countries, mostly using cross-section analysis of country-level data (see for example Veneiris and Gupta (1986), Barro (1991), Alesina and Perotti (1996), Alesina et al. (1996), and Rodrik (1999)). However, there are relatively few studies that examine the economic effects of an armed conflict per se on a country. Moreover, as Abadie and Gardeazabal (2001) point out, another potential shortcoming of studies based on country-level data is that conflicts in different countries may be radically different in nature; such heterogeneity may create problems when comparing the experiences of different countries and interpreting the results.

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) find that the intensity of casualties from terrorist incidents has significant own and cross-country effects on the market shares of the affected countries, and that there are significant contagion effects from terrorism in the region. However, these studies limit their focus to one sector of the economy and do not consider the impact of terrorism on the economy as a whole.

Ndikumana (2001) seeks to remedy this. He studies fiscal policy and armed conflict in two African countries in the 1990s and the interactions between fiscal and other economic aggregates. However, the study limits its analysis to the two countries, and does not directly quantify the impact of armed conflict on growth or on the public finances. Addison and Murshed (2001) do a similar type of analysis but for a larger number of countries, mostly in Africa, and discuss also the important role of fiscal institutions, and possibly fiscal reform, in ensuring a broad-based and sustainable economic reconstruction following the end of a period of armed conflict.
One study that does assess the effect of armed conflict or terrorism on the economy as a whole is Abadie and Gardeazabal (2001). This study uses a combination of regions in Spain to construct a ‘synthetic’ region, which resembles many relevant economic characteristics of the Basque area before the outset of terrorism in the 1970s. The subsequent economic evolution of this ‘counterfactual’ region without terrorism is compared to the actual experience of the Basque region. They find that, after the outbreak of terrorism, per capita GDP in the Basque region declined by about 10 percentage points relative to the synthetic region, and that this gap seemed to widen in response to spikes in terrorist activity. Arunatilake, Jayasuriya and Kelegama (2000) provide another case study of the economic costs of armed conflict in Sri Lanka, and find that the cost since 1983 may be at least equivalent to twice the country’s 1996 GDP.

This study aims to add to the literature by providing a cross-country examination of the fiscal effects of armed conflict. The following section lays out the channels through which armed conflict can have an impact on the fiscal accounts, both directly and indirectly, and at the links between armed conflict and economic variables. Section III discusses methodological issues related to the empirical analysis presented in the paper. Section IV presents an assessment of 22 episodes of armed conflicts in a number of lower- and middle-income countries. This involves an examination of various macroeconomic and fiscal variables and socio-economic indicators during conflict periods and in the years immediately preceding and following these conflicts. Section V presents and estimates an integrated system of equations for real per capita income growth, government revenue and government spending, and uses the results to examine the main channels through which armed conflict affects the fiscal accounts. Section VI concludes.

II. FISCAL EFFECTS OF ARMED CONFLICT: POTENTIAL CHANNELS

Armed conflict can affect the fiscal accounts through its impact on both revenues and public expenditures. One way in which conflict adversely affects government receipts is through its impact on real economic activity. In most countries, tax receipts vary with the health of the economy, with economic downturns implying a decline in real tax revenues. The direct impact of conflict on the level of economic activity can occur through loss of physical infrastructure and of human capital (either through loss of human life, reduced productivity of the existing labor force as a result of disabilities or injuries suffered, or through emigration). In general, the most important indirect effects are the impact on trade volumes (in part through possible destruction of essential transport infrastructure), on investment as a result of greater macroeconomic and political uncertainty, and discouragement of tourism.

Addison and Murshed (2001) and Ndikumana (2001) note that there might also be important fiscal dimensions to the causes of armed conflict. In particular, perceived inequities (by region or ethnic group) in the distribution of the tax burden and/or discrimination relating to the allocation of the benefits of public spending can inflame grievances and play a role in conflict generation. Conversely, social stability is often associated with the existence of an efficient and effective redistributive mechanism through the fiscal system.
Beyond the effect of armed conflict on real activity, armed conflict (particular if prolonged) can destroy part of the tax base (through the destruction of business firms, for example) and also 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 capacity was also eroded. 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 pre-conflict level.

Armed conflict also affects the composition of government spending. Military expenditures typically increase during conflict and tend to remain high even after conflict is apparently resolved. At the same time, as noted above, the revenue base is eroded during the conflict, and in the period immediately following it. The consequence is that higher defense expenditures are afforded at the expense of lower outlays in socially and economically productive sectors and higher budget deficits, with adverse effects for long-term growth. This also suggests that ending conflicts can result in a “peace dividend” that can help release fiscal resources for either deficit reduction, lower taxes, or growth-enhancing spending in the social sectors.

Previous research extending beyond conflict-afflicted countries also suggests that cutting military spending can help foster economic growth (Arora and Bayoumi, 1993; Bayoumi, Hewitt, and Schiff, 1993; and Knight, Loayza and Villanueva, 1996). While some earlier studies argued that military spending could boost growth (e.g., Benoit, 1978), 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.

III. EMPIRICAL METHODOLOGY

The empirical analysis in this paper follows two different approaches. In the first, we look at 22 episodes of armed conflict in lower- and middle-income countries, and at the evolution of various macroeconomic and fiscal variables and socio-economic indicators during the conflict period and in the years immediately preceding and following the conflict. Our sample includes those episodes of armed conflict that either began, or were ongoing, in 1985 or after, and which ended in 1999 or earlier, and for which the relevant data for analysis are available. In this section we follow the Stockholm International Peace Research Institute (SIPRI) in defining conflict as “prolonged combat between the military forces of two or more governments, or of one government and at least one organized armed group, incurring the battle-related deaths of at least 1,000 people during the entire conflict, and in which the

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1 For an examination of how countries across the world (both conflict and nonconflicted afflicted) have utilized the peace dividend arising from the decline in worldwide military spending from 1990–95, see Schiff, Gupta, and Clements (1998).
One shortcoming of the SIPRI index is that it applies an absolute criteria 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 (1,000) 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 different economic effects, in terms of their impact on business and consumer confidence and international perception of the riskiness of the affected country, than a single dramatic event affecting mainly the tourist sector or key sectors linked to foreign trade. Nevertheless, the SIPRI index is broadly consistent with the conflict index produced by the Heidelberg Institute for International Conflict Research (HIIK). Furthermore, where country ratings on internal conflict by the International Country Risk Guide (ICRG) are also available for the corresponding episode periods (for 14 of the 21 countries), we find a broad match between low ICRG ratings (of 8 or less) and countries that have been classified as conflict-affected by SIPRI and HIIK. The SIPRI index has been used in other empirical studies, such as Davoodi, Clements, Schiff and Debaere (2001).

Our first approach focuses on the impact of armed conflict within conflict-affected countries. In our second approach, which is designed to compare the effects of armed conflict across countries, we estimate econometrically an integrated system of equations for real per capita income growth, government revenue and government spending, and use the results to examine the main channels through which armed conflict affects the fiscal accounts.

For the purpose of the econometric analysis we use both the SIPRI index and the ICRG ratings on internal conflict. The ICRG’s internal conflict rating is an assessment of political violence in the country and its 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, direct or indirect, against its own people.” The lowest rating is given to a country embroiled in an ongoing civil war. The risk rating assigned is the sum of three subcomponents, each with a maximum score of four points and a minimum score of zero points. A score of four points equates to very low risk and a score of zero to very high risk. The subcomponents are: civil war, terrorism/political violence, and civil disorder. The ICRG series covers a wide range of countries, including countries not affected by conflict as defined by SIPRI and HIIK.

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2 See the website address of the Political Risk Services Group at http://www.prsgroup.com/index.html
IV. Macroeconomic and Fiscal Variables and Socio-Economic Indicators: Pre-Conflict, Conflict, and Post-Conflict

The results from 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 post-conflict years, while on inflation there is a dramatic pickup in inflation during the conflict period, followed by a significant decline in the immediate post-conflict period (see Figures 1 and 2). With regard to gross fixed capital formation, the data show a notable increase in its share to GDP in the immediate post-conflict years, particularly with regard to private sector investment (see Figure 3).

Figures 4–5 show the evolution of fiscal variables over the pre-conflict, conflict and post-conflict periods. The available data for our sample of countries show that the share of government revenue and grants in GDP tends to fall during the conflict period, and to pickup somewhat in the immediate post-conflict 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 pre-conflict period, followed by a notable decline in the immediate post-conflict period. In particular the available data suggest high government spending on defense during the conflict period and in the period immediately preceding it, followed by a significant fall in the immediate post-conflict 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 significantly higher budget deficits and a dramatic pickup in inflation) rather than at the cost of lower spending on education and health as a share of GDP; however, 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. Bevan (2000) and Addison and Murshed (2001) note, however, that the economic benefits from lower defense spending and the peace dividend may not accrue immediately following the end of a period of armed conflict, but over a period of time as the political situation returns to normal.

Turning now to the socio-economic indicators, Table 1 shows a significant decline in the rate of improvement of life expectancy at birth during the conflict period, but the trend improvement in life expectancy picks up again in the immediate post-conflict 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 post-conflict period. The available data also show a marked improvement in gross school enrollment rates (at all three levels—primary, secondary, and tertiary) following the end of armed conflict.

While a useful exercise, the conclusions that are drawn from this type of before-during-after analysis have to be interpreted with caution, in particular because this type of analysis does not control for other factors (variables) that might have changed during the periods and affected not only the outcomes, but also the interactions among the variables of interest. For
Figure 1. Real GDP Growth in Conflict Countries 1/
(Average annual percent)

Sources: *World Economic Outlook; 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 pre-conflict, conflict and post-conflict 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)

Sources: *World Economic Outlook; 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)

Sources: *World Economic Outlook; 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 4/
(In percent of GDP)

Sources: *World Economic Outlook; World Development Indicators 2001;* and IMF staff calculations.
4/ Based on a sample of 14 countries.
Figure 5. Composition of Government Spending in Conflict Countries 1/
(In percent of GDP)

Sources: World Economic Outlook; 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.
Table 1. Selected Social Indicators in Countries Experiencing Armed Conflicts 1/
(Average annual rates of change)

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

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

1/ Combines all the low income, lower-middle-income, and upper-middle-income countries afflicted 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); pre-conflict refers to the average of 3 years preceding the conflict, and post-conflict refers to the average of 3 years following the conflict (depending upon availability of data).

3/ Positive rates of growth signify an improvement in the variable.
this reason the next section of the paper presents an econometric estimation of a system of interlinked equations covering a wider range of countries, including countries not affected by conflict as defined by SIPRI and HIIK.

V. ECONOMETRIC ESTIMATES

As mentioned earlier, there are three main ways in which armed conflict can affect the fiscal accounts: through its impact on real economic activity (GDP), and therefore on 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, in turn, can have important repercussions on economic growth, which further affect the public finances. To capture all these we specify a structural model with three equations: one for economic growth, one for the government revenue to GDP ratio, and one 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:

\[
\begin{align*}
\text{GRPCY}_{it} & = \alpha_r + \alpha_1 \text{PCYINI}_{it} + \alpha_2 \text{GSECINI}_{it} + \alpha_3 \text{DEFEXPD}_{it} + \alpha_4 \text{AGEDEP}_{it} + \alpha_5 \text{CONF}_{it} + \mu_{1it} \\
\text{GREVGDP}_{it} & = \beta_r + \beta_1 \text{PCY}_{it} + \beta_2 \text{NONAGRX}_{it} + \beta_3 \text{CONF}_{it} + \mu_{2it} \\
\text{DEFEXPD}_{it} & = \lambda_r + \lambda_1 \text{DEFGDPN}_{it} + \lambda_2 \text{CONF}_{it} + \mu_{3it}
\end{align*}
\]

where

\[
\begin{align*}
\text{GRPCY} & = \text{growth of real per capita income (GDP)}. \\
\text{PCYINI} & = \text{real per capita income (GDP, in $U.S.) in the initial year of the sample period.} \\
\text{GSECINI} & = \text{gross secondary school enrollment rate in the initial year of the sample period.} \\
\text{DEFEXPD} & = \text{share of defense expenditure in total government spending.} \\
\text{AGEDEP} & = \text{age-dependency ratio.} \\
\text{CONF} & = \text{a conflict variable (discussed below).} \\
\text{GREVGDP} & = \text{government revenue as a ratio of GDP.} \\
\text{PCY} & = \text{real per capita income (in $US).}
\end{align*}
\]
NONAGRX = share of nonagricultural exports in GDP.

DEFGDPN = (unweighted) average of neighboring countries’ ratio of defense spending to GDP.

$\alpha_r$, $\beta_r$ and $\lambda_r$ are region-specific factors, and

$\mu_{1it}$, $\mu_{2it}$ and $\mu_{3it}$ 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: 1980–1984, 1985–1989, 1990–1994, and 1995–1999. Region-specific and time dummies were included in the estimated equations.

Some authors have argued that conflict is, in some sense, endogenous due to the possibility of reverse causation, in that conflict is not only a cause but may also be an effect of fluctuations in economic variables. Indeed, instrumental variable techniques have been used in some of these studies to correct for reverse causation, but the validity of instruments in cross-country regressions has sometimes been questioned and subjected to criticism. However, given the difficulty of empirically modeling “conflict” or in finding suitable instruments for it, we follow a number of studies (e.g. Davoodi, Clements, Schiff, and Debaere (2001); Gupta, de Mello, and Sharan (2001); Hess and Pelz (2002)) and take our conflict variable to be exogenous in our econometric estimations.

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 in the structural model as well as the ratio of value-added in agriculture in 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 negatively correlated, and urbanization positively correlated, with the revenue effort; and corruption negatively correlated with growth and revenues, but positively with defense spending. All of the results presented below pass the Sargan test for validity of the instrument set. The data used in estimation of the structural model was taken from the IMF’s *World Economic Outlook*, the World Bank’s *World Development Indicators 2001*, Yearbooks of the Stockholm Institute of Peace Research Initiative (SIPRI) and the *International Country Risk Guide*. In light of the limited

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3 For an examination of the impact of corruption on growth and defense spending, see Mauro (1995) and Gupta, de Mello, and Sharan (2001), respectively.

4 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.
availability of time series data on tax revenues, we utilize data on both revenues and external
grants as a proxy for domestic revenues.

Table 2 presents, under Model 1a, the results obtained from estimating the model when using
a conflict measure based on the SIPRI index—the proportion of years during each five-year
period during which the country was in conflict, according to SIPRI. As in the standard
Barro growth-equations (see Barro, 1991), the coefficient on the initial level of per capita
income is negative and statistically significant at the one percent level, but the coefficient on
the initial stock of human capital (proxied by the gross secondary school enrollment rate) is
not statistically significant. The implication is that, at least for the sample of countries
included in this study, convergence towards a common level of real per capita income is not
dependent on the initial human capital stock. The age dependency ratio is also found to have
a negative effect on real per capita growth, which is statistically significant at the 10 percent
level. Consistent with our hypothesis the ratio of defense spending in total government
expenditure has a negative effect on growth, as does the conflict variable, and both of these
effects are statistically significant at the 1 percent level.

Our structural equation for the government revenue to GDP ratio is based on studies such as
Bahl (1971), Tanzi (1992) and Ebrill, Keen, Bodin and Summers (2001) and our estimates
are consistent with their findings that the government revenue share of 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 (as proxied by the ratio of nonagricultural exports
to GDP). However, our conflict variable does not have any significant effect on the
government revenue-to-GDP ratio, apart from its effect on growth, and thereby on the level
of real per capita income. One reason why stronger results were 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, could not be expected
to affect grants in the same fashion.

Our third equation, for the share of government expenditure going to defense, is consistent
with the finding in Davoodi, Clements, Schiff, and Debaere (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 expenditure in total
government spending. In addition, the coefficient on our conflict variable is positive and
statistically significant at the one percent level.

5 For the sake of brevity the estimates of the time dummy and regional dummy coefficients are not presented in
Table 2.

6 Many authors have found demographic transition variables to have a statistically significant effect on
economic growth; see for example Bloom and Sachs (1998), Bloom and Williamson (1997), and Chesnais
Table 2. Regression Results 1/

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Model 1a</th>
<th>Model 1b</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Growth of Real Per Capita Income</td>
<td>Growth of Real Per Capita Income</td>
<td></td>
</tr>
<tr>
<td>Per capita income—initial</td>
<td>-0.0004 (2.59)***</td>
<td>-0.0005 (2.16)***</td>
<td>-0.0001 (1.37)</td>
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<td></td>
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<tr>
<td>Gross secondary enrolment—initial</td>
<td>-0.02 (-1.48)</td>
<td>-0.02 (-1.14)</td>
<td>0.0081 (1.40)</td>
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<tr>
<td>Ratio of defense spending to government expenditure</td>
<td>-0.25 (-3.16)***</td>
<td>-0.22 (-2.03)***</td>
<td></td>
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<td></td>
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<tr>
<td>Growth of real spending on education and health</td>
<td></td>
<td>0.53 (7.40)***</td>
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<tr>
<td>SIPRI conflict</td>
<td>-1.77 (-2.53)***</td>
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<tr>
<td>ICRG internal conflict rating</td>
<td></td>
<td>0.078 (0.51)</td>
<td>(-3.25)***</td>
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<td></td>
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<tr>
<td>Age dependency ratio</td>
<td>-5.39 (-1.78)*</td>
<td>-4.51 (-1.16)</td>
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<tr>
<td>R-squared</td>
<td>0.18</td>
<td>0.17</td>
<td>0.21</td>
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<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Revenue and Grants (In percent of GDP)</th>
<th>Revenue and Grants (In percent of GDP)</th>
<th>Revenue and Grants (In percent of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real per capita income</td>
<td>0.0013 (4.12)***</td>
<td>0.0012 (4.47)***</td>
<td>1.01 (4.05)***</td>
</tr>
<tr>
<td>Real per capita income growth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio of nonagricultural exports to GDP</td>
<td>0.28 (6.04)***</td>
<td>0.30 (6.15)***</td>
<td></td>
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<tr>
<td>SIPRI conflict</td>
<td>-1.10 (-1.04)</td>
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<tr>
<td>ICRG internal conflict rating</td>
<td></td>
<td>0.05 (0.23)</td>
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<tr>
<td>R-squared</td>
<td>0.64</td>
<td>0.64</td>
<td>0.34</td>
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<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Defense Spending (In percent of government spending)</th>
<th>Defense Spending (In percent of government spending)</th>
<th>Defense Spending (In percent of government spending)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth in revenue and grants</td>
<td>1.21 (7.17)***</td>
<td>1.21 (7.17)***</td>
<td>1.21 (7.17)***</td>
</tr>
<tr>
<td>Average defense spending of neighbors (in percent of GDP)</td>
<td>1.61 (3.75)***</td>
<td>1.39 (3.03)***</td>
<td>1.39 (3.03)***</td>
</tr>
<tr>
<td></td>
<td>3.50 (2.07)**</td>
<td>3.50 (2.07)**</td>
<td>3.50 (2.07)**</td>
</tr>
<tr>
<td>ICRG international conflict rating</td>
<td>-0.84 (-)</td>
<td>-0.84 (-)</td>
<td>-0.84 (-)</td>
</tr>
<tr>
<td></td>
<td>123</td>
<td>122</td>
<td>114</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.61</td>
<td>0.61</td>
<td>0.61</td>
</tr>
<tr>
<td>P-values 2/</td>
<td>0.73</td>
<td>0.72</td>
<td>0.76</td>
</tr>
</tbody>
</table>

1/ White's heteroscedastic consistent t-statistics are in parentheses; (***), (**), and (*) denote significance at the 1, 5, and 10 percent levels.

2/ The p-values refer to the test of overidentifying restrictions implied by the exogeneity of instruments.
In summary, our empirical results suggest that armed conflict leads to a higher share of defense spending in total government expenditure, which in turn has a negative effect on growth by diverting resources away from spending on socially and economically productive sectors that promote economic growth over the long term. Armed conflict is also found to have an additional negative impact on growth, separate from its impact on the composition of government spending. However, conflict does not seem to have any impact on government revenue, independent of its effect on growth and therefore on the level of real per capita income.

To assess the robustness of the results, we also estimated the model using a different measure of conflict. The middle column in Table 2 presents the results from reestimating Model 1a using the ICRG internal conflict rating, instead of the SIPRI-based conflict measure; the results are presented under Model 1b. Note that, in contrast with our previous conflict measure, a higher value of the ICRG conflict rating means a lower risk of internal conflict. The results are very similar to those presented and discussed under Model 1a, except that the age dependency ratio becomes statistically insignificant and our conflict measure no longer has a statistically significant effect on growth separate from its impact on the composition of government spending. One possible reason why the results using the ICRG conflict measure are weaker involves the nature of the ICRG index. Since the index is continuous, countries with both low and “medium” levels of conflict have different ICRG ratings. If the economy is only affected by severe conflicts, and not a “medium” level of conflict, then the ICRG ranking may not necessarily be strongly correlated with economic variables. Since the SIPRI-based index is discrete for any given year (either 0 or 1), it may do a better job of identifying conflicts with economic consequences.

Another issue of interest is whether conflict affects 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, one cannot directly infer that this comes at the expense of lower spending on education and health, as our model does not hold total government spending constant. To test the effects of conflict on these outlays more directly, we formulate 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)). The model is specified as follows:

\[
\begin{align*}
\text{GRPCY}_{it} &= \theta_r + \theta_1 \text{PCYINI}_{it} + \theta_2 \text{GSECINI}_{it} + \theta_3 \text{GREDUHL}_{it} + \\
&\quad \theta_4 \text{CONF}_{it} + \nu_{1it} \\
\text{GRGREV}_{it} &= \gamma_r + \gamma_1 \text{GRPCY}_{it} + \nu_{2it} \\
\text{GREHU}_{it} &= \eta_r + \eta_1 \text{GRGREV}_{it} + \nu_{3it}
\end{align*}
\]

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

\[ \text{GREDUHL} = \text{growth in real per capita government spending on education and health.} \]

\[ \text{GRGREV} = \text{growth in government revenue and grants, in real per capita terms.} \]

\( \theta_r, \gamma_r \) and \( \eta_r \) are region-specific factors, and \( \nu_{1it}, \nu_{2it} \) and \( \nu_{3it} \) are the usual error terms.

The results from this model are presented in Table 2 under Model 2. The conflict variable used in the estimation is the SIPRI-based conflict measure. 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, which leads to a proportionate reduction in growth of real per capita government revenue, and this in turn results in lower real per capita spending by the government on education and health. The latter has a further significant and negative impact on growth. These findings are consistent with those discussed earlier from the estimation of Model 1.

**VI. Conclusions**

This study has aimed to provide a cross-country examination of the fiscal effects of armed conflict. Two different approaches have been taken to examine this issue. In the first, we looked at 22 episodes of armed conflicts in lower- and middle-income countries, and at the evolution of various macroeconomic and fiscal variables and socio-economic indicators during the conflict period and in the years immediately preceding and following the conflict. This was followed by econometric estimation of an integrated system of equations for real per capita income growth, government revenue, and government spending to examine the main channels through which armed conflict affects the fiscal accounts.

Our findings are consistent with the hypothesis that armed conflict leads 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. In particular there is evidence that armed conflict, by negatively affecting growth of real per capita income and thereby growth in government revenue in real per capita terms, leads to lower growth of real per capita government spending on education and health, which in turn adversely affects economic growth. The results also suggest that conflict has had an additional and significant negative impact on growth, independent of its effect on the composition of government spending. On the revenue side, conflict only appears to affect the fiscal accounts through its effects on real economic activity, and does not have an independent effect per se on revenues. The inclusion of foreign grants in our measures of revenues may have contributed to this result.
These findings from the econometric estimation are generally consistent with the conclusions of the before-during-after conflict analysis on growth. The share of government revenue in percent of GDP tends to fall during the conflict period, and to pickup somewhat in the immediate post-conflict period. This finding is not reflected in our econometric estimates, perhaps because the before-during-after conflict analysis is based on a much smaller sample of countries. The before-during-after conflict 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 dramatic 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 implication is lower growth in real per capita government spending on education and health during conflict periods. Not surprisingly, the data is consistent with an increase in the share of investment in GDP in the immediate post-conflict period, and in particular in the share of private sector investment. The available data also show a dramatic pickup in inflation during the conflict period, followed by a significant decline in the immediate post-conflict period.

The results suggest sizeable economic gains for countries that end conflicts in terms of economic growth, macroeconomic stability, and the generation of tax revenues to support poverty-reducing spending. Ending conflicts can be expected to reduce the share of the budget allocated to military spending. These results confirm those found in earlier studies, which underscore the potential for this “peace dividend” to contribute to economic development. For example, a recent study by Hess and Pelz (2002) find 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.

The IMF is often heavily involved in lending for reconstruction to post-conflict countries. In particular, the IMF provides assistance under its emergency assistance facility to help members emerging from conflicts rebuild capacity and recover economic stability in post-conflict periods; over the period 1995-2000, the IMF provided such assistance (amounting to over $300 million) to seven countries. Our analysis has implications for the design of macroeconomic and fiscal policies for these countries emerging from conflicts. In particular, our results suggest that these countries are likely to experience a pickup in government tax revenues and a reduction in military spending (albeit perhaps with a lag) in the post-conflict period. As such, the resolution of conflicts should help contribute to restoring macroeconomic stability above and beyond other reform measures implemented in the post-conflict era.
Sample Selection

The information on armed conflicts provided by the Stockholm International Peace Research Institute (SIPRI) provides the starting point for selecting the sample for this study.7 This information is in broad agreement with that provided by the Heidelberg Institute for International Conflict Research (HIIK), which defines conflict more broadly than SIPRI.8 Another measure of conflict is provided by the International Country Risk Guide's (ICRG) ratings on internal conflict (available from 1984 onwards). Using the information provided by SIPRI, we find 20 countries (22 episodes) where conflict began or was ongoing after 1985, but ended before 2000 (Table 1). The sample includes 15 low-income countries (Armenia, Azerbaijan, Bangladesh, Cambodia, Chad, Congo, republic of, Georgia, Guinea-Bissau, Laos, Mozambique, Nicaragua, Senegal, Tajikistan, Uganda, and Yemen), 3 low 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 episode periods (for 14 of the 21 countries), we find a broad match between low ICRG ratings (of 8 or less) and countries that have been classified as conflict-afflicted by SIPRI and HIIK.9 The average ICRG internal conflict score (where available) for these 20 countries is 3.7 between 1984–89, 6.4 between 1990–94, and 8.2 between 1995–99. This is a reflection of the fact that in most of these 20 countries, the main conflict took place during the 1980s (or before) and during the first half of the 1990s. It should also be noted that the ICRG rating for external conflict for these same countries was 5.7, 8 and 9 over the periods 1984–89, 1990–94 and 1995–99 respectively.

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7 The Stockholm International Peace Research Institute (SIPRI) provides a quantitative definition of conflict, “the prolonged combat between the military forces of two or more governments, or of one government and at least one organized armed group, incurring the battle related deaths of at least 1,000 people during the entire conflict, and in which the incompatibility concerns government and/or territory.”

8 Unlike SIPRI, the Heidelberg Institute does not consider a cut-off level of 1,000 conflict-related deaths to classify a country as being afflicted 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.”

9 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 1990–94.
References


