

# MEASURING THE ECONOMIC COSTS OF CONFLICT

**Sungsup Ra and Bipul Singh**

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**MEASURING THE ECONOMIC COSTS OF CONFLICT**  
THE EFFECT OF DECLINING DEVELOPMENT EXPENDITURES ON  
NEPAL'S ECONOMIC GROWTH

**Sungsup Ra and Bipul Singh**

June 2005

*Sungsup Ra is Head, Macroeconomic, Finance, Governance, Regional and External Relations and Senior Country Programs Specialist in the NRM; Bipul Singh is an Economics Officer in the NRM.*

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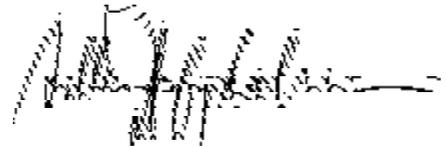
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## PREFACE

Conflict has increasingly affected Nepal's economic performance since 2001. Economic growth slowed to an average of 1.9% over the fiscal year (FY) 2002–FY2004 period compared to 4.9% in the decade preceding that. More than 12,000 people have been killed, physical infrastructure has been destroyed, thousands of people have been displaced, economic disruptions have increased, and development expenditures have declined sharply.

The study was undertaken by the Asian Development Bank's Nepal Resident Mission (NRM) to measure the economic costs of the conflict, and the effect of declining development expenditures on Nepal's economic development. This paper uses the Nepal Macroeconometric Model to measure it. The paper tries to establish the relationship between development expenditures and economic growth and contribute to improving the understanding of the costs of conflict in Nepal.

The paper *Measuring the Economic Costs of Conflict: the Effect of Declining Development Expenditures on Nepal's Economic Growth* was prepared by Sungsup Ra, Head, Macroeconomics, Finance, Governance, Regional and External Relations, and Senior Country Programs Specialist, NRM, and Bipul Singh, Economics Officer, NRM. The editorial assistance of Arun S. Rana is appreciated, and thanks are due to Kavita Sherchan, External Relations and Civil Society Liaison Officer, NRM for finalizing the report.



Sultan Hafeez Rahman  
Country Director  
Asian Development Bank  
Nepal Resident Mission

## ABBREVIATIONS

ADB	Asian Development Bank
CPNM	Communist Party of Nepal (Maoist)
FY	fiscal year
GDP	gross domestic product
NMM	Nepal Macroeconometric Model
NRM	Nepal Resident Mission

## CONTENTS

PREFACE	iii
ABBREVIATIONS	iv
ABSTRACT	vii
I. INTRODUCTION	1
II. CONFLICT AND DEVELOPMENT: LITERATURE REVIEW	2
III. SIMULATIONS	3
A. Scenarios	4
B. Results	4
IV. CONCLUSION	5
REFERENCES	7
APPENDIX: THE NEPAL MACROECONOMETRIC MODEL	8

## **ABSTRACT**

This paper attempts to measure the economic costs of conflict, focusing particularly on the impact of continued decline in development expenditures on gross domestic product (GDP) growth. The Nepal Macroeconometric Model is used to estimate GDP growth under different conflict and no-conflict scenarios of development expenditures. Scenario analysis indicates that if development expenditures decline at the current rate (4.2%), the total GDP growth loss is 8.3% for the period between the fiscal years 2005 and 2009, an average loss of 1.7% of growth per annum. If the conflict intensifies and development expenditures decline at twice the current rate (8.4%), total GDP growth lost is 10.3%, an average loss of 2.1% of growth per annum.

## I. INTRODUCTION

The Maoist insurgency in Nepal dates back to February 1996 when the “people’s war” was first launched in the hills of mid-western Nepal by the underground Communist Party of Nepal–Maoist (CPNM), which rejects the fundamental premises of Nepal’s constitutional monarchy and parliamentary system. The insurgency sharply escalated in 2001 and has adversely affected economic performance since then. Economic growth slowed to an average of 1.9% over the fiscal year (FY) 2002–FY2004 period compared to 4.9% in the decade preceding that.

Economic performance has been affected through different channels. More than 12,000 lives have been lost and physical infrastructures worth at least \$250 million have been destroyed.<sup>1</sup> Conflict related disruptions, such as strikes, security checks, blockades, shutdowns, and extortion have increased the costs of economic activity and contributed to an economic slowdown. The conflict has caused internal and external displacement of people. Nearly 400,000 rural families have been internally displaced while thousands of others have crossed over to India in search of work.<sup>2</sup> The private investment rate<sup>3</sup> has declined from 15.4% in 1996 to 12.6% in 2004, as private investors have desisted from making investments and foreign investors have stayed away.

The economy has also suffered from a decline in development expenditures, which have fallen by a third since 2001. Development expenditure exceeded regular expenditure for the first time in the country’s history in FY2002.<sup>4</sup> Thereafter, development expenditure declined at a rate of 4.2% during FY2002–FY2004 compared with a growth of 10.4% during the period between 1991 and 2001. Government development expenditures stood at about 6% of the gross domestic product (GDP) in FY2004, down from 9% of the GDP in FY2001 (Figure 1). In contrast, government security expenditures almost doubled from 1.6% to 3% of the GDP in the same period.

This paper attempts to measure the economic costs of the conflict, focusing particularly on the impact of continued decline in development expenditures on GDP growth. Development expenditure is one of the variables under the government’s control and, therefore, most likely to be cut as implementation challenges mount and security expenditures rise. GDP growth estimates for different conflict and no-conflict scenarios are compared to forecast the GDP growth loss resulting from the decline in development expenditure during the conflict. The paper will also help establish the relationship between development expenditures and economic growth.

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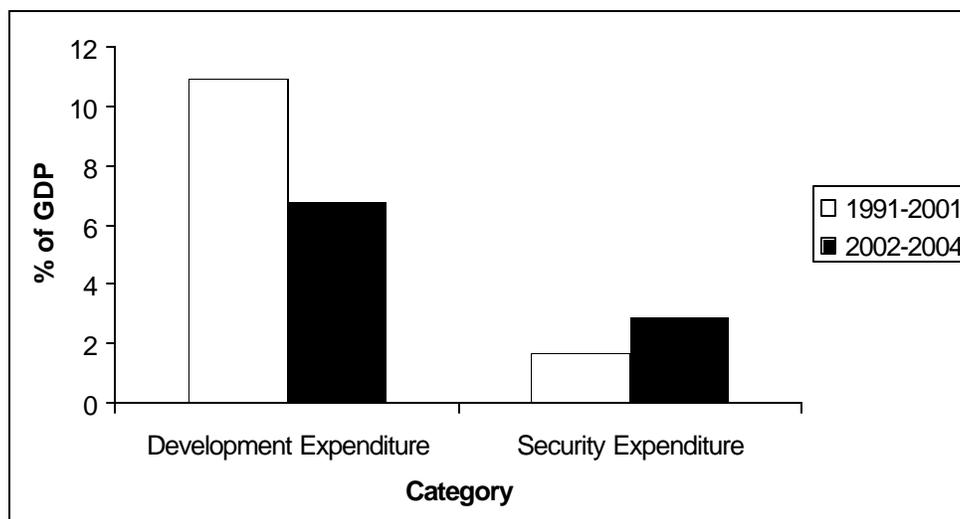
<sup>1</sup> Mahat, P. 2003. The Conflict Assessment and Implication for ADB Development Assistance in Nepal. Submitted to ADB, December 2003. Kathmandu.

<sup>2</sup> The net effect of migration from villages to urban areas and neighboring countries on income and poverty may have been positive. The results of the National Living Standard Survey II suggests that remittances from migrants contributed to increasing rural incomes.

<sup>3</sup> Gross Fixed Capital Formation as a percentage of gross domestic product.

<sup>4</sup> The Government has reclassified its reporting format to capital and recurrent expenditure since fiscal year 2004. However, data in regular and development expenditure classification is also available.

**Figure 1: Government Expenditures (FY1991–FY2004)**



Section II reviews international economic literature on conflict and development. Section III describes the Nepal Macroeconometric Model (NMM), the different scenarios analyzed in this paper, and also the results. It is observed that if the development expenditures continue to decline at the current rate, GDP growth will be 1.7% lower than if there had been no conflict. Section IV concludes.

## II. CONFLICT AND DEVELOPMENT: LITERATURE REVIEW

A number of papers have studied output losses in conflict, including Knight et al. (1996), Collier (1997), and Staines (2004). Collier (1997) investigated the consequences of civil war for GDP and its composition using a comprehensive data set of all of the civil wars during 1960–1992. Using a model of the economic effects of civil war and the post war period, the paper finds that GDP per capita, during civil wars, declines at an annual rate of 2.2% relative to its counterpart. The explanation proposed in the paper is that the decline is partly because war directly reduces production, and partly because it causes a gradual loss of capital stock due to destruction, non-saving, and the substitution of portfolios abroad.

Staines (2004) explored the dynamics of pre-1990 and post 1990 conflicts—finding significant differences in the duration and costs of conflict in these two periods. Real GDP growth was 1.7% below normal for conflicts before 1990, close to the estimates of Collier. However, for conflicts after 1990, real GDP growth was 12.3% below normal; considerably more than earlier conflicts. Countries with conflicts before 1990 experienced relatively modest contractions followed by lengthy recovery periods during the conflict itself, resulting in levels of real GDP per capita not far below the pre-conflict level and real GDP significantly higher than before the conflict. For conflicts after 1990, the pace and depth of the contractions were much more severe and typically continued to the end of the conflict, resulting in levels of output still far below the pre-conflict level.

Knight et al. (1996) investigated the effects of war and quantified a peace dividend using a 79 country data set. The study indicates that warfare has strong negative effect on investment. This is consistent with the underlying presumption of the present paper, namely that civil wars reduce growth mainly by depleting the domestic capital stock in its various forms. Indeed, when Knight et al control for physical and human capital, together with military spending and trade policy, they fail to find a significant effect of war in their growth regression.

Although no previous study has quantified the growth effects of a decline in development spending, some studies have roughly estimated the overall costs of the current conflict in Nepal. A Department for International Development study put the costs of conflict at 8–10% of the GDP. A study by National Peace Campaign (2004) put the cost of conflict at \$66.2 billion for the 1996–2003 period. However, no studies have, so far, attempted to disaggregate the impact of decline in development spending on economic growth.

This paper attempts to provide more depth to existing analyses on the costs of conflict in Nepal. It fills the gap in the existing conflict related literature on Nepal in at least three ways. The existing estimates of the economic costs of the conflict are not based on macroeconomic analysis and are, therefore, mainly rough estimates. The paper uses a 37-equation Keynesian income-expenditure model to bring rigor to estimates of costs of Nepal's conflict. A second shortcoming in the existing literature is tendency to lump together the different costs of conflict. This paper takes a first step towards disaggregating the costs by estimating the economic costs of decline in development expenditures. Finally, in contrast to existing literature, this paper is forward looking and attempts to forecast the costs of continued conflict over the FY2005–FY2009 period.

### III. SIMULATIONS

The NMM, a medium-sized annual Keynesian model, is simulated to carry out the scenario analysis.<sup>5</sup> There are 20 behavioral equations, and 17 identities in the NMM. Of the 59 variables in the system, 37 are endogenous and 22 exogenous. There are five building blocks in the NMM: final demand, prices, credit and money, government, and the balance of payments blocks. Final demand is the sum of private consumption, government consumption, private fixed investment, government fixed investment, increase in stock or inventory, and net exports. In NMM, development expenditure is a determinant in the private fixed investment, public fixed investment, and public consumption equations.

A shock, such as a decline in development expenditure, affects the economy through the propagation mechanism across the 5 building blocks. Adjusting to the shock, all the variables go through a dynamic process until the economy finds a new equilibrium with values for each endogenous variable.<sup>6</sup> Baseline estimates of the NMM show that 1% increase in development

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<sup>5</sup> Ra, S. and C.Y. Rhee. 2005. Nepal Macroeconometric Model. *NRM Working Paper Series No. 1*. Kathmandu: ADB. June 2005.

<sup>6</sup> The model is seen to be able to track the historical development of the Nepalese economy reasonably well. The root mean square percentage error is less than 10% for most variables and, most importantly, the performance of forecasting gross domestic product is excellent: root mean square percentage error is only 3.9.

expenditure results in 1.57% increase in private fixed investment, 0.65% increase in public fixed investment, and 0.18% increase in public consumption. Development expenditure has a lagged and highly sensitive relation with private fixed investment. This could be because private investors extract information about future business conditions from government development expenditure, or because government investment may have multiplier effects on the private sector. The correlation of development expenditure is stronger with public fixed investment than public consumption.

## **A. Scenarios**

The following three scenarios are analyzed using the NMM:

- (i) **No-Conflict:** Development expenditure grows at the historical (FY1991–FY2001) growth level of 10.4% for 5 years.
- (ii) **Conflict:** In this scenario, development expenditure is projected to decline by 4.2% for 5 years. This is the conflict level of growth as recorded during the FY2002–FY2004 period.
- (iii) **High Conflict:** In this scenario, development expenditure is projected to decline by 8.4% for 5 years. This growth rate is twice the current rate of decline of development expenditures to reflect further intensification of the conflict.

GDP growth estimates under the no-conflict scenario are compared with estimates under conflict scenarios. The economic cost is measured as the economic growth lost in the conflict scenarios in comparison to the no-conflict scenario.

## **B. Results**

Government consumption, government investment, and private investment are explained by development expenditure. Development expenditure is also a key component of government expenditure identity in the government block. A decline in development expenditure reduces government consumption, government investment, and private investment, thereby lowering GDP growth. This is consistent with the theoretical models of Solow (1992) and Barro (1991). If the conflict continues for the next five years and development spending declines at the current rate, the total GDP growth loss due to the decline in development spending is 8.3% for the FY2005–FY2009 period—an average loss of 1.7% of growth per annum (See table on next page). If the conflict intensifies and development expenditures decline at twice the current rate, total GDP growth loss is 10.3%—an average loss of 2.1% of growth per annum.

**Table: NMM Scenario Analysis – GDP Growth Loss  
(%)**

	<b>Conflict</b>	<b>High Conflict</b>
FY2005	1.3	1.7
FY2006	1.6	2.0
FY2007	1.7	2.1
FY2008	1.8	2.2
FY2009	1.9	2.3
<b>FY2005–FY2009</b>	<b>8.3</b>	<b>10.3</b>

#### IV. CONCLUSION

The economic growth loss attributed to the decline in development expenditures, 1.7% per annum for the conflict scenario, and 2.1% for the high conflict scenario for the FY2005–FY2009 period in the simulations is well within the 3% overall growth loss observed for the FY2001–FY2004 period. If the FY2001–FY2004 patterns of growth are assumed for the FY2005–FY2009 period, the simulations show that up to 57% of the loss in economic growth could be due to the decline in development expenditures. It is observed that the annual costs increase with each successive year of conflict. This is because the effects of decline in development expenditures accumulate each year, affecting GDP growth more as the conflict lengthens.

The above simulations do not estimate the effects of destruction of economic infrastructure, displacement of people, and disruption of economic activities on GDP growth. The impact of lower private investments in the conflict is also not fully reflected. Therefore, the overall cost of the conflict for the FY2005–FY2009 period is likely to be higher. Also, the effects of the conflict on GDP growth will persist well after the conflict is over, as low development spending during the conflict will have lowered the economy's capital stock, and development expenditures will take time to recover fully.

It is worth noting that the 3% GDP growth foregone by Nepal during the conflict is much lower than the 12.1% growth loss estimated by Staines (2004) for conflict-affected countries in the 1990s, and closer to the 2.2% loss estimated by Collier (1997) for pre-1990 conflict countries. Unlike the majority of the countries analyzed by Staines, Nepal has benefited from a steady flow of remittances from overseas economies. This is likely to have significantly ameliorated the adverse effects of the conflict on income and poverty. However, the 1.7% growth attributed to decline in development expenditures in the conflict scenario is a significant proportion of the overall growth loss.

The poverty implications of the above results are significant. At the conflict rate of decline in development expenditures, GDP per capita is forecast to be 7.8% lower over the FY2005–FY2009 period in the conflict scenario than the no-conflict scenario. This implies a poverty rate 4.8% higher than the no-conflict scenario.<sup>7</sup> The decline in development expenditures is of special concern for poverty reduction because it reduces the future productive capacity of the economy and has long-term consequences for the country. Low expenditure in areas such as education, health, and infrastructure suppresses private sector investment in the country, with adverse impact on incomes and the poverty situation in the country. Urgent efforts are, therefore, required to reverse the decline of development expenditures and limit the adverse effects of the conflict on the economy.

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<sup>7</sup> Nepal's total elasticity of poverty reduction with respect to growth has been negative 0.6%, i.e. every percent in growth of per capita expenditure resulted in 0.6% reduction in the number of poor.

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**THE NEPAL MACROECONOMETRIC MODEL**


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<b>Notation</b>	<b>Definition</b>	<b>Type</b>	<b>Unit</b>
AMORT	Amortization		million NRs
CAPREV	Sales of Fixed Assets or Capital Revenue	Exogenous Variable	„
CB	Current Account Balance		„
CG	Real Government Consumption (94/95 base year)		„
CP	Real Private Consumption (94/95 base year)		„
CPI	National Urban Consumers' Price Index		95/96=100
CURREV	Current Revenue		million NRs
DBORR	Domestic Financing		„
DC	Domestic Credit		„
DCG	Net Claims on Government		„
DCO	Claims on Government Enterprises	Exogenous Variable	„
DGP	Claims on Private Sector		„
DEVEXP	Development Expenditure	Policy variables	„
DUM9498	Dummy for 1994~1998	Exogenous Variable	
DUM97	Dummy for 1997	Exogenous Variable	
DUM99	Dummy for 1999	Exogenous Variable	
ERA	Average Exchange Rate	Policy variables	NRs. per \$
FAD	Foreign Aid Disbursement		million NRs
FBORR	Foreign Borrowing	Policy variables	„
FC	Real Gross Fixed Investment (94/95 base year)		„
FCG	Real Government Fixed Investment (94/95 base year)		„
FCP	Real Private Fixed Capital (94/95 base year)		„
FDI	Foreign Direct Investment	Exogenous Variable	„
FGRT	Grants	Exogenous Variable	„
FLOANS	Foreign Loans		„
GDP	Real GDP (base year 1994/95)		„
GDPN	Nominal GDP		„
GRANT	Grant of Foreign Aid Disbursement		„
INDP	Indian CPI	Exogenous Variable	1995=100
INT	Lending Rates of Commercial Loans	Exogenous Variable	%
IS	Real Change in Stock (94/95 base year)	Exogenous Variable	million NRs

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(Continued on next page)

(table continued)

**THE NEPAL MACROECONOMETRIC MODEL**

<b>Notation</b>	<b>Definition</b>	<b>Type</b>	<b>Unit</b>
KB	Capital and Financial Accounts Balance		„
LINV	Loans and Investment	Exogenous Variable	„
LLPAY	Lending Less Repayments		million NRs
LOAN	Loans of Foreign Aid Disbursements		„
M2	Money Supply		„
MIND	Merchandise Imports from India	Exogenous Variable	„
MM	Real Imports of Goods and Non-Factor Services (-) (94/95 base year)		„
MRUP	Merchandise Imports (CIF)		„
NFA	Net Foreign Assets		„
NOLCG	Official Loans (net) and Capital Grants		„
NOLOANS	Official Loans (net)		„
NSER	Services (net)	Exogenous Variable	„
NTAX	Nontax Revenue		„
NTRS	Transfers (net)	Exogenous Variable	„
OB	Overall Balance or Change in Reserves		„
OCGRANTS	Official Capital Grants		„
OM2	Net Capital and Other Items (-)	Exogenous Variable	„
OVSUR	Overall Balance		„
OVSURFG	Overall Balance after Grants		„
PCEO	Private Capital and Errors and Omissions	Exogenous Variable	„
PGDP	GDP Deflator		94/95=100
PRPAY	Principal Repayments Received	Exogenous Variable	„
REGEXP	Regular Expenditure	Policy variables	„
STD	Real Statistical Discrepancy	Exogenous Variable	„
TAX	Tax Revenue	Policy variables	„
TB	Merchandise Trade Balance		„
XIND	Merchandise Exports to India	Exogenous Variable	„
XRUP	Merchandise Exports, FOB		„
XX	Real Exports of Goods and Non-Factor Services (94/95 base year)		„



### 3. Money and Credit block

#### Net Foreign Assets

$$D(NFA) = -1548.60 + 0.96*OB \quad (Equation 9)$$

(-2.2)      (6.3)

#### Private Domestic Credit

$$D(DCP) = -993.71 + 0.04*GDPN \quad (Equation 10)$$

(-1.4)      (13.2)

#### Government Domestic Credit

$$D(DCG) = -235.13 + 0.83*D(DCG(-1)) - 0.86*OVSUR + 0.88*OVSUR(-1) + 1122.09*DUM99 \quad (Equation 11)$$

(-0.4)      (3.7)      (-5.1)      (4.2)      (1.0)

### 4. Government block

#### Non-tax Revenue

$$\text{Log}(NTAX) = -5.77 + 1.15*\text{Log}(GDPN) + [AR(1) = 0.29] \quad (Equation 12)$$

(-15.3)      (35.3)      (1.6)

### 5. Balance of payments block

#### Merchandise Exports

$$\text{Log}(XRUP) = 2.30 + 1.91*\text{Log}(ERA) - 2.89*(DUM97*\text{Log}(ERA)) \quad (Equation 13)$$

(14.6)      (37.6)      (-1.7)

$$+ 0.65*(DUM97*\text{Log}(XIND)) + 6.13*DUM97$$

(2.3)      (1.3)

#### Merchandise Imports

$$\text{Log}(MRUP) = -6.02 + 0.78*\text{Log}(MRUP(-1)) + 0.61*\text{Log}(GDP) + 0.17*\text{Log}(MIND) \quad (Equation 14)$$

(-2.0)      (8.5)      (1.9)      (2.3)

$$- 0.13*\text{Log}(ERA) + 0.47*(DUM97*\text{Log}(GDP)) - 1.44*(DUM97*\text{Log}(ERA))$$

(-0.8)      (3.5)      (-3.6)

#### Foreign Loans and Official Capital Grants

$$\text{Log}(FLOANS) = 0.28 + 0.62*\text{Log}(FLOANS(-1)) + 0.37*\text{Log}(FBORR) \quad (Equation 15)$$

(1.3)      (10.1)      (5.0)

$$D(OCGRANTS) = -159.20 + 1.24*D(MOVAV(FGRT,4)) + [AR(1) = 0.62]$$

(-0.3)      (2.8)      (3.0)

*Amortization*

$$\text{Log}(-AMORT) = -17.47 + 2.06*\text{Log}(GDPN) - 0.93*(DUM97*\text{Log}(GDPN)) + 11.34*DUM97 \quad (\text{Equation 16})$$

(-33.1)            (42.8)                            (-2.4)                            (2.3)

*Foreign Aid Disbursements*

$$\text{Log}(LOAN) = 0.28 + 0.37*\text{Log}(FBORR) + 0.62*\text{Log}(LOAN(-1)) \quad (\text{Equation 17})$$

(1.3)            (5.0)                            (10.1)

$$\text{Log}(GRANT) = -0.04 + 1.00*\text{Log}(FGRT) \quad (\text{Equation 18})$$

(-0.4)            (69.3)

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**Nepal Resident Mission**  
**Srikunj, Kamaladi, Ward No. 31**  
**Post Box 5017**  
**Kathmandu, Nepal**  
**Tel: +977 1 422 7779**  
**Fax: +977 1 422 5063**  
**[adbnrm@adb.org](mailto:adbnrm@adb.org)**  
**[www.adb.org/nrm](http://www.adb.org/nrm)**