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Articles

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Aims and scope

This journal raises and debates all issues related to the political economy of personal, communal, national, international, and global conflict, peace and security. The scope includes implications and ramifications of conventional and nonconventional conflict for all human and nonhuman life and for our common habitat. Special attention is paid to constructive proposals for conflict resolution and peacemaking. While open to noneconomic approaches, most contributions emphasize economic analysis of causes, consequences, and possible solutions to mitigate conflict.

The journal is aimed at specialist and nonspecialist readers, including policy analysts, policy and decisionmakers, national and international civil servants, members of the armed forces and of peacekeeping services, the business community, members of nongovernmental organizations and religious institutions, and others. Contributions are scholarly or practitioner-based, but written in a general-interest style.

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Abstracts

Sterling Huang and **David Throsby**. "Economic, political, and social determinants of peace." Although quite a lot is known about the economics of war and conflict, rather less is known about the economics of peace. In this article we address the question: What are the major factors likely to lead countries toward peacefulness? We categorize these factors in three groups: economic, political, and socio-demographic, and test a set of hypotheses as to their influence using data for 2007 and 2008 covering more than 100 countries. Our results show that all three groups of factors play some part in contributing toward peacefulness in a country. In particular, among the economic factors we find that the most important influence is exerted by the openness of the economy. Political factors also emerge as significant, indicating that a properly constituted well-functioning democratic system of governance free of political corruption is an important requirement for the achievement of a peaceful society. [Keywords: economics of peace; conflict resolution; Global Peace Index] [JEL code: H56]

Alvaro J. Riascos and **Juan F. Vargas**. "Violence and growth in Colombia: A review of the quantitative literature." This is a critical review of the empirical literature on the relationship between violence and economic growth in Colombia, an interesting case study for social scientists studying violence, conflict, crime, and development. We argue that despite the rapid development of this literature and the increasing use of new quantitative techniques, there is still much room for research. After assessing the contribution of the most influential papers on the subject, we suggest directions for future research. [Keywords: Colombia; violence; economic growth] [JEL codes: D74, K14, O4]

Steve Pickering. "Determinism in the mountains: The ongoing belief in the bellicosity of 'mountain people'." It has long been argued that mountains have an effect on wars. While some research understands this chiefly in physical terms, other research looks at the effect that mountains have on human nature. This article looks at the two thousand year history of the term "mountain people." It explores how the belief has emerged that living in mountainous regions changes people to the degree that it makes them more likely to engage in conflict. It also explores how mountain people can be seen in a more positive light, but this perspective is often ignored by both popular media and conflict research. It makes the case that the foundations upon which perceptions of "mountain people" are based are rather shaky and somewhat misleading for empirical conflict research. [Keywords: mountains; determinism; conflict] [JEL code: D74]

Vincenzo Bove. "A theoretical approach to the demand and supply for peacekeeping." The post-cold war period is characterized by peace operations and negotiations, with increased size, number, and intensity of external interventions, particularly those sponsored by multilateral organizations. This article examines some factors that influence the demand for peacekeeping missions, i.e., conflict situations that invite third-party interventions, as well as the supply of peacekeeping, the ability and desire of states to intervene elsewhere through peacekeeping missions. On the demand side, a framework is developed that synthesizes the main obstacles to peacekeeping intervention, in particular the role of overconfidence, and explains how interpersonal preferences, such as the desire for vengeance, contribute to conflict escalation. On the supply side, the article explains some of the conditions determining countries' contribution to peace missions. [Keywords: peacekeeping; third-party intervention] [JEL codes: D74, D82, H56]

John Gilbert, **Krit Linananda, Tanigawa Takahiko**,, **Edward Tower**, and **Alongkorn Tuncharoenlarp**. "The deadweight cost of war: An illustrative CGE." War is costly both because of the resources used up and because of the inefficiency introduced by the higher taxes necessary to finance them. War has been justified by its ability to help an economy achieve full employment. Robert Barro argues that war increases employment because folks work harder to smooth consumption and take advantage of the higher interest rates caused by the scarcity that accompanies war. In his view, it does not reflect putting previously wasted resources to work. This article describes the simulations of a small-scale intertemporal computable general equilibrium model. It illustrates that the cost of war depends on how it is financed, and that the increase in employment that it generates may be explained by the logic that Barro offers. Our model can be loaded into GAMS, a program which is available free of charge online, so readers can themselves simulate variations of the model. [Keywords: war; peace; marginal welfare cost of tax collection] [JEL codes:C68, H21, H56]

Zachary Tambudzai. "Determinants of military expenditure in Zimbabwe." While many articles have been written on the determinants of military expenditure in developing countries, few have attempted to use a qualitative approach to investigate the underlying motives for military expenditure. This article uses data drawn from interviews with key informants and documentary sources to study the determinants of military expenditure in Zimbabwe. Findings suggest that Zimbabwe's military expenditure since 1980 has been influenced more by internal political dynamics than by economic factors. The most significant factors include regime security, elite corruption and rent-seeking, liberation war ideology hangover, and fear. [Keywords: military expenditure; determinants; informal interactions; regime security; rent-seeking; Zimbabwe] [JEL code: H56]

Economic, political, and social determinants of peace

Sterling Huang and *David Throsby*

A number of studies have examined the determinants of intranational and international conflict. Economists in particular have looked at the economics of war and the preparation for war, using military or defense expenditure as the primary indicator of a dependent or explanatory variable.[1] Such expenditure can be seen as defensive if a particular country is not actively engaged in conflict, or offensive if it is engaged in war or preparing for military operations. Either way, economists' use of military or defense expenditure in their analyses of the relationships between these expenditures and a range of economic variables has meant that their studies have been orientated toward the economics of war rather than the economics of peace. While it is certainly true that understanding the economics of war can be regarded as a necessary prerequisite to finding ways toward conflict prevention, the fact remains that to study the economics of peace can provide an alternative and more direct understanding of what makes for a peaceful society. If it is possible to identify what factors are associated with peace within and between countries, it may help in the formulation of policy strategies to improve the prospects for reducing conflict around the world.

In this article we draw on the literature of defense economics to identify economic, political, and social factors that are related to military spending, with a view to formulating testable hypotheses concerning the obverse relationship, i.e., the extent to which such factors might be determinants of peace. On the basis of a review of this literature we put forward three propositions relating to economic, political, and socio-demographic factors respectively that can be hypothesized as determinants of peacefulness. We then proceed to test these propositions by estimating a simple model using OLS regression and principal components analysis for a dataset covering more than 100 countries over the two-year period 2007-2008. In the final section of the article we discuss some implications of our results.

Military expenditure and conflict

Economic variables

The principal economic variables that have been studied in research work on the determinants and effects of defense expenditure have been the rate of economic growth, the level of inflation, and the importance of external trade to a country's economy. We consider each of these in turn.

While understanding the economics of war can be regarded as a prerequisite to finding ways toward conflict prevention, the study of the economics of peace can provide an alternative and more direct understanding of what makes for a peaceful society.

First, a large number of studies over a long period of time have examined the relationship between military expenditure and economic growth. Overviews of this area have variously pointed to three different perspectives that have emerged.[2] The first strand sees defense expenditure as a stimulus to growth, through its effects in increasing aggregate demand, absorbing idle resources, contributing to employment creation, and producing positive externalities especially through technological spillovers. The second strand takes the opposite view, namely that increased military expenditure will retard growth because of the opportunity costs of the resources involved. The third line of argument acknowledges that both of these causal connections may be possible, depending on the particular resource base, stage of development, and structural features of the economy of the country under study.[3] The conclusion to be drawn is that there appears to be no systematic and generalizable effect in one direction or the other, the actual experience being dependent on a country's particular circumstances.

Second, research into the relationship between military expenditure and inflation has also thrown up a variety of results.[4] Perhaps unsurprisingly, it appears that defense expenditure could potentially affect the rate of inflation in an economy where there is full employment and full capacity utilization by placing excessive pressure on demand, whereas in an underemployed economy military expenditure is likely to have little or no impact on the price level.

Finally, in regard to external trade we can point to three different hypotheses that have been investigated. The first is that trade reduces conflict because trade is motivated by national needs and hence is likely to generate mutual gains for all parties. A second body of argument states that trade causes conflict by generating friction and intensifying competition among countries. And third, some studies claim that the effect of trade on conflict is mixed or negligible.[5] Despite the variability of the results from empirical research on the relationship between trade and conflict, it seems plausible to conclude that increased economic interdependence is likely to mean that the parties will have more to lose than gain from conflict, and that therefore trade will tend to diminish conflict rather than increase it.

Political and socio-demographic variables

Political conditions and socio-demographic characteristics provide the context within which the mentioned economic variables operate and need to be taken into account in modeling economic relationships. For example, it is plausible to postulate a link between political instability and internal conflict or external aggression. Such a link

may operate through the effects of political unrest on economic conditions, for example by its influence on holding back economic development.[6] But political and socio-demographic factors may also play an important role in their own right in determining the peacefulness of countries.

In regard to political factors, several studies provide specific examples and empirical evidence for the relationship between political factors and the level of peacefulness of a country. One study, for example, demonstrates the vulnerability of the capital market to political conditions in a given country, drawing attention to the joint impact of political and economic conditions on the country's peacefulness. Another shows that economic interdependence and democracy have important benefits for peace.[7]

Turning to demographic features, we note that adverse socio-demographic circumstances in a country such as poor health status, low educational levels, or high levels of interethnic intolerance are likely to be associated with increased tendency to violence and conflict. Paul Collier presents a theoretical argument showing that conflict is more concentrated, or the risk of having a conflict is much higher, in countries with less democracy, little education, fast population growth, and ethnic dominance. Geographic dispersion of the population is also important in determining the risk of conflict.[8]

Hypotheses

Based on the larger literature illustrated by this brief review, this article puts forward hypotheses on the determinants not of the likelihood of war but of the actuality of peace. The hypotheses are grouped under the same three headings—namely economic, political, and socio-demographic factors—and are summarized as follows.

Proposition 1 (economic): Greater peacefulness will be associated with (1) increased prosperity (higher GDP per head, higher growth rates); (2) lower rates of unemployment; (3) a more equal distribution of income; and (4) greater economic engagement with other countries.

Proposition 2 (political): Greater peacefulness will be associated with (1) stronger and more stable political institutions; (2) less corruption; and (3) greater acceptance of civil liberties, free speech, and respect for human rights.

Proposition 3 (socio-demographic): Greater peacefulness will be associated with (1) higher average levels of education; (2) higher average health status; (3) lower population densities and rates of population growth; and (4) less ethnic intolerance.

In the following section, we test these propositions using as the measure of peacefulness of countries around the world the Global Peace Index (GPI) as compiled for the years 2007 and 2008 by the Economist Intelligence Unit on behalf of the Institute for Economics and Peace.[9] The explanatory variables are derived from data for more than 100 countries over the two year period 2007-2008. Data sources include the Global Market Information Database, the Economist Intelligence Unit, the World Bank, Transparency International, the United Nations Development Programme, and UNESCO. A model specifying the GPI score as a function of appropriate explanatory variables is estimated using principal components analysis and OLS regression.

Model and data

The stated hypotheses can be tested simultaneously by formulating a model in which peacefulness is expressed as a function of a series of variables measuring the influences represented in the separate hypotheses. Thus the independent effect of each of the influences is tested under conditions controlling for the effects of all other variables.

The dependent variable in our model is derived from the level of peacefulness of a given country as measured by its GPI score. The original GPI scores as published by the Institute for Economics and Peace range from 1.10 to 3.29, where a higher value indicates less peacefulness. For our purposes we prefer our dependent variable to represent the positive attributes of peacefulness; hence the original GPI scores are subtracted from 4 so that the higher the value of the converted score, the more peaceful is the country.

The explanatory variables and their sources are categorized according to the three groups of factors hypothesized as affecting (positively or negatively) a country's peacefulness. The economic factors are: the rate of economic growth; per capita GDP; income distribution; inflation rate; unemployment rate; and openness of the economy. The political factors are: effective democratic governance; level of public-sector corruption; press freedom; and civil liberties. The socio-demographic factors are: education levels of the population; literacy levels of the population; health status of the population; importance of religion in political or social life; and population growth rate.

The variables representing these factors, as well as their measurement and source, are explained in Table A1 (in the appendix). All variables are measured for the years 2007 and 2008 unless otherwise indicated. Table 1 shows summary statistics for all the variables included in the model. The countries contained in the dataset range from some of the least developed to some of the most advanced countries in the world, as is evident from the minima and maxima of the variables such as income, literacy, health, and education. Table 1 illustrates especially the wide variability in some of the economic characteristics, including income distribution, growth, inflation, and unemployment.

Similarly, there are substantial differences in peacefulness among countries as measured by the index used to derive the dependent variable in our model; in the years under review, the Nordic countries including Iceland, Denmark, and Norway were among the most peaceful, while the least peaceful were Iraq, Somalia, Sudan, and Afghanistan.

Table 1: Summary statistics

Variable	*Mean*	*Median*	*St.dev.*	*Min.*	*Max.*
PEACE	0.66	0.70	0.24	-0.35	1.04
GROWTH	0.05	0.06	0.04	-0.02	0.23
INCOME	8.66	8.62	1.55	5.21	11.69
DISTR	39.86	37.90	10.78	3.90	74.30
INFL	8.21	6.70	6.26	-5.50	35.00
UNEMP	9.17	8.00	6.78	0.60	47.00
TRADE	-0.24	-0.16	0.68	-5.54	1.56
GOVERN	5.48	5.71	2.35	0.00	10.00
CORRUP	5.71	6.60	2.21	0.40	8.60
RESTPF	28.03	21.50	24.19	0.50	103.75
LIBRTY	6.68	7.94	2.75	0.59	10.00
EDUC	12.09	12.26	3.63	2.80	20.69
LITRCY	83.74	90.90	18.45	20.00	99.90
HEALTH	67.57	71.36	12.04	34.97	82.08
RELIG	2.83	3.00	1.16	1.00	5.00
POP	0.63	0.68	0.74	-0.93	3.11

Results

We estimate the model outlined above in two ways. First, we use ordinary least squares (OLS) to regress the log of the peacefulness score on the independent variables as a means of identifying the effects of individual variables when the other explanatory variables are held constant. We then employ a second estimation procedure, principal components analysis (PCA), to check the validity of our findings. This approach allows us to examine the influence of groups of variables on the level of peacefulness and provides an independent assessment of the robustness of the model.

Model estimation via OLS regression

Results of the OLS estimation of the model are shown in Table 2. Looking first at Proposition 1 that relates to the economic factors, we note that the most significant influence on peacefulness appears to be the openness of the economy, with a strong positive effect apparent in the trade variable. The coefficient on this variable indicates that a 1 percent increase in the annual value of a country's trade would result in a change in the raw score for the peacefulness variable of approximately exp(0.04), equivalent to an increase of about 30 places in the country's peacefulness ranking amongst 128 countries.

Among the other economic factors, it appears that the growth rate rather than the level of income is a determinant of peacefulness, although the positive coefficient on the growth variable is not significant. Greater equality in the distribution of income is associated with greater peacefulness, although the coefficient on this variable is not

Table 2: OLS model estimation (dependent variable: PEACE)

Variable	*Regression coefficient*	*t-ratio (df=236)*	*p-value*
GROWTH	0.4133	1.30	0.194
INCOME	-0.0293*	-1.76	0.080
DISTR	-0.0020	-1.49	0.137
INFL	-0.1972	-1.07	0.286
UNEMP	-0.2251	-0.89	0.375
TRADE	0.0414***	3.00	0.003
GOVERN	0.0259**	2.18	0.031
CORRUP	-0.0289***	-3.18	0.002
RESTPF	-0.0024***	-2.68	0.008
LIBRTY	-0.0243**	-2.12	0.035
EDUC	0.0056	0.92	0.358
LITRCY	0.0016	1.33	0.185
HEALTH	0.0012	0.66	0.510
RELIG	-0.0371***	2.77	0.006
POP	-1.8563	-0.79	0.432
TIME	0.0237	1.07	0.285
CONSTANT	1.0947***	6.05	0.000

n = 253; R^2 = 0.5232; adj. R^2 = 0.4909; F = 26.08***; variance of the estimate = 0.0283; sum of squared errors = 6.6828; mean of dependent variable = 0.6604; ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

statistically significant. The remaining economic variables have signs consistent with Proposition 1, but are not statistically significant.

Greater peacefulness is strongly related to the first three political factors as listed in Proposition 2: Countries with more strongly developed and well-functioning democratic governance clearly tend to be more peaceful, as do countries with lower levels of public sector political corruption, and countries with more press freedom. Our results suggest that a 1-unit increase in a country's governance score, or a 1-unit decrease in its corruption index, would improve the country's peacefulness ranking by up to 30 positions. However, our results do not support the remaining element in Proposition 2: instead, they indicate a negative rather than the expected positive effect of the observance of civil liberties.

The most influential factor to emerge among the socio-demographic factors included to test Proposition 3 is the religious variable. It must be noted that this provides only indirect evidence relating to the fourth element in this Proposition, namely ethnic intolerance. All that we can say is that our results indicate a greater level of peacefulness to be evident in more secular societies. Other socio-demographic factors are not statistically significant in affecting peacefulness, although at least we can say that the coefficients on education, literacy levels, and health status have the expected positive sign.

Alternative estimation via PCA

A potential problem with the OLS estimation is that coefficient estimates and the resulting statistical inference are sensitive to the degree of correlation among the explanatory variables. The possible presence of multicollinearity in our empirical model can be assessed by examination of the simple correlation matrix for the independent variables. Shown in Table A2, the data indicate that, although we do not have anything approaching perfect multicollinearity, some of the variables show moderate correlation, for example between income, health status, and education. It is therefore important to apply an alternative analytical method to check our results. Such an alternative approach is provided by PCA.

The logic of applying PCA to our model is that this technique allows us to derive a reduced set of factors—in effect, a set of orthogonal (uncorrelated) latent variables—that reproduce the total system variability and can be used to explain the underlying structure of the data in a more meaningful way. Moreover, once these principal components have been identified, they can be used as explanatory variables in a regression with the original dependent variable on the left-hand-side. Given that the factors are orthogonal to each other, we avoid the problem arising from multicollinearity.

Estimation of the principal components yields a series of variables, the first of which has maximal overall variance, the second has maximal variance among all unit-length linear combinations that are uncorrelated to the first principal component, and so on. The last principal component has the smallest variance among all unit-length linear combinations of the variables. All principal components combined contain the same information as the original variables, but the important information is partitioned over the components in a particular way: In particular, the components are uncorrelated with each other, and earlier components contain more information than later components. PCA thus conceived is simply a linear transformation of the data that is equivalent to factor analysis when we assume that all the variations in the covariance matrix are fully captured by the independent variables. In our present analysis, given that our choice of independent variables includes most of the factors that are known a priori to influence either peace or military expenditure, such an assumption appears to be reasonable.

To carry out the PCA, we first perform spectral decomposition on the covariance matrix, with the resulting collection of eigenvectors forming the so-called factor loading matrix; each column in the factor loading matrix represents the weights placed on the original variables, and the principal component is constructed as the product of weight and original variable. The pattern of weights suggests what each latent variable is measuring, with the absolute value of the weights indicating the relative importance of each explanatory variable in the model in forming that principal component. The loading matrix for the first six components from this analysis is shown in Table 3.

The results in Table 3 show that the first six principal components (PC1 to PC6) explain just over 80 percent of the variance. Note that the contribution of each principal component in explaining the total variance is in descending order, i.e., PC2 contributes less than PC1, PC3 less than PC2, and so on. We can see from Table 3 that in our analysis PC1, and to a lesser extent PC2, load heavily on the political and socio-demographic factors in our model. The remaining principal components reflect how different economic factors influence peacefulness. PC3 captures the effect of openness of the economy, with a weight of 0.742 attached to the trade variable; the significance of a country's growth rate rather than its level of per capita GDP is also highlighted in this component. Unemployment is prominent in PC4, while inflation, income distribution, and again the growth rate appear in PC5 and PC6.

To complete the analysis we regress the original dependent variable, PEACE, on these six principal components. The results, as shown in Table 4, are consistent with the original model estimation in Table 2. Using only six principal components, rather than 15 independent variables, the regression in Table 4 explains a similar proportion of the variance, and the overall PCA reflects the same pattern of influence of the explanatory variables as in the earlier OLS analysis.

We can conclude that despite the moderate collinearity in the original OLS estimation, we are justified in using the model put forward in this article as a basis for testing our hypotheses concerning the influence of economic, political, and socio-demographic variables on peacefulness.

Table 3: Loading matrix for the first six principal components

Variable	*PC1*	*PC2*	*PC3*	*PC4*	*PC5*	*PC6*
GROWTH	0.180	0.220	0.454	0.077	0.435	0.027
INCOME	-0.327	0.157	0.168	-0.076	-0.138	-0.188
DISTR	0.169	-0.416	0.041	-0.169	0.373	-0.682
INFL	0.202	0.223	-0.366	-0.037	0.414	0.291
UNEMP	0.081	-0.152	0.066	-0.833	-0.152	0.192
TRADE	-0.103	-0.064	0.742	0.031	0.115	0.257
GOVERN	-0.315	-0.279	-0.135	0.156	0.048	0.001
CORRUP	0.329	0.065	-0.033	-0.192	-0.207	0.026
RESTPF	0.241	0.463	-0.075	0.012	-0.053	-0.287
LIBRTY	-0.299	-0.352	-0.124	-0.082	0.231	0.094
EDUC	-0.334	0.152	-0.016	-0.093	0.025	-0.197
LITRCY	-0.294	0.271	0.024	-0.203	0.337	-0.257
HEALTH	-0.302	0.332	0.014	-0.071	-0.140	-0.176
RELIG	0.228	0.038	0.134	-0.205	-0.407	-0.177
POP	0.278	-0.219	0.129	0.315	-0.211	-0.229
Cumulative proportion of variance explained (%)						
	43.8	54.2	62.3	70.0	75.6	80.5

Table 4: Principal components regression (dependent variable: PEACE)

Variable	*Regression coefficients*	*t-ratio (df=236)*	*p-value*
PC1	-0.0223***	-9.01	0.00
PC2	0.00971***	4.33	0.00
PC3	0.0533***	3.59	0.00
PC4	0.1243***	7.14	0.00
PC5	0.0369***	5.55	0.00
PC6	-0.01451***	-4.01	0.00
CONSTANT	0.8899***	7.90	0.00

n = 253; R^2 = 0.5027; adj. R^2 = 0.4905; F = 41.63***; variance of the estimate = 0.0283; sum of squared errors = 6.9706; mean of dependent variable = 0.6604; *** indicates significant at 1% level.

Conclusions

We began this article by pointing out that we know quite a lot about the economics of war, but rather less about the economics of peace. In the article we have drawn insights from the literature in defense economics to suggest some important variables that could be hypothesized to be determinants of the absence rather than the presence of conflict; in other words we have addressed the question: What are the major factors likely to lead countries toward peacefulness? We categorized these factors in three groups—economic, political, and socio-demographic—and put forward hypotheses to identify causal connections involved. We then proceeded to test the hypotheses using data for 2007 and 2008, covering more than 100 countries, with peacefulness measured by the Global Peace Index.

Our results show that all three groups of factors play some part in contributing toward peacefulness in a country. We find that among the economic factors, the most important influence is exerted by the openness of the economy. This is a significant result in the context of ongoing efforts within the WTO to reduce barriers to international trade, especially through providing improved access for exports from poor countries into markets in the developed world. It suggests that as well as promoting economic development, freer trade is likely to have benefits for affected countries through encouraging peacefulness, other things being equal. Our finding in regard to the openness of the economy also supports other research that points to intercultural dialogue, closer diplomatic ties, and social and cultural interrelationships between countries as means toward reducing the potential for conflict.

Also among the economic factors, our results indicate that economies with high growth rates are likely to be more peaceful than those experiencing slower growth. However, as Amartya Sen has pointed out, rapid growth on its own does not guarantee social progress. Much depends on how the benefits of growth are distributed: It is important that they are not captured by sectional interests but distributed equitably, especially in pursuit of poverty alleviation objectives.[10] Our results suggest that there is an additional payoff to equitable growth, one measured in terms of peacefulness.

Political factors emerge as particularly significant in our analysis. The results lend weight to the proposition that a properly constituted, well-functioning democratic system of governance free of political corruption is an important requirement for the achievement of a peaceful society. Many examples exist in the contemporary world where countries subject to nondemocratic government are prone to internal and external conflict. Our results suggest that popular support in such countries for a more democratic political system might, if successful, lead not only to improvements in civil rights but also to greater peacefulness.

Not only is a well-governed society likely to avoid internal conflict, it may also be more capable of responding to popular demand for a greater sense of peace and security in the everyday lives of its people. Peacefulness is, in economic terms, a public good, and a polity well-attuned to the demands for collective goods in general

might be expected to heed the people's will in its peace-related activities. As a public good, the demand for peacefulness could be measured using the methods of nonmarket valuation that have been used to assess the demand for security expressed through preferences for different levels of military expenditure.[11]

Finally, of the three groups of factors influencing peacefulness, we find the least strong effects among the socio-demographic characteristics of a country's population. There is some limited evidence in our results for a greater level of peacefulness to be associated with positive human development indicators such as literacy, education, and health. Countries with low rates of population growth, mostly in the developed world, also tend to be more peaceful. The one statistically significant factor among the socio-demographic variables is that measuring the importance of religion in politics and in social life. We find that secular societies tend to be more peaceful than those characterized by a politically influential state religion.

The model presented in this article represents only a partial explanation of factors associated with peace. Data limitations and specification problems mean that potentially significant variables had to be omitted, such as the influence of international networks and alliances. Furthermore, different insights may be possible if the model could be estimated for given countries or groups of countries using time-series rather than cross-section data. Clearly more research in this important area is needed.

Notes

Sterling Huang, a former staff member of the Department of Accounting at Macquarie University, Sydney, Australia, is currently a PhD student at INSEAD, Singapore. He may be reached at <sterling.huang@insead.edu>. **David Throsby**, the corresponding author, is Professor of Economics at Macquarie University, Sydney, Australia. He may be reached at <david.throsby@mq.edu.au>. With the usual caveat, the authors acknowledge the helpful comments of two referees on earlier versions of this article.

1. See, for example, contributions to Sandler and Hartley (2007).

2. Such as those of Dreze (2006); Brauer (2007); Dunne (2009); Hartley (2010).

3. First: e.g., Atesoglou (2002); Aslam (2007); Kollias, *et al*.(2007). Second: Mylonidis (2008); Pieroni (2009). Third: e.g., Aizenman and Glick (2006); Kollias and Paleologou (2010).

4. Sandler and Hartley (1998); Tzeng, *et al*. (2008).

5. First: Gartzke, *et al*.(2001); Polachek, *et al*. (2005); Dorussen (2006); Polachek (2007). Second: Barbieri (2002). Third: Martin, *et al*. (2008).

6. See for example assessments of the effects of political instability on economic development in Sub-Saharan Africa (Fosu, 2004) and in the Middle East and North African region (Tosun, *et al*. 2008).

7. See an overview in Goldstone, *et al*. (2010). One study: Gartzke, *et al*. (2001). Another: Oneal and Russett (1999).

8. Collier (2006).

9. Institute for Economics and Peace (2008).

10. See, for example, Sen (2011).

11. See, for example, Throsby and Withers (2001).

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Appendix. Table A1: Dependent and explanatory variables

Variable	Definition	Source
PEACE: level of peacefulness	Log of converted score on Global Peace Index for 2007 and 2008 (details see text)	Institute for Economy and Peace (IEP)
ECONOMIC		
GROWTH: rate of economic growth	Real GDP growth rate (%) in 2007-08	GMID
INCOME: per capita income	Log of GDP per capita (USD, 2008)	GMID
DISTR: income distribution	Gini coefficient (%) for 2007-08	UN Human Development Index; EIU
INFL: rate of price inflation	Annual inflation rate (%) in 2007-08	GMID
UNEMP: level of unemployment	Annual unemployment rate (%) in 2007-08	EIU
TRADE: openness of the economy	Log of exports plus imports as a percentage of GDP (%)	EIU
POLITICAL		
GOVERN: functioning of government	Index representing qualitative assessment of whether freely elected representatives determine government policy and whether there is an effective system of checks and balances on the exercise of government authority. Ranked from 1 to 10, with 1 indicating low level of functioning/governance	EIU Democracy Index
CORRUP: level of public sector corruption	Index drawing on multiple expert opinion surveys that poll perceptions of public sector corruption scoring countries on a scale from 0-10, with 0 indicating high levels of perceived corruption and 10 indicating low levels of perceived corruption.	Transparency International, Corruption Perception Index
RESTPF: restrictions on press freedom	Index reflecting the degree of freedom journalists and news organisations enjoy in each country, and the efforts made by the state to respect and ensure respect for this freedom. The score ranges from 0 to 100, with 100 indicating the highest level of restriction on press freedom.	Reporters without Borders
LIBRTY: civil liberties	Index representing qualitative assessment of the prevalence of civil liberties based on a questionnaire. Ranked from 1-10, with 1 indicating very low and 10 indicating very high.	EIU Democracy Index

SOCIO-DEMOGRAPHIC		
EDUC: level of education	Mean years of schooling primary to tertiary	UNESCO
LITRCY: adult literacy	Adult literacy rate as a percentage of population over the age of 15	UNDP, Human Development Report
HEATLH: health status of population	Life expectancy at birth is the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life	World Bank, World Development Indicators
RELIG: importance of religion in national life	Index representing qualitative assessment of the level of importance of religion in politics and social life. Ranked from 1 to 5 (very low to very high)	EIU
POP: projected population growth rate	Projected annual population growth from 2004 to 2050 (%, not compounded)	UN Population Reference Bureau
TIME: dummy variable	2007 = 0; 2008 = 1	n/a

Abbreviations:
GMID: Global Market Information Database
EIU: Economist Intelligence Unit
UNDP: United Nations Development Programme
UNESCO: United Nations Educational, Scientific and Cultural Organization

Table A2: Simple correlation matrix for independent variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	GROWTH														
(2)	INCOME	-0.29													
(3)	DISTR	0.13	-0.38												
(4)	INFL	0.21	-0.45	0.11											
(5)	UNEMP	0.01	-0.11	0.19	0.04										
(6)	TRADE	0.10	0.27	-0.07	-0.28	-0.03									
(7)	GOVERN	-0.43	0.54	-0.21	-0.40	-0.24	0.12								
(8)	CORRUP	0.40	-0.78	0.39	0.48	0.23	-0.21	-0.74							
(9)	RESTPF	0.32	-0.42	0.11	0.39	0.02	-0.25	-0.63	0.52						
(10)	LIBRTY	-0.40	0.46	-0.10	-0.35	-0.06	0.15	0.81	-0.57	-0.74					
(11)	EDUC	-0.35	0.74	-0.37	-0.39	-0.14	0.18	0.60	-0.66	-0.36	0.59				
(12)	LITRCY	-0.17	0.70	-0.25	-0.22	-0.14	0.17	0.45	-0.49	-0.30	0.48	0.73			
(13)	HEALTH	-0.29	0.73	-0.48	-0.32	-0.20	0.16	0.48	-0.59	-0.23	0.44	0.73	0.70		
(14)	RELIG	0.24	-0.39	0.21	0.23	0.21	-0.11	-0.46	0.50	0.30	-0.44	-0.46	-0.41	-0.27	
(15)	POP	0.29	-0.55	0.41	0.21	-0.01	-0.11	-0.45	0.42	0.30	-0.52	-0.61	-0.69	-0.60	0.43

Violence and growth in Colombia: A review of the quantitative literature

Alvaro J. Riascos and *Juan F. Vargas*

Colombia is an exceptional case study for social scientists interested in conflict, crime, and violence in general. It is a country that suffers not only from a civil conflict but also from high levels of crime, forced displacement, kidnapping, and narcotrafficking. Since the 1990s, economists working on Colombia have turned increasing attention to the analysis of the causes and costs of crime and conflict and the academic output is now abundant. Yet this literature is virtually unknown to the international academic community.[1] The aim of this article thus is to provide a brief review of the evolution and state of art of the research on the relationship between violence and economic growth in Colombia. We hope to demonstrate that Colombia is an interesting case well worth studying and contribute to the diffusion of this literature among academics and policymakers working in the field of violence.

The review follows three guidelines. First, we focus on quantitative studies on the effect of violence on economic growth.[2] Second, we do not distinguish among works using conflict or crime variables, nor we differentiate between forms of crime or ask about their origins. While the majority of the papers we refer to focus on crime, some of them also use data on the internal conflict. Although they can be related in specific contexts, crime and conflict are different phenomena and their interrelation has not yet been studied sufficiently.[3]

Throughout, we stick to crime and conflict concepts as used in the specific papers we review. Otherwise, we will use the word violence generically, although we recognize this is problematic.[4] For example, the concept of crime is itself quite broad. It is variously associated with the homicide rate, manslaughter, street crime, crime against property, drug trafficking, kidnaping, or a mixture of some or all of these. Although we believe that a clear distinction of the different types of crime and their impact on economic growth should be at the top of any research agenda, in this review, once more, we use the term violence in a generic way.

Our third guideline concerns the emphasis we place on the *rate of growth* of the economy as the outcome variable of interest. That is, we abstract from the long-term relationship between violence and the economy and focus on the short-term , leaving aside studies that have had as their variable of interest the *level* of output.[5] As illustrated by Figure 1, these are indeed very different concepts and associated research questions. The figure shows the evolution of the level of real per capita GDP (left axis) and its rate of growth (right axis) for the period 1950-2005, measured in purchasing power parity terms.[6] After a short episode of negative growth in 1958 the country grew steadily (and with low volatility) until the mid-1970s. The rate of growth was again negative in 1982 but, in contrast to the rest of the Latin America region then hit by a debt crisis, Colombia rapidly resumed its growth path, albeit with a perceptible increase in volatility. In 1999, an unprecedented domestic crisis made Colombia's per capita growth rate reach its all-time low at (nearly) minus six percent. After a large upward bounce in 2000, the growth rate recovered.

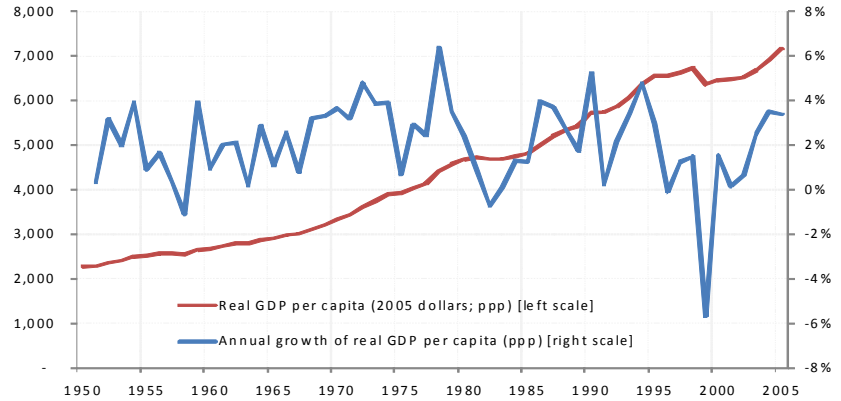

Figure 1: Real per capita GDP and GDP growth, Colombia, 1950-2005 (in purchasing power parity dollars, 2005).
Source: DANE (various), GRECO (2002), and Florez (2000). See text.

The changes in the growth rate of the economy have left their trace in the real per capita GDP level of course, but Figure 1 also shows that the latter has increased steadily over the whole 1950 to 2005 period. In fact, average output per person has more than tripled.

This review is not meant to be exhaustive. We have made an effort to survey the most influential studies given the topic limitations that we have imposed on ourselves. Over the last two decades, the empirical literature on violence and economic growth in Colombia has evolved from simple comparisons and cost accounting exercises to more sophisticated techniques and the use of specific theoretical frameworks. This coincides with the recent trend in the international literature, which increasingly is making use of modern techniques to better understand the dynamics of violence, crime, and conflict.[7] Our contribution is to document the evolution and current state of research pursued by economists and other social scientists interested in Colombia as a case study of a violent country.

Violence and economic growth in Colombia

Economists in Colombia became interested in studying violence using quantitative approaches some 15 years ago. The first few papers were conceived as a reaction to

a 1988 study by a multidisciplinary group of social scientists that related Colombia's growing record of violence to variables associated with economic deprivation.[8] A few years later, in 1995, three independent quantitative studies by Gaitán, Rubio, and by Montenegro and Posada questioned this conclusion, which by that time had already become part of the local "conventional wisdom." In contrast to the qualitative approach of the 1988 interdisciplinary study, the 1995 articles were at the time novel in their quantitative approach and should be identified as pioneers in the empirical analysis of the relationship between violence and the economy in Colombia.

While Gaitán (1995) focuses on the determinants of violence incidence, Rubio (1995) and Montenegro and Posada (1995) tackle the problem in terms of its consequences on economic growth. We therefore exclude the former from the survey.

Focusing on the 1980s and early 1990s, Rubio (1995) explores the correlation between the aggregate homicide rate (killings per 100,000 people) and GDP growth. The author concludes that the persistently high homicide rate during that period prevented the economy from growing two additional percentage points per year. In contrast, Montenegro and Posada (1995) [hereafter MP] find a positive relationship between the homicide rate and GDP growth at the regional level during the late 1970s and the 1980s. They argue that the high level of violence during that period was the result of the rapid economic growth of some regions that did not have the required institutional strength (e.g., protection of property rights) to transform this growth into a virtuous circle of development without crime. In turn, the fast output growth created wealth easy to predate and disrupt. Rubio (1995) shows that the results of MP are not robust to changing the estimation period and provides evidence in turn consistent with the idea that more violent periods unambiguously coincided with lower growth rates.

From a methodological point of view, MP's findings come from estimating an econometric model in which the dependent variable is the regional growth rate and the main explanatory variable is the homicide rate. The latter is included both in levels and as a squared term to explore potential nonlinearities. Indeed, the authors find a nonmonotonic (inverted-U) relationship. Their interpretation is that when violence reaches some critical threshold, the positive correlation between crime and growth reverses and crime starts hampering economic growth. In short, the story that MP put forward is idiosyncratic. At lower levels of violence causality runs from economic growth to violence: High economic growth causes violence to increase. But when violence is high enough causality runs in the other direction: Higher violence causes economic growth to slow down. While such story illustrates the classic endogeneity problem of reverse causality, MP make no attempt to deal with the identification issue.

In Rubio (1995), the analysis of the relationship between growth and violence goes beyond the observation of simple correlations. The author investigates for the 1980s the relationship between the declining levels of Colombia's total factor productivity (TFP) and violence levels, which increased during the same period. By running an OLS regression of the time series of these variables (controlling for the then high and volatile inflation rate), Rubio finds that the increase in the homicide rate during the 1980s was directly responsible for an aggregate growth loss of about two percentage points per year.

Rubio explores a potential indirect channel as well and OLS-regresses aggregate investment on the homicide rate. Controlling for more traditional determinants of investment decisions, the author finds that the increasing homicide rates hampered private investment, costing the country an additional 0.7 percent of GDP growth per year.

Suffering not only from a civil conflict but also from high levels of crime, forced displacement, kidnapping, and narcotrafficking, Colombia is an exceptional case study for social scientists in the field of conflict, crime, and violence. This article documents the evolution and current state of quantitative research pursued by economists and other social scientists interested in Colombia as a case study of a violent country.

The overall conclusion of Rubio (1995) is that, in the counterfactual situation in which crime had not increased so much in the 1980s, annual economic growth in Colombia would have been over 2.5 percentage points higher. It is worth noting that this figure is rather similar to the one provided by Collier (1999). Collier looks at the relationship between civil conflict and economic growth in the second half of the twentieth century for a sample of countries and estimates that the incidence of war is associated with a growth rate reduction of 2.2 percentage points. To appreciate the magnitude of this effect, note that an economy growing at a real rate of 2.5 percent annually will double its size in just 28 years.

Rubio's paper and methodology inspired researchers. One is Parra (1998) who delves into the burden violence imposes on investment. Another is Cardenas (2007), whose motivation is actually the same as that of Rubio: the decline in TFP experienced during the 1980s in Colombia. In addition to violence, Cardenas (2007) also explores the role of inequality on the TFP slow-down.

Parra (1998) regresses the aggregate investment rate in the second half of the twentieth century on a number of variables, including proxies of the cost of capital, a measure of economic activity, a proxy of aggregate human capital, and the (lagged) growth of the homicide rate as a proxy of the overall violence of the country.[9] Parra finds that if violence levels were equal to the Latin American average prevailing during the 1990s (which implies a reduction of 75 percent of the actual Colombian rates), the investment rate would have been 50 percent higher, boosting economic growth. Put another way, given the period-average share of investment in GDP, a reduction of 10 percent in the homicide rate would have translated into additional 1.2 percent in the annual rate of economic growth.

Cardenas' (2007) econometric analysis is motivated by a comparative description of Colombia against a large sample of countries in terms of size, macroeconomic

performance, trade, indebtedness, geography, health, income, wealth inequality, population fragmentation, political institutions, and the incidence of violence. Colombia shows up as an "average" country in all but two measures: economic inequality and violence. Colombia's income-Gini (0.51) is higher than the world average; and the land-Gini (0.86) is one of the highest of the world. Moreover, Colombia is a world-outlier in terms of violence, ranking first among 80 countries in 1995 in terms of the homicide rate, with 80 killings per 100,000 inhabitants.

Such comparisons motivate Cardenas' hypothesis regarding the role of inequality and violence as possible obstacles to improving Colombia's economic performance. The author runs an auto-regressive model of the growth of GDP for the period 1950 to 2000 and incorporates year-specific binary variables to uncover potential structural changes in the country's economic growth. He finds one such shift taking place in 1979: Colombia's economic growth fell from an average of five percent in the period 1950-79 to an average of three percent in 1980-2000.

Using a neoclassical constant returns to scale production function with human capital, Cardenas performs a growth accounting exercise to explore the factorial sources of this structural change. The estimated Solow residual suggests what the author calls an implosion of Colombia's TFP: During the period 1950-1979, the TFP growth rate was on average 1.01 percent. In contrast, between 1980 and 2000 it was -0.95 percent.

Cardenas' hypothesis is that the productivity slowdown is explained by both the huge increase in crime and the growing inequality: On the one hand, production of cocaine rose from an annual average of less than 100 tons before 1980 to more than 500 tons in 1999, and illicit crop planting increased form 20,000 to 140,000 hectares in the same period. The homicide rate increased monotonically from 23 killings per 100,000 inhabitants in the 1970s to 41 in the 1980s and 62 in the 1990s. Kidnapping increased from an annual average of 44 in the 1980s to 3,706 in 2000. On the other hand, starting in 1980 the income-Gini increased steadily from 0.46 in 1982 to 0.53 in 2000, offsetting a downward trend that started at the beginning of the 1960s.

Cardenas also explores potential transmission mechanisms. He argues that crime and violence destroy the "social infrastructure" (a concept motivated by Hall and Jones, 1999) and hence damage productivity by encouraging predatory behaviors that divert capital and labor to unproductive activities. To test these arguments the author runs an OLS regression of the previously estimated Solow residual on the homicide rate and the Gini coefficient, finding evidence of a negative correlation of both factors with the dependent variable.

Cardenas (2007) was an influential paper among younger Colombian economists who started studying the relationship between violence and economic growth in Colombia in the early 2000s. One example is Vargas (2003) who distinguishes crime from conflict-specific events and takes advantage of a unique data set on the latter to focus, for the first time, on the effects of the Colombian internal conflict on the country's economic performance. Previous studies had used the homicide rate as the best proxy of crime but a closer inspection suggest that it is poorly correlated with the dynamics of the conflict itself..[10] Vargas proposes a systematic way of thinking of the channels through which the conflict may affect the rate of economic growth. He argues that in the context of a simple production function, conflict intensity can affect the growth rate of output both directly, by shifting productivity downward, and indirectly, by hindering the accumulation of factors of production (i.e., both physical and human capital). Thus, the author develops a neoclassical growth model in which both total factor productivity and the accumulation of physical and human capital are affected by the intensity of conflict.

To quantify the impact of conflict on growth, Vargas estimates by 3SLS a system of equations using quarterly data from 1988 to 2001. In the first equation, GDP growth is a function of physical and human capital as well as of the intensity of conflict.[11] The second and third equations capture, respectively, by using autoregressive processes, the dynamics of physical and human capital. Also, measures of the intensity of the conflict are added in both equations. This strategy allows Vargas to capture the direct impact of conflict on economic growth (through the coefficient of the conflict-proxy in the first equation) as well as the indirect impact. The latter is the effect of conflict on the accumulation of factors of production times the contribution of each factor to the growth rate of output, as captured by the first equation.

Vargas estimates that the increase in the intensity of the Colombian conflict since the late1980s slowed the per capita economic growth rate by 0.3 percentage points on average during the 1990s. In particular, the large upsurge of conflict activity starting in the late 1990s was responsible for about a one percentage point loss in the per capita growth rate. Most of this impact (90 percent) is a direct impact via TPF growth, and the rest is indirect via the accumulation of physical capital.

While it appeals to a simple but formal theoretical framework to organize the empirical strategy, Vargas study has a major shortcoming that is common to all the papers reviewed so far: It does not address the problems of simultaneity and omitted variables bias. In this respect, the paper by Querubin (2003) stands out. The author exploits the panel structure of the available data (department-level variation over time), which contrasts with the dominant time-series approach.[12] The author takes into account the potential for omitted variables, especially given the lack of regional data on important economic variables, as well as the difficulty in finding reasonable instruments to solve for the endogeneity between violence and growth. Because both the rate of growth and the growth of violence change over time as opposed to most of the other determinants of regional growth, Querubin argues that taking the first difference of the growth equation eliminates all the departmental-specific fixed effects.

While this methodology solves the omitted variables problem for time-invariant controls, the reverse-causality issue is still at play and hence conclusions in this case also have to be taken with caution.[13] Controlling for other time-varying growth rate

variables (transfers from the central government and income from illegal drugs), Querubin estimates the panel by GLS. His measure of violence is a three-dimensional vector including the homicide rate, the number of kidnapping, and the number of actions of illegal armed groups. The three measures of violence turn out to be statistically significant at the one percent level and have the expected sign.

According to the results, an increase of 10 percentage points in the rate of growth of the homicide rate implies an annual reduction of 0.37 percentage points in the GDP growth rate. Similarly, the effect is 0.13 if the increase is on the rate of growth of the kidnapping rate, and 0.07 in the case of illegal attacks.

Querubin (2003) is the last paper in our survey that looks at the direct relationship between violence and economic growth. We speculate that, by acknowledging the existence of potential endogeneity between the incidence of violence and economic performance, Querubin paved the road for the more recent generation of empirical studies on the effects of violence in Colombia. Indeed, these more recent papers have focused on the impact of violence on specific mechanisms that in turn may affect economic growth, while at the same time undertaking explicit efforts in making causal statements. These include the accumulation of human capital, the micro decisions of the productive firms, early childhood development, and sovereign risk.[14] We do not review these contributions here because while the channels are made explicit, the ultimate effect on economic growth remains speculative. However, these are certainly topics and papers that deserve a review of their own.

Discussion

Since the mid 1990s the literature on conflict and crime in Colombia has expanded rapidly, being now one of the main research agendas of local social scientists. One of the topics of this agenda is the relationship of violence, broadly understood, to economic performance. While this particular topic was studied in the late 1990s and early 2000s, little research has been done since then and the currently predominant research questions focus on different topics: The determinants of violence incidence and its duration, the determinants and the spatial dynamics of illicit crops, and the effect of violence on specific channels that are thought to affect economic performance.[15] But the general point is that the last two decades have witnessed a boom in the economic analysis of violence and conflict in Colombia.

We believe that the final word about the effect of violence on economic performance is far from been said. Besides the fact, already mentioned, that all the papers surveyed lack a convincing identification strategy, the bulk of the literature has focused on the short-term relationship with economic performance, overlooking how violence shapes long-term economic performance. Indeed, this is the variable more closely associated with what likely is to be the main motivational driver of all these type of studies: sustainable economic development.

Future research on the topic may result in large potential payoffs on at least three fronts: (1) thinking of clever identification strategies that allow causal inference statements on the relationship between violence and economic performance; (2) linking the channels identified as conflict-affected, and that are likely to have an impact on economic performance, with the actual ultimate outcome; and (3) looking at how violence affects long-term development and, related to the second front, through what mechanisms this happens. In addition, we also expect to see the introduction of more structural and game theoretic modeling strategies with an eye to empirical application.

This is an ambitious agenda, but we anticipate that it will not remain unfulfilled. In fact the pool of economists (both local and foreign) interested in the topic is growing steadily. We foresee that studies in the areas suggested will soon proliferate: As a case study that combines a long-lasting history of violence with the availability of reliable micro-data, Colombia can become a source of academic output that can guide research on conflict, crime, and civil war in its shift from cross-country correlations to micro-level-based analyses. Happily, this process has already started.

Notes

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1. One exception is a forthcoming special issue on Colombia in *Defence and Peace Economics*. However, none of the papers included in that issue study the relationship between violence and economic growth directly.

2. A separate question that has also received large attention in the last few years is that of the economic determinants of violence in Colombia. Relevant studies in this field include Comisión de Estudios sobre la Violencia (1988); Gaitan (1995 and 2001); Sarmiento (1999); Sánchez and Nuñez (2001) and more recently Rodriguez and Daza (forthcoming). Without denying the importance of this question, for the sake of space we overlook it in the present survey. For a short review of the determinants of violence in Colombia see Martinez (2001).

3. An exception is Sánchez, Díaz, and Formisano (2003) who use spatial econometrics to explore the link between crime and conflict in Colombian regions.

4. The World Health Organization (2002) differentiates among self-harm (e.g., suicide), interpersonal violence, and collective violence. While only the latter has systematically been studied by social scientists interested in civil war, the study of interpersonal violence is often limited to crime economists. Our review of contributions in both fields responds to our personal belief that the fields have much to learn from each other.

5. Also, we do not review studies that look at the effect of violence on intermediate outcomes that may, in turn, have an impact on economic growth. Indeed, the research on the transmissions mechanisms linking violence and growth in Colombia is scarce. One exception is Dinar and Keck (1997) who argue that conflict adversely affects private irrigation investments in rural Colombia and, through that channel, harms economic growth.

6. GDP data comes from a compact disk accompanying GRECO (2002). (GRECO is the acronym of an economic growth research group at Colombia's central bank). For 2001 onward, the series was updated by DANE, Colombia's statistics office. For per capita computations, population is based on census data; Florez (2000).

7. See Blattman and Miguel (2010) for a recent comprehensive review.

8. Comisión de Estudios sobre la Violencia (1988).

9. The paper lacks a convincing justification for using the growth rate rather than the level of the homicide rate in a regression of the burden on private investment.

10. Best proxy: e.g, Rubio (1994). Poorly correlated: Restrepo, *et al*. (2004).

11. He uses various measures that go from clashes and attacks to casualty rates.

12. Rubio (1995), Parra (1998), Cardenas (2007), Vargas (2003); MP's approach is a regional-pooled OLS regression.

13. While the author refers to his method as a difference-in-difference (DD) approach, this is not so, at least not in the sense that DD is traditionally understood in microeconometrics, i.e., one in which an indicator of the treatment group is interacted with one of the post-treatment period, which generates a natural counterfactual difference to compare outcome-gains in the treatment group with. Rather, Querubin's regression is one of acceleration rates (second differences) of the variables of interest.

14. Human capital: Rodriguez and Sánchez (forthcoming). Productive firms: Camacho and Rodriguez (2011). Early childhood development: Camacho (2008). Sovereign risk: Castañeda and Vargas (forthcoming).

15. Incidence: Nuñez and Sánchez (2001) and Dube and Vargas (2008). Duration: Vargas (forthcoming). Determinants and spatial dynamics: Díaz and Sánchez (2004). Specific channels: see endnote 14.

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Determinism in the mountains: The ongoing belief in the bellicosity of "mountain people"

Steve Pickering

> *Conflicts in mountains have increased in the last 50 years, with serious violent conflicts now almost twice as likely to occur at high altitude.* (UN FAO, 2004)

> *... because mountain territories are often border zones between states, they are often the scene of many wars or guerrilla warfare. Thus, 80% of the world's conflicts are played out in mountain regions.* (World Mountain People Association)

> *Mountain people are often the same everywhere ... Mountain people are clanny. They are closed to outsiders. They are warm and free with kith and kin but withdrawn and silent and wary with strangers. They keep their emotions to themselves, especially those of a most private nature.* (Lincoln, 2002, p. 147)

It is over fifty years since Sprout and Sprout's ground-breaking study of the relationship between environment and conflict. One of their most important arguments was that policy decisions are influenced by what they refer to as the "psychological environment," the idea that policy may not directly be influenced by environmental factors (such as terrain, forests, roads, etc.), but by the importance policymakers *imagine* those factors to have. This psychological environment still plays a large part in analyses of mountains and conflict today, and is accepted largely uncritically both in literature and in popular discourse. This article presents some of the ways in which mountainous regions have been linked with conflict and argues that we need to be more careful in looking at such regions.

A brief history of mountain determinism

The idea has emerged that there is a "mountain people;" a people living in mountainous regions which is imbued with certain qualities relating to their likelihood of engaging in conflict. Recently, the belief has developed that there is great commonality between mountain peoples all over the world; indeed, such is the effect of mountains on human beings that mountain *peoples* are one *people*—mountain people. The foundations for this argument date back to antiquity but became particularly prevalent in travel-writing of the nineteenth century. Such writing at best gives a romanticized idea of people in mountain regions; at worst, it becomes scientific racism. For the most part, it is geographically deterministic and is based on pop psychology, stereotypes, and a curious interpretation of Darwinism. Nevertheless, these romantic ideas pervade contemporary understandings of people and conflicts in mountain regions and indeed have recently come full-circle to redefine the self-identities of people living in mountainous areas.

Mountaineers have been described as savage, yet of rigid morality; revolutionary, yet conservative; covetous, yet provident; democratic, yet opposed to civilization; passionately independent, yet of arrested political development; honest, yet piratical; lawless, yet united; healthy, yet closely intermarried.

This article presents some of the ways in which mountainous regions have been linked with conflict and argues that we need to be more careful in looking at such regions.

The specific linkage between mountain people and wars also dates back to antiquity. Strabo's *Geography* establishes one of the central ideas that has exercised subsequent writers on the subject: that something inherent in the nature of mountains affects the human condition, and that this changed lot leads to war. This one idea remains constant through the history of geography, the creation of political geography, and the changes in the politics of geography. Positivism, anthropogeography, Darwinism, environmental determinism, scientific racism, and a retreat to modern political geography are all stops along the way, and at all of them, the question of Sprout and Sprout's "man-milieu" relationship remains central.

Mountaineers

The people living in mountains are referred to as "mountaineers."[1] Paradoxes abound in describing this "people." The descriptions are often contradictory and sometimes lead into scientific racism. Mountaineers have been described as:[2] Savage, yet of rigid morality; revolutionary, yet conservative; covetous, yet provident; democratic, yet opposed to civilization; passionately independent, yet of arrested political development; honest, yet piratical; lawless, yet united; healthy, yet closely intermarried.

The flurry of adjectives continues: Mountaineers are warlike, courageous, wretched, brigands, brave, lovers of liberty, half barbarian, isolated, poverty-stricken, reactionary, exponents of retarded civilization, rude and simple, proud, vigorous, rustic, honorable, industrious, frugal, and even short.

Many such notions can be disregarded quickly. However, many of these ideas are central to modern discourse on conflict in mountain regions. Firmly held beliefs regarding mountain people today are often based on nineteenth century romanticism. In order to come to a better understanding of the relationship between mountains and conflict, it will be necessary to piece apart these ideas.

Mountain determinism: The frozen sheep's tongue

In the crudest form of environmental determinism, environmental factors have a direct effect on human behavior; accordingly, humans lack agency. The upshot of this is that human history can be explained and human future can be predicted (Sprout and Sprout, 1957, p. 312). Some of the foundations of this determinism can be found in the Renaissance. Bodin, for instance, argues that because of their environment, mountain people[3] have a naturally savage nature which cannot be easily tamed (Bodin, 1583b, pp. 155-156). Bodin, like all of us, is conditioned by his times, one aspect of which is Renaissance (or indeed Galenic) physiology. Human behavior is determined by the four humors (blood, phlegm, yellow bile, and black bile); those in colder climes are more phlegmatic. They have a "more vehement internal heat" giving them"much greater strength and natural vigour" (Bodin, 1583b, pp.146-155). This allows a contrast between, on the one hand, the proud and warlike people of the north/mountain people, with the inhabitants of the valleys, who are ordinarily effeminate and delicate (Bodin, 1583a: V, pp. 694-695).

Montesquieu takes this line of reasoning a step further and, bizarrely, looks at a sheep's tongue under a microscope, before and after freezing it. He notices pyramids between the "papillæ" which he assumes to be the "principle organs of taste." When frozen, the papillæ diminish and the pyramids disappear, rising and appearing again when warmed up. From this, he argues that nervous glands are less expanded in cold countries and that, therefore, the people have "very little sensibility for pleasure"; those in temperate climes have more, whereas those in hot countries have the most (Montesquieu, XIV, p. 2; Rousseau later came to similar conclusions in his 1781 work). Montesquieu relates his frozen sheep's tongue observation to agriculture (in warm climates, people will not bother with agriculture: XIV, p. 6); alcohol consumption (they drink more in the cold north, in proportion to latitude: XIV, p. 10); food consumption (XIV, p. 10); passage of laws (XIV, pp. 14-15); plus two books spent relating climate to slavery (XV-XVI). None of the modern authors uses a frozen sheep's tongue in their research. Yet many of the authors adopt a similar level of determinism. Montesquieu's line of reasoning is included here as a reminder of how shaky the foundations of determinism can be.

Such determinism can be found in media discussions of the former Yugoslavia. Gearóid Ó Tuathail quotes ABC News:

> There are countless explanations for the volatility of the "Balkan Powderkeg." Historians variously blame disputes over resources, ancient hatreds or meddling by Great Powers intent on keeping the region unstable. But geography is also a powerful clue: Lying south of the Danube river, the Balkans region, like Afghanistan, is composed of scarce fertile valleys, separated by high mountains that fragment the area's ethnic groups, even though many have similar languages and origins. (ABC News 1998, in Ó Tuathail, 2001, p. 797).

Here we can see that the environmental factors are being used to explain the conflict. Indeed, Ó Tuathail makes the case that Colin Powell argued "consistently that the topography precluded effective military action by NATO" (2001, p. 803). Ó Tuathail argues that it is not the mountains themselves, but people's preconceived notions of mountains which were used to create the image of the region as a powderkeg.

Different types of mountain

Hommaire de Hell was a nineteenth century travel writer who made some important observations which are often forgotten by more recent researchers. Importantly, he argues that the physical nature of the Caucasus chain is quite different to that of the other European chains:

> The Alps, the Pyrenees, and the Carpathians, are accessible only by the valleys, and in these the inhabitants of the country find their subsistence, and agriculture develops its wealth. The contrary is the case in the Caucasus. From the fortress of Anapa on the Black Sea, all along to the Caspian, the northern slope presents only immense inclined plains, rising in terraces to a height of 3000 or 4000 yards above the sea level. These plains, rent on all directions by deep and narrow valleys and vertical clefts, often form real steppes, and possess on their loftiest heights rich pastures, where the inhabitants, secure from all attack, find fresh grass for their cattle in the sultriest days of summer. The valleys on the other hand are frightful abysses ... This brief description may give an idea of the difficulties to be encountered by an invading army (Hommaire de Hell, 1847, pp. 297-298).

Reclus (1876) makes similar observations on the different types of mountainous terrain. Consequently, different types of mountain may have different types of effect on different types of conflict. Yet a considerable body of recent empirical research on mountains and terrain[4] is based on a simple binary: A region is either mountain, or not mountain. This is important, as it has implications for conflict analysis. Radvanyi and Muduyev point out that:

> [m]ost authors who purportedly analyze "the Caucasus" are actually writing about the piedmonts, unaware of reality in the mountains proper. In fact, in most cases (especially with regard to Dagestan) it is necessary to separate the mountain communities from those of the piedmont, where the "rules of the game" are quite different (Radvanyi and Muduyev, 2007, p. 174).

The authors also point out that "[a]mong the shortcomings of conventional geographical determinist discourse is the frequent use of the adjective "mountainous" to describe the entire region without qualification or nuance" (Radvanyi and

Muduyev, 2007, p. 158). Zürcher (2007) makes related points on different types of mountainous terrain affecting conflict in different ways in South Ossetia, Abkhazia, Nagorno-Karabakh and Chechnya. This is an extremely important point. Much existing research only presents a region, or indeed a state, as "mountainous" or "not mountainous." This problem is summed up well by Farer, who quotes a member of the 1867 British Expeditionary Force to Ethiopia: "They tell us this is tableland. If it is, they have turned the table upside down and we are scrambling up and down the legs" (Farer, 1979, p. 11). It is unfortunate that much recent research has not been able to capture this sort of distinction.

The problem can also be seen in reverse: Regions which are not technically mountainous can still be very rugged. The Chittagong Hill Tracts provides a good example here. While Khan (1972, p. 9) describes the terrain as being "exceedingly irregular," much existing research regards the region as being nonmountainous (Gerrard, 2000, for example, ranks the whole of Bangladesh as zero percent mountain). Yet Rashid (1999, p. 147) points out how ideal this terrain was for guerrilla activities, van Schendel, *et al*. (2000, p. 209) point out how useless Land Rovers were in this terrain, while Olsen (1996, p. 163) argues the terrain was too dangerous for a presidential visit. Again, much recent research ignores these arguments and simply regards the region as "not mountainous."

Conclusion

Aron (1966) suggests that it is impossible to evaluate the effects of the environment: "Neither isolable nor specifically determinant, the action of the geographical environment is exerted continually, without our being able to measure its limits" (Aron, 1966, p. 188). This argument could perhaps be taken a step further: The action of the geographical environment is exerted continually, *without our even knowing it*. Sprout and Sprout presented their arguments on the "psychological environment" in 1957, yet this psychological environment still continues to hold sway in discourse on mountain regions and conflict. Two thousand years ago, Strabo told us that there was something about mountains that changed human nature. Over 400 years ago, Bodin told us that mountain people are naturally savage. More recently, in 2002, Lincoln argued that mountains lead to genetic change. Mountains will have effects on human behavior. Some of these effects may relate to factors associated with conflict. Yet it is the argument of this article that now that conflict researchers are in a position to test the relationship between environment and terrain empirically, we must do everything we can to recognize that some of the beliefs we hold dear may be built on foundations which are considerably less firm than the mountains.

Notes

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1. The literature in English is uniform in its usage of the word "mountaineer" to describe people living in mountains, thereby offering no clear distinction with those who climb them. The German literature does offer this distinction: While those who climb mountains are Bergsteiger, those who live in mountain chains are the Gebirgsvölker, who, in cases like Switzerland, live in Gebirgsstaaten.

2. Several of these descriptions are given by multiple authors. To avoid over-referencing in the text, the descriptions are drawn from the following: Aron (1966, p. 183); Bodin (1583a, pp. 156, 694); Darwin (1874, pp. 50-52); Demolins (1901, p. 424); Febvre (1932, pp. 196-199); Goldenberg (1994, p. 3); Griffin (2003, p. 118); Hommaire de Hell (1847, p. 299); von Humboldt (1849, p. 304); Johnston (2008, p. 326); Lincoln (2002, p. 147); Lunn (1963, pp. 13, 18); Montesquieu (1748, XIV, p. 2); Omrani (2009, p. 180); Radvanyi and Muduyev (2007, p. 165); Ripley (1899, p. 81); Russell (2007, p. 59); Semple (1901, pp. 589-594; 1911, pp. 20, 35, 586); Speckhard, *et al*. (2005, p. 134); Spykman (1938, p. 20); Strabo (2.5.26, 3.3.5); von Thielmann (1875, p. 257); von Trietschke (1897, pp. 101-102); Wordsworth (1984, p. 330); Ziring (2009, p. 72).

3. Bodin is more precise than recent English writers: He refers to those "qui demeurent aux montagnes" (those residing in the mountains). The term "alpenisme" only really emerges in the later part of the nineteenth century after the establishment of the Alpine Club and as with the German, the term is never confused with those who *live* in mountains.

4. The two most notable papers are Fearon and Laitin (2003) and Collier and Hoeffler (2004). Several papers have since depended on these two papers, including de Rouen and Sobek (2004); Blimes (2005); Snyder and Bhavnani (2005); Hegre and Sambanis (2006); Lacina (2006); Brancati (2007); Carey (2007); Fjelde (2009), and Collier, Hoeffler, and Rohner (2009).

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A theoretical approach to the demand and supply of peacekeeping

Vincenzo Bove

This article examines some factors that influence the demand and supply for peacekeeping missions. Demand is viewed as conflict situations that invite third party intervention; supply refers to the ability and desire of states to intervene through peacekeeping missions.

The post-cold war years have been marked by a variety of external interventions in civil conflicts. The empirical judgement on the overall performance of U.N. peacekeeping is mixed and shows that military instruments may be ineffective and sometimes counterproductive for the recovery of war-torn societies.[1] On the one hand, this may be explained for example by a lack of agreement on what would have happened without a deployment and a lack of understanding of the conditions leading to peace. On the other hand, the empirical work may be based on a relatively weak theoretical understanding of peacekeeping. Thus, this article first further develops the theory of peacekeeping, and it argues that the interaction between the demand for peacekeeping, i.e., factors pertaining the nature of the conflict, and the supply of peacekeeping troops, i.e., the economic and political factors affecting states' ability and willingness to contribute to peace operations, jointly determine the outcome of such operations. It is this interaction that needs to be explored to explain theoretically and empirically which factors and circumstances leads to peacekeeping success.

On the demand side, to understand how to bring about peace, one has to understand how a war begins. In the literature on civil war, individual gains are one of the most immediate understandable causes of civil wars.[2] Consequently, the economic motivations for war are better theorized than any other factor, leading to a vast literature on conflict models. But there is still no consensus on how one should analytically characterize peacekeeping as an activity and how one should integrate a third party external intervention into traditional two-party models of conflict, especially how a third party can change the various incentives of combatants away from warfare. In the traditional bilateral conflict models, for instance of Hirshleifer, Grossman, or Skaperdas, the warring factions are viewed as rational decisionmakers who choose conflict or cooperation, depending on which is more profitable on the margin.[3] This approach takes anarchy, i.e., the absence of property rights protection, and the agents' set of preferences as given, and focuses on how many resources are devoted to "appropriative activities" in equilibrium. When introducing a third party into these models, one can show how this can lower the level of hostility by altering the elements underlying the choice between conflict and cooperation, such as rent-seeking and the financial viability of the conflict, and thus solve the dispute. The results suggest that intervention is most likely to succeed when the third party can convince the belligerents (1) that resistance to settlement is costly; (2) that success can be impossible; and (3) that the cost of complying with coercive demands is a price they can afford to pay. It can be shown that limiting the scope of conflict and enforcing an agreed settlement is only feasible with the third party's credible authority to regulate the conflict and, if necessary, to inflict heavier damage to any one conflict side than would otherwise be the case.[4]

Nonetheless, in many cases of unsuccessful coercion, the third party's threats may well be credible and carried out exactly as promised and yet may not be sufficient to produce compliance. A poor knowledge of what combatants value and how they make decisions can result in strategic failure. Thus, it is crucial to also understand what the belligerents value and how committed they will be to resisting an external action. Indeed, overconfidence, wrong perceptions, and the desire for vengeance can hamper any attempt to settle a dispute. To understand the limitations of peacekeeping, and the obstacles to the demand for peacekeeping, the first part of this article focuses on wrong perceptions and malevolence, two neglected aspects in the literature on third party intervention. A framework is developed to synthesize the problem of overconfidence; the framework also explains how human preferences, such as the desire for vengeance, contributes to conflict escalation.

Understanding how countries decide to intervene is central to evaluating the success or failure of operations as well. Therefore, having discussed some aspects of peacekeeping on the demand side, one needs to understand the desire of actors to intervene. Determining the objectives of the intervening governments is difficult because the stated goal often reflects a rhetoric of intervention and may not mirror the true objectives. Moreover, given the variety of domestic and international factors that determine a country's contribution to military peacekeeping, there must be a question as to whether their motivation can be captured in a simple objective function suitable for mathematical analysis. Nonetheless, the second part of this paper is on the supply side and attempts to capture some conditions determining countries' contributions to peace missions.

Wrong perceptions and irrational behavior

Standard economic models of conflict assume that asymmetry in military capabilities, and fighting efforts, determines the relative degree of conflict success. Individual preferences play a role only in relation to material returns and punishment. There are two exceptions. First, a civil war may also present asymmetry of information. The parties in a conflict act on the basis of perceptions, because they cannot truly know the relative cost and benefit of war. The belligerents are vulnerable to systematic errors in decisionmaking, such as overestimating their chances of winning. Brauer

(2006) suggests that this problem can be compared to information failures in financial markets, when information is insufficient, incorrect, or impossible to process. If the problem of asymmetric information is not addressed, a successful third party intervention may not be possible. Second, although economists view war as a process of rational calculation by combatants, actions can be motivated by a consistent set of seemingly irrational human behavior, such as hatred and vengeance. When the parties in dispute are inspired by deep feelings of ideological, religious, or ethnic hatred, reaching compromise may become impossible. When the historical record of past attempts is poisoned by betrayals and failures, as for instance in the case of the Arab-Israeli conflict, radicalized preferences may hamper the willingness to believe in the other side's good will and the desire for settlement. This requires the third party to understand what the belligerents value and how committed they may be to resisting an external action.

Overconfidence

If everyone agreed on the expected outcome of any dispute, there would be no need to fight. In particular, if the weaker side had full knowledge of its relative condition, it would surrender and the conflict would cease. But when the two sides do not agree on how much damage they are likely to inflict on each other, conflict ensures. This is partly due to overconfidence, the overestimation of one's own relative ability and/or the underestimation of the rival's ability. Consider a conflict between two agents, a government and a rebel movement, and suppose that they differ in fighting ability. The higher ability agent obtains a higher return when he wins. Agents' ability are referred to as their "types," the real value of which is disclosed when the war is over. Assume that any agent's subjective belief about its own type is not equal to the true type, and that this subjective belief is private information. Moreover, the agents do not know that they and their rival are overconfident in their own types. Each belligerent's fighting effort is chosen to maximize its expected resource partition on the basis of prior and subjective information about its type. Further assume that the overestimation of one's type increases one's effort: The agent behaves as if it has a higher type and, since the effort strategy is increasing in types because the agent believes victory is more likely, it chooses a higher effort.

The true probability of winning depends on the probability that one's own type is no lower than that of the rival. During the course of the conflict each party constantly reassesses its probability of winning in response to new information regarding the progress of the war, and because each side may have different information available to it, an agent's subjective probability of winning the war need not to be symmetrical, as standard economic models assume. This means, for example, that a decrease in the government's subjective assessment of its probability of winning does not necessarily imply an equivalent increase in the rebels' assessment of their probability of victory.

This dynamic may be shown by means of an easy example. Building on Wittman (1979), in Figure 1, S_G in the settlement region on the horizontal axis indicates an unconditional surrender by government and corresponds to its lowest level of utility on the vertical axis, while S_M means an unconditional surrender by the rebels. Now suppose rebels begin with a low subjective probability of winning (point A) and thus a low expected utility from continuing the war, indicated by the dashed line and the number 1 near the left vertical axis. Government will only agree to a settlement if it is located to the right of C (where C is chosen for purposes of illustration) because to the right of C its utility increases. Because the settlement region to the left of A gives rebels more utility than at A, both parties are better off between points C and A, and a negotiated settlement is feasible. However, if rebels overestimate their own type and believe hat they are more likely to win, thus receiving more utility (from utility 1 to utility 2), their demands in any negotiations increase (shift from A to B). If at the same time, government's subjective probability and minimal demands remain unchanged, then the rebels' relative optimism about the outcome of war renders settlement impossible, because no longer is there an overlap between the area to the right of C and that to the left of B.

Figure 2 shows the opposite dynamic. As rebels' subjective probability of winning decreases (the vertical arrows pointing down), so does their minimal demand which moves to the right (from 1 to A). At the same time, the government's subjective probability of winning as well as its minimal demand decrease, moving to the left (from 2 to B). As both minimal demands move favorably, settlement becomes more likely because the settlement region expands: The area between points A and B is wider than the area between 1 and 2. This indicates that there is more room for settlement. Obviously, if one side's increase in subjective probability of winning were to exactly offset the other side's decrease in subjective probability of winning, there would be no change in the settlement region. These examples show that, unless both parties perceive that a peaceful settlement can make them better off, fighting is likely to continue.

To reach peaceful settlement, a third party can try to modify either conflict party's expected utility from continuing war by changing its subjective probability of winning. This may be done by undertaking actions against one party to inflict heavy damage and increase the perceived cost of pursuing war (e.g., the strategic bombing of military areas). As argued by Regan (1996, p.341) "the key to any intervention strategy is to alter the calculation by which the antagonists arrive at a particular outcome." When a party faces a decrease in its subjective probability of winning, its minimal acceptable demand is reduced. Third party intervention is a process that involves bargaining with the aim to compel both parties to sit at the negotiation table. Thus, being prepared to inflict unacceptable damage on either party, and making sure it is aware of the risk, increases the perceived cost of war and lowers the expected probability of a successful outcome. A settlement of war is then more likely. Clearly, the influence of a third party can be counterinfluenced by recourse to a fourth party. This happened for instance during the cold war era, when East and West battled by

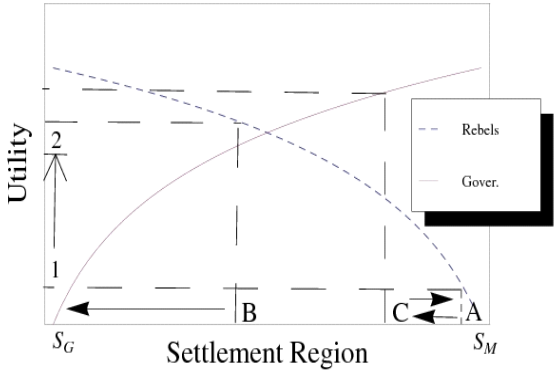

Figure 1: Contracting settlement region.

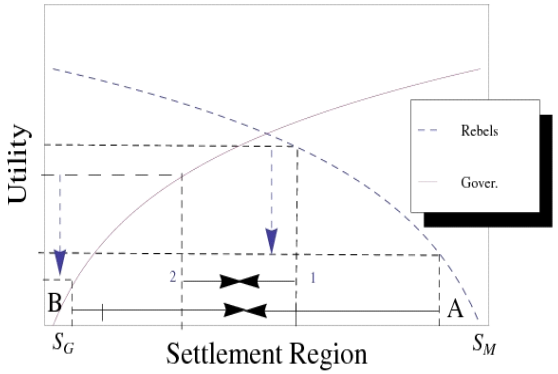

Figure 2: Expanding settlement region.

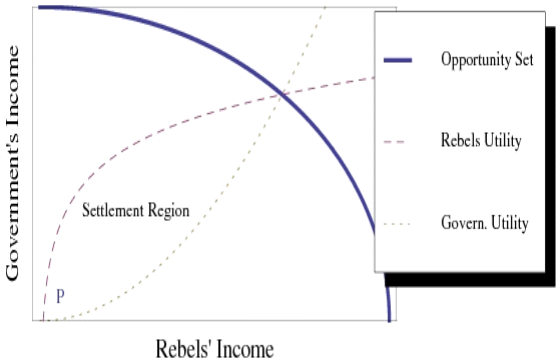

Figure 3: Malevolent preferences.

proxy, turning friends and allies abroad into warriors in their own behalf.

Preferences and the role of vengeance

The desire for vengeance is a powerful force driving many conflicts. People are likely to differ in their notions of fairness and the appropriate level of punishment and retaliation. Retaliatory actions often incur costs that are out of proportion to the harm that initiated the conflict in the first place. Revenge is often tied to the self-worth of the originally offended individual.[5] Individuals with little power may seek revenge against more powerful adversaries even though this action may incur overwhelming costs. One may model this in terms of malevolent behavior whereby an agent willingly sacrifices income to make the other party poorer. This may be seen in Figure 3, based on Hirshleifer (1999). Government's income is scaled along the vertical axis, and rebels' along the horizontal axis. Both want to achieve as high a position as possible. The concave curve in bold type font reflects the upper bound of the settlement opportunity set, a range of peaceful outcomes attainable if war is avoided. Point P is the mutual perceived utility from continuing war. Instead of government being concerned only with maximizing its income, and rebels only with maximizing theirs, each party now attaches a positive utility to the other's material impoverishment. Each side is ready to incur a material sacrifice to reduce the other's well-being. Thus, the indifference curve now has a positive slope. Because reciprocal malevolence reduces the settlement region, and fighting is more favorable than are the terms of any conceivable peace treaty, it becomes difficult to sufficiently alter the costs and benefits to induce cooperation. The extent to which mutual malevolent preferences reduce the opportunities to negotiate successfully depends on the shape and location of the utility curves.[6] Thus, bargaining may fail when war does not entail these net costs, as psychological gains outweigh the costs of arming and destruction.

A third party wishing to facilitate a solution has to wait until the parties desire peace. Moreover, in the presence of vengeful feelings, and without genuine reconciliation, achieving a settlement might not suffice to start a process of relationship rebuilding. Rasmussen (2001) claims that traditional peace negotiations have been ineffective in repairing the relationship between the parties for three reasons. First, the goal of such negotiations is usually a "micro-level change in behavior" rather than to create the "attitudinal changes" which are crucial for the reconciliation between the disputants. Second, negotiations have always addressed tangible causes of conflict (e.g., land, property, and political structure) but failed to reach a deeper level of human psychological needs, such as recognition, justice, dignity, and identity. Third, traditional negotiations have not mapped out specific ways for belligerents to repair their relationship.

When such preferences are deeply rooted, punishment strategies will rarely succeed and hatred may well be strong enough to motivate belligerents to resist, even if this requires paying a high price. Preferences and emotions play a critical role in conflict, and a proper understanding of civil war resolution requires an integration of emotions into the other, more understood and better-developed causes of war.

The private provision of peace

Standard economic models assume that the peacekeeping actors are the governments of states with private, "national," interests who agree to provide the international public good of peacekeeping (see, e.g., Brauer, 2006; Berkok and Solomon, 2005). Yet states are not unitary rational actors. Instead, their decisions reflect the operation of coalitions of interests. Partly as a consequence of this incoherence, the justification for intervention, provided to internal or international audiences, may differ from the actual objectives of influential actors. Intervention motivations, as put forward by a number of scholars, mainly relate to humanitarian reasons, institutional arrangements, and strategic interests.

Intervening for humanitarian reasons is a frequent justification for state intervention in civil wars. The preservation of human rights and the promotion of economic and social development are central themes in international law, but there are tradeoffs between these and state sovereignty, both of which are affirmed in the U.N. Charter. Chapter 7 (art. 41 and 42) authorizes the Security Council to introduce measures, including military actions, that may be necessary to maintain or restore international security against those responsible for threats to peace. The traditional view of Westphalian sovereignty prohibiting intervention in the internal affairs of other states is being reconsidered.

The decision to intervene for altruistic motives by a state may reflect public opinion and media pressure to stop human rights violations associated with civil wars, especially in democratic countries where popular consensus is vital to politicians seeking reelection. Diasporas from the country in conflict may exert pressure in the countries in which they live to intervene. Moreover, expatriate communities from the intervening countries living in the conflict zone, as well as past colonial links can also prompt intervention, such as individually-led military missions in former colonial spheres, such as Britain's in Sierra Leone and France's in Côte d'Ivoire.[7]

Yet, the participation in U.N. operations, although undertaken as part of a multilateral and internationally legitimized deployment, is subject to a formal approval at the state level. Differences in countries' institutional arrangements and some constitutional frameworks set limits on the action leaders can take (e.g., the parliament's veto power on the deployment of forces outside the state's boundaries). As opposed to Western countries, a weak system of checks and balances on executive action helps to explain the relative ease with which African countries deploy troops in U.N. operations.

There are many areas in the world that are considered strategically important, in ways that transcend altruistic motivations. Concern with vital resources has made Africa, the main area of peacekeeping, of more strategic interest to China, India, and Russia. Indeed, the continent has taken on increased relevance to the extent that its affairs affect energy security, but also immigration policies and transnational terrorism. The need to keep energy supplies flowing and international waterways accessible, two pillars in the American security policy for example, may also justify intervention.

However, different views about the primary function of the armed forces are the ultimate determinants. Some favor force projection over territorial defense. In the United Kingdom, for example, the sphere of influence and interests is deemed to be global and the image of the "guardian of the global order" is responsible for the currently prevailing attitude in favor of military intervention (Heiselberg, 2003). Conversely, there is a group of countries with long-standing foreign policy against sending troops abroad. While Germany, for instance, rejects its past military excess and its strategic culture values military force only as a deterrent, a "culture of restraint," the Austrian historical experience of being on the losing side in both world wars has created the feeling that security could better be achieved by neutrality (Giegerich, 2008).

In less democratic countries, other motivations are at play. For those that have experienced military involvements in state politics, peacekeeping insulates domestic politics from military interference by diverting armed forces from the domestic to the international arena, as in some Latin American states, the so-called "diversionary peace" (Norden, 1995). Governments that emerge from the authority of an external power or those formerly under a military regime may use peacekeeping to signal the end of an internationally ostracized government and the beginning of a new foreign policy era (Findlay, 1996). Argentina's deployment of troops in U.N. peacekeeping operations (PKOs) was a way to regain prestige lost during the Falkland/Malvinas war (Sorenson and Wood, 2005). China, a nondemocratic country in the Security Council, may want to project the image of a responsible country, committed to sustaining the U.N. system. States are also drawn to the incentive of responsibility within or over a mission. Countries that are given operational command positions in the field tend to be more committed to operations (e.g., Brazil's participation to the mission in Haiti).

Given these explanations, peacekeeping can be interpreted as a self-interested action to preserve or increase a country's standing in the global arena. Doubtless, peacekeeping enhances a country's reputation and prestige, and therefore it is not only the armed forces that seek a role and gain benefits, but also the foreign ministry, "perhaps prodded by its mission to the UN in New York" (Findlay, 1996).

Given the variety of domestic and international factors that determine a country's contribution to military peacekeeping, there must be a question as to whether all this can be captured in a single objective function that can generate testable hypotheses. The next part of this section explores question this with an example.

The problem of troop contribution

The appendix provides a neoclassical model on the private provision of public goods, i.e., peace. The state is viewed as a rational actor, with a set of preferences. It maximizes its utility subject to a resource constraint. The model predicts a number of factors that are likely to explain the contribution to peacekeeping operations. In particular

- The unit cost of a soldier—or the statistical value of his life—and the expected marginal cost of casualties affect the participation dilemma (equations 3 and 4).
- The value placed on global stability and the proximity to the conflict area drive state-specific responses (equation 2).
- Countries face a troop constraint when choosing between a peacekeeping mission (t_i) and other military activities, including concurrent peace operations (s_i). They may not be willing to bear the additional burden of a new deployment when they already have committed forces elsewhere (equation 5).

- An increase in other countries' contribution to an operation decreases a country's provision of troops to the same operation. This denotes a typical free-riding behavior (equation 10).

Some of the predictions of the theoretical model and some of the factors described in the previous section are tested through a panel data analysis against a data set on troop contributions across 102 states and 45 operations from 1999 to 2009. Both the likelihood of intervention (only for U.N. missions) and the size of the participation are investigated (for U.N. and non-U.N. operations, e.g., AU, NATO, and EU). Conflict characteristics identify which types of conflicts attract outside intervention; and the characteristics of the intervener identify which states are more willing to provide troops than others (Table 1). The empirical results suggest that at the donor level, the comparative advantage in manpower (N_i in the model), proxied by the number of armed forces, plays a big role. The risk of casualties [R(M) in the model], measured by the number of deaths among the peacekeepers and the number of concurrent operations (s_i) is an important obstacle in non-UN operations. States abstain from engaging in operations with a high level of casualties among peacekeepers. The results also suggest that the unit cost of a soldier, or the "value of life" (equations 3 and 4), proxied by the real per capita GDP and the tertiary enrollment ratio, negatively affect the likelihood and size of participation. At the conflict/operation level, the security threat that a conflict poses, measured by conflict intensity, and the proximity to the conflict area, captured by the distance between donor and host country and the same geographical area dummy, influence the likelihood and size of intervention.

Overall, the results find that donors' characteristics are as important as the features of the country in conflict. Certainly, one of the most robust explanation of when states choose to intervene is the proximity to the conflict: When a conflict is regarded as a threat to global or regional stability, security concerns will trigger state-specific responses.

Table 1: Summary of empirical findings

Variable	*Proxy for ...*	*UN op's*	*non-UN op's*
	Likelihood		
	Operation and conflict characteristics		
no. of death per year	risk of casualties	positive	
conflict intensity	global stability	positive*	
same geographical area	proximity	positive*	
distance	proximity	negative*	
	Donor characteristics		
no. of concurent PKOs	sustainability of multiple ops	inversely U-shaped	
real per cap. GDP	value of life	negative*	
tert. enrollm't ratio (%)	value of life	negative*	
mil. exp/GDP (%)	weight of the military	negative	
no. in armed forces	advantage in manpower	insignificant	
	Size		
	Operation and conflict characteristics		
no. of death per year	risk of casualties	positive	negative*
conflict intensity	global stability	positive*	positive*
	Donor characteristics		
no. of concurrent PKOs	sustainability of multiple op's	insignificant	negative*
real per cap. GDP	value of life	negative*	negative*
tert. enrollm't ratio (%)	value of life	insignificant	insignificant
mil. exp/GDP (%)	weight of the military	insignificant	insignificant
no. in armed forces	advantage in manpower	positive*	insignificant

* Results are those that are expected.

Conclusion

How useful is the economic approach in helping a peacekeeping third party to provide the right incentives for peace? Standard two-party models of conflict do not always provide a convincing tool to understand conflict resolution, even when economic factors are central. While they assimilate war and search for profit, implying that the main cause of war is the personal enrichment, the mediation and bargain process may be difficult to implement because of poor communication and fear that limit the room for solutions. Wrong perceptions, such as the overestimation of one's own relative ability, can affect the size of the settlement region, or its very existence. In this scenario, a successful intervention depends on a third party's ability to reorient the belligerents' perceptions and estimation about their chances of winning, the time

required, and the expected payoffs from winning versus accepting a settlement. Yet, a significant obstacle to conflict resolution can also operate via mutual mistrust, fear, and hatred. Even when a peace agreement is reached, if the root causes that triggered the desire for vengeance are not addressed, the risk of relapse into conflict is inevitably high.

But, thus far, only strategies of reactive intervention have been considered. Preventative intervention, aimed to reduce the scale of conflicts by finding solutions at an early stage (e.g., by observing early warning signs) should also be regarded as effective. Indeed, the causes of many societal breakdowns tend to be structural, and thus might be addressed in a preventative manner. For example, stability guarantees for those weak states that have not already broken down in conflict is the easiest and most efficient external assistance one can supply and should give higher returns. A credible commitment of support by a number of states with well-equipped forces, and a proven record of success, would be necessary.

This leads to a need to explain how states decide to intervene in peace operations. Understanding this process is crucial because in the last few years the supply side of peace operations has come under difficult strains. A state's decision to intervene is based on self-interest, combined with a geostrategic dimension, and constrained by domestic and technical considerations. The research findings summarized here help to explain why the surge of violence in many parts of the world, Africa in particular, saw many overstretched operations, close to collapse on the ground, while conflicts in the Balkans and in Lebanon have been tackled more quickly and with a large deployment of forces. One of the greatest challenges is to account for concerns over the risk of casualties, which can hamper willingness to participate. In this respect, case studies can give additional insights. The Somali debacle in 1992 and the failed U.S. intervention there had repercussions around the world. Henceforth, before offering any military support to the U.N., the United States had to be satisfied that a vital national interest was at stake and that the mission was clearly defined in scope, size, and duration. But intolerance of casualties has not prevented the U.S. from intervening in Afghanistan and Iraq to topple the ruling regimes there. Further work along these lines, including additional data collection, would probably lead to more robust explanations.

The attempt to decompose peacekeeping into a demand for intervention and into a supply side—including its constituent elements of state interests and military capabilities—can generate valuable insights. Explaining obstacles to the demand for peace and the interests involved in peacekeeping is a crucial means of understanding the political dynamics of peacekeeping and of the actors involved in constructing peacekeeping as a global institution.

Appendix: A model of troop contribution

To study the problem of troop contribution, we consider two military goods. One, s_i, is private, say the number of troops employed within a state's boundaries. The other, T, is a public good, which is the size of state i's own peacekeeping contributions, t_i, and those of the other n-i nations, T_{n-i}. The states initially have some endowment of the private good, N_i, and determine how much to contribute to the public good. Each state faces a troop constraint when choosing among peacekeeping, t_i, and other military activities, s_i. If state i decides to contribute t_i, it will have $s_i=N_i-t_i$ of private security consumption left. The primary function of armed forces personnel, N_i, is the protection from foreign threats, but they also are used in public safety roles with police duties among the civilian population and in emergency civil support tasks in post-disaster situations. All these duties are captured by s_i. In case of multiple peacekeeping operations, s_i captures not only the home defense, but also the troops already committed to other operations (e.g., Afghanistan or Iraq). Each unit of peacekeeping generates two joint products, a private benefit, αt_i, and a global purely public characteristic, βt_i. The symbols α and β are positive parameters and account for the coexistence of altruistic motivations (β) with the egoistic considerations (α) of intervening states.

Assume that the outcome of the intervention is decided by state i's participation and the coalition's relative investment in fighting. The probability of success, σ, is a ratio given by

$$(1) \qquad \sigma(t_i) = (T_{n-i} + t_i) / (M+T_{n-i}+t_i),$$

where the intervener fighting effort is measured by the scale of its deployment and M is the belligerents' strength and thus their resistance against third party involvement. When $t_i=T_{n-i}=0$, there are no chances that the conflict will be settled without any third party involvement. Let us define a utility function, which captures the optimal number of troops to dispatch in peace operations.[8] Because peacekeeping does not exclusively generate pure public benefits (e.g., peace and global stability), it also produces some excludable and rival contributor-specific benefits (e.g., protecting the expatriate community). With an adaptation of Khanna's, *et al* (1999) model, state i's expected utility function can be written as follows:

$$(2) \qquad EU_i=\sigma(t_i)U[\alpha t_i,\beta(t_i+T_{n-1}),s_i,Q] - C_i(t_i).$$

Q is added to the function to capture any factor that can influence the utility from peacekeeping, such as the international security threat posed by the conflict and the proximity to the conflict area. $C_i(t_i)$ are the costs of participation. Accounting for the cost of a peace mission is not easy and, as pointed out by Fetterly (2006), there might be some hidden costs involved.[9] Besides the military cost, the most important is the loss of life among peacekeepers. The value of life is usually compared to the discounted value of earnings foregone by individuals. The model assumes that the cost function can be expressed as

(3) $C_i(t_i)=wt_iR(M)$,

where w is the unit cost of a soldier, i.e., the value of life, and the function R measures the risk of the mission, which is increasing in its argument M. A traditional peacekeeping force in the midst of active and heavy hostilities, captured by a high value of the hostile parties' strength M, might not have the capacity to suppress the conflict and may even be limited in its ability to defend itself. On the contrary, low values of M result in higher odds of establishing peace (equation 1) and a lower risk of casualties (equation 3). Defining x as the state-specific output, αt_i, and y as the global public characteristics, βt_i, the first order condition for t_i can be found by maximizing equation (2) and rewriting this as

(4) $\sigma`(t_i)U_i+\sigma(t_i)[(\alpha\delta U_i)/(\delta x) +(\beta\ \delta U_i)/(\delta y)] = \sigma(t_i)\delta U_i/(\delta s_i) +wR(M)$.

The condition for efficiency is that the marginal benefit of providing peacekeeping (left-hand side of equation 4) equals the marginal costs (right-hand side). The marginal benefit is the sum of the utility weighted by the marginal impact of a soldier on the probability that intervention will be successful, and the marginal utility of the private and purely public activity weighted by the probability of success. The marginal benefit is offset by the sum of the opportunity cost of having fewer soldiers left for home duty times the probability of success, and the expected marginal cost of casualties.

To describe the Nash equilibrium and to obtain the reaction function of state i , one proceeds as follow. Simplify the model by normalizing the exogenous parameters α, β, and Q and the endogenous probability of success, σ. The quantity of a state i's provision of the public good is still denoted by t_i. One unit of t_i is also the quantity of the impure public good and its private characteristics. Letting $T= \sum^{ni=1} t_i = T_{n-i}+t_i$, the utility maximization problem can be written as

(5) $Max_{si,ti}[U_i(s_i,t_i,T)$, s.t. $s_i+t_i = N_i,\ T = T_{n-i}+t_i]$,

where the rescaled utility function, U_i, keeps the properties of being strictly increasing and quasiconcave. Adding $T_{n=i}$ to both sides of the budget constraint and using the fact that $T = T_{n-i}+t_i$, one can rewrite this state's problem as

(6) $Max_{si,ti}[U_i(s-_i,t_i,T)$, s.t. $s_i+T = N_i+T_{n-i},\ T\geq T_{n-i}]$.

Equation 6 says that a state i is choosing the total amount of peacekeeping subject to the constraint that the amount it chooses must be at least as large as the amount provided by the other countries. The troop constraint says that the total value of its security consumption must equal the value of its troop endowment, N_i+T_{n-i}. Substituting the constraints into the objective function, one can rewrite this problem as a choice over the aggregate (global) level of peacekeeping:

(7) $Max_{T\geq Tn-i}[U_i(N_i+T_{n-i}\ \ T, T-T_{n-i}, T)]$.

Problem 7 is like any consumer maximization problem, and a state's optimal choice of peacekeeping, T, will be a continuous function of its national endowment:

(8) $F_i(N_i+T_{n-i}, T_{n-i})\geq T_{n-i}$.

Each state's level of private provision of peacekeeping can be written as

(9) $t_i=F_i(N_i+T_{n-i},T_{n-i})-T_{n-I} \geq 0$.

This expression is the reaction function for state i and gives its optimal contribution as a function of the other states' contribution.

Typically, in models of private provision of private goods, a further assumption is the normality condition, satisfied if both the private and public goods are normal with respect to troop endowment (i.e., N_i+T_{n-i}). The assumption is stated as

(10) $0 \leq\ \delta F_i / \delta T_{n-i} \leq 1$.

This implies that reaction functions have slopes greater than -1 and less than or equal to zero. Therefore, an increase in other states' contribution, T_{n-i}, must increase its demand for the public good and not decrease its demand for the private good.

An alternative formulation to obtain the best-response function is

(11) $t_i = Max[F_i(N_i+T_{n-i})-T_{n-i},0]$.

This last expression shows that each state either contributes a positive amount or completely free rides and contributes zero. Finally, a Nash equilibrium is a set of contributions, $\{t_i\}_{i=1n}$, that satisfies the aggregation rule, $T^* =\sum^{ni=1}t_{i*}$. Kotchen (2007) provides a proof of existence and uniqueness of this Nash equilibrium in an impure public good model.

Notes

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1. Diehl (2008).

2. For a review of civil war, see Blattman and Miguel (2010).

3. Grossman(1991), Hirshleifer (1995); Skaperdas (1992).

4. Bove and Smith (2011); Bove (2011).

5. Kim and Smith (1993).

6. Anderton and Carter (2009).

7. Germany's participation in the U.N. Transition Assistance Group (UNTAG) in Namibia was vital for the protection of 20,000 German-Namibians.

8. The utility, defined over the space of private and public characteristics, is strictly increasing in consumption of both the private and the public good, quasiconcave, continuous, and everywhere twice differentiable.

9. SIPRI provides budget costs for U.N. multilateral peace operations. They refer to core operational costs, which include the cost of deploying personnel and direct nonfield support costs. The cost is shared by all U.N. member states through a specially designed scale of assessed contributions that takes no account of their participation in the operations.

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The deadweight cost of war: An illustrative CGE

John Gilbert, *Krit Linananda*, *Tanigawa Takahiko*, *Edward Tower*, and *Alongkorn Tuncharoenlarp*

> *War has several causes. Dictators and others such, to whom war offers, in expectation at least, a pleasurable excitement, find it easy to work on the natural bellicosity of their peoples. But, over and above this, facilitating their task of fanning the popular flame, are the economic causes of war, namely, the pressure of population and the competitive struggle for markets. It is the second factor, which probably played a predominant part in the nineteenth century, and might again, that is germane to this discussion.*
>
> *[T]here was no means open to a government whereby to mitigate economic distress at home except through the competitive struggle for markets. For all measures helpful to a state of chronic or intermittent under-employment were ruled out, except measures to improve the balance of trade on income account.*
>
> *Thus, whilst economists were accustomed to applaud the prevailing international system as furnishing the fruits of the international division of labour and harmonising at the same time the interests of different nations, there lay concealed a less benign influence; and those statesmen were moved by common sense and a correct apprehension of the true course of events, who believed that if a rich, old country were to neglect the struggle for markets its prosperity would droop and fail. But if nations can learn to provide themselves with full employment by their domestic policy (and, we must add, if they can also attain equilibrium in the trend of their population), there need be no important economic forces calculated to set the interest of one country against that of its neighbours.*
>
> - John Maynard Keynes. 1936. *The General Theory of Employment, Interest and Money*. London, U.K.:Palgrave-Macmillan. [Extract from chapter 24.]

War is costly both because of the resources used up and because of the inefficiency introduced by the higher current or deferred taxes necessary to finance it. War has been justified by its ability to help an economy achieve full employment. As Keynes points out and as Leontief, *et al*. (1965) demonstrate with a simulation, war is far from a first-best policy for doing so. Historically, employment has been relatively high in times of war. So as a matter of history, does war put wasted resources to work? Barro (2008) argues that the higher employment that war brings reflects higher labor force participation created by the need to smooth consumption, and maintain the standard of living when resources are being sucked up by the military. The hunger for consumption at times when war has created scarcity causes folks to try to borrow more, which pushes up interest rates. This high reward attached to earning and saving for the future further encourages work. In his view war does not reflect putting previously wasted resources to work.

War has been justified by its ability to help an economy achieve full employment. "Jobs, jobs, job," former U.S. Secretary of Defense, Caspar Weinberger once said in response to queries about high military spending. But as John Maynard Keynes pointed out in 1936 and as Wassily Leontief *et al*. (1965) demonstrate with a simulation, war is far from a first-best policy for doing so.

This article describes simulations of an intertemporal computable general equilibrium model, which illustrates that the cost of war depends on how it is financed.

This article describes the simulations of an intertemporal computable general equilibrium (CGE) model, which illustrates that the cost of war depends on how it is financed, and that the increase in employment that it generates may be explained by the logic that Barro offers. Our model can be loaded into GAMS, a program which is available free of charge online, so readers themselves can simulate variations on the model.

The model was developed by an undergraduate class in computer modeling at Chulalongkorn University, Bangkok, Thailand. It was designed to provide a simple application of computable general equilibrium modeling, and to illustrate the excess burden of government expenditure under alternative assumptions about the economy and the form that taxation takes. We have chosen to tell a story where that expenditure is war, but the ideas apply to any sort of government expenditure.

The model

The conceptual structure of the model is best captured by enumerating the series of steps it follows. Appendix A contains the computer code.

1. We assume that the world exists for three periods.
2. There is only one good. "Widgets" are produced at home and abroad.
3. All citizens are identical, with identical productivity and identical tastes in consumption of goods and leisure throughout the entire three periods. Thus, we can model the economy as if there was only one individual. We call her the representative citizen. Flexible wages keep our representative citizen employed to the extent she wishes to be.
4. Our representative citizen has Cobb-Douglas preferences in work and leisure over

the three periods.

5. The exponents attached to work and leisure in each of the periods are identical and sum to one. This means that an N percent increase in consumption of goods and leisure in all periods causes an N percent increase in utility, for any N. Of course our individual's endowment of time is fixed, so such an expansion is not possible. A hypothetical outward shift in the budget constraint by N percent also increases her utility by N percent. Since the endowment of leisure is fixed, and the exponents of the Cobb-Douglas utility function on goods and leisure each period are equal, a one percent increase in widget consumption each year over the entire lifetime, holding leisure consumption constant, would increase utility by only half a percent, so from increasing goods consumption alone, holding leisure constant, there is diminishing marginal utility.
6. Our individual equates the present value of her disposable income over the three periods of her life to the present value of her consumption. This is to say, she exhausts her savings at the end of her life.
7. The government equates the present value of its spending to the present value of taxes collected. This is to say, the government runs a balanced budget over the lifetime of the model.
8. In the variants of the model when we permit capital flows, arbitrage, and perfect foresight, we keep the domestic real interest rate equal to the foreign one. In our other simulations, where there is no international investment, the interest rate equates domestic saving to zero each period, because the economy as a whole cannot save.
9. Labor is the only factor of production, and its marginal physical product is one widget per day.
10. The interest rate is expressed in real terms. We assume that nobody holds money, because the expected rate of inflation is so high that bonds are a better store of value.
11. There is no investment in the national accounts sense, just consumption and government expenditure and in the open economy, imports and exports.

The simulations

The simulations are arranged from best situation to worst situation. The move from each simulation to the next involves tweaking the model in one respect. This helps us see what drives the results.

Simulation 1: Peace

This is our benchmark simulation. We assume a closed economy. We solve the model to maximize the utility of the representative citizen, given the prices and endowments. She is endowed with 100 days of time each year. Peace reigns. The model solution is that she consumes 50 days of leisure and 50 widgets each year. The real interest rate in period 1 is the interest rate that applies to a bond issued in period 1 and redeemed in period 2. The real interest rate in period 2 is that which applies to a bond issued in period 2 and redeemed in period 3. From now on we will refer to the real interest rate simply as the interest rate. We have defined a unit of leisure and a widget so that the wage and the price are both one in all three periods. We define utility as a linearly homogenous Cobb-Douglas function and define the initial level of utility as the value of goods and leisure consumed. Under peace the interest rate is perpetually zero. So under peace the lifetime leisure endowment is tradable for 300 widgets. We can label one indifference curve arbitrarily. We define the citizen's level of utility in the peace equilibrium as the endowment that supports the indifference curve attained during our peaceful equilibrium. It is 2*50*3=300 utils.

The model is calibrated (the parameters are selected) so the individual maximizes her utility by consuming in each period what she produces in each period when the interest rate is zero. Consequently, the interest rate settles at zero. In this model there is no preference for consumption in one period over another. The individual just wishes to produce and consume at constant rates. If the economy had been open with our individual able to borrow and lend internationally at a zero interest rate, the result would have been the same.

There are no taxes, because there is no government expenditure in this Eden of peace.

The story is told in the numbered column 1 of Table 1 (Appendix B; the notation is explained next to the table). Utility is 300, output is 50 widgets per year. Leisure is 50 days per year. The government buys no goods in any period. 50 widgets are consumed in each period. The tax rates are zero. The interest rates are zero. Net exports in each period are zero.

Simulation 2: War in period 2 only; lump-sum taxes and an open economy

Now the economy fights a war in year 2. For this, it requires 40 widgets. The world interest rate is assumed to be zero. In period 1, our representative citizen sees scarcity coming in year 2. She wants to smooth consumption and work effort, so she saves in both year 1 and year 3. This allows her to smooth out consumption, so consumption is identical in all three periods. It also allows her to smooth out work effort, so leisure is the same in all three years. The stabilizer is the international economy. The world interest rate is assumed to be zero. Thus our country has a trade surplus in year 1 and 3 and a trade deficit in year 2. The interest rates are all zero, so the sum of the trade imbalances equals zero. Annual consumption, annual leisure and intertemporal utility all fall. In particular, the utility of our representative citizen falls from 300 utils in simulation 1 to 260 utils in simulation 2. The reason is that war has taken away from her 40 of the 300 units of leisure with which she is endowed. Output and employment rise to generate the necessary output and employment needed for the war effort, but

without raising the ratio of leisure consumption to goods consumption.

Simulation 3: Small war in period 2 only; optimum tax

In simulation 3, we have a small war, which uses only a single widget. The war occurs in period 2. It is financed with an excise tax on production in the three periods. The tax rate is chosen by GAMS to maximize utility. Utility is defined so that the marginal utility of a widget in the initial equilibrium is one. Utility falls from 300 utils to 299. (Actually the number produced by GAMS was 298.995 utils.) Thus the drop in utility is very close to the one widget worth of utility that is needed to prosecute the war. In the limit, as the war becomes tiny, the drop in utility approaches the resources used up to finance the war, in spite of the distortionary taxation. Thus, the cost of the distortionary taxation is only a second-order effect. The ratio of the excess burden of taxation to the cost of the resources used up in fighting the war approaches zero in the limit as the resources used up to fight the war approaches zero. Consequently, the cost of distortionary taxation becomes relevant only for large levels of taxation.

The war is anticipated in period 1. Consequently, folks desire to save for the hard times ahead, pushing the period 1 interest rate to minus one percent. However, when the hard times hit in period 2, our citizens try to borrow to smooth consumption, pushing the period 2 interest rate to plus one percent. To the limits of accuracy of the program, consumption is smoothed to equality in each of the three periods. Output expands in the second "war" period. It contracts in the two "peace" periods. The cause of the expansion is the desire to maintain consumption. The cause of the two contractions is the higher taxation which discourages work.

This illustrates that one cannot assess the employment benefit of war by just comparing war periods with others. We see that period 2's war discouraged work effort in the other two periods.

This issue is present in the current U.S. American discussion of how increased spending can shrink spending by forcing higher taxes to finance it. Alan Blinder (2011) writes "OK. But the question remains: How can the government destroy jobs by either hiring people directly or buying things from private companies? ... One possible answer is that the taxes necessary to pay for the government spending destroy more jobs than the spending creates. That's a logical possibility, although it would require extremely inept choices of how to spend the money and how to raise the revenue."

Simulation 4: War in period 2 only; lump-sum taxes and a closed economy

The innovation in this simulation is that international trade is not available to smooth consumption and leisure. In an attempt to smooth consumption, workers try to save in period 1 and borrow in period 2. This makes the period 1 interest rate negative and the period 2 interest rate positive. In an attempt to raise consumption in period 2, our individual works harder in that period. Thus war increases employment. The increase, however, is a change in voluntary employment, not a reduction in Keynesian involuntary unemployment. Leisure falls back to its peaceful levels of 50 days in periods 1 and 3.

Taxation has the same effect regardless of when it is levied. This is called Ricardian equivalence, after David Ricardo who enunciated the proposition, which was later revived by Barro, and named Ricardian equivalence by James Buchanan (1976). The tax rates are zero, for the taxes are lump-sum. In this economy, it does not matter when the government collects the lump-sum taxes.

We expected the negative interest rate in the first period to encourage postponement of work from the first to the second period, and the positive interest rate in the second period to encourage the acceleration of work effort from the third to the second period. That is the case compared with simulation 2 with the lump-sum taxation and an open economy. However, we see that leisure and consumption in the first and third periods remained at their peaceful levels of 50.

Utility drops below that of simulation 2. The drop is to 253.03 utils from 260 utils. This demonstrates the cost of autarky, when there is war in one period. More generally it demonstrates the cost of autarky when government spending makes variable demands on the economy. Steady work becomes unsteady work.

Simulation 5: War in period 2 only; an optimal intertemporal VAT and a closed economy

The innovation in this simulation as compared with simulation 4 is that lump-sum taxes are no longer available. Taxes are imposed to fight the war in all three periods. The mix of tax rates is optimized. The marginal welfare cost of tax collection rises with the tax rate in any period, so optimal taxation involves spreading the tax burden over the three periods. Leisure expands in each period and consumption falls in each period as compared to simulation 4. This is due to the disincentive effects of taxation. The tax rate is highest in the war period and at a lower level in the other two periods. This demonstrates that uniform taxation is an inferior solution.

Utility drops below that of simulation 4. It falls from 253.03 utils to 246.974 utils, demonstrating that lump-sum taxation beats uniform taxation.

Simulation 6: War in period 2 only; uniform VAT and a closed economy

The innovation in this simulation is that a uniform VAT is required to fight the war. The tax rate is the same in each period. Utility drops below that of simulation 5. The drop is a relatively small amount, from 246.974 utils to 246.703 utils. Still, it does demonstrate the superiority of optimal intertemporal taxation to uniform intertemporal taxation.

Simulation 7: War in period 2 only; an unanticipated war and a closed economy

The innovation in this simulation is that the war is unanticipated. So no financial war chest is built-up prior to the war. Consequently, the war must be financed with VAT taxes collected in periods 2 and 3. Utility drops below that of simulation 6. The drop is from 246.703 utils to 243.288 utils. The economy behaves in period 1 as it does with universal peace. But in periods 2 and 3 work and consumption fall below the levels when war is anticipated in simulation 6.

Simulation 8: War in period 2 only; VAT, a balanced budget, and a closed economy

The innovation in this simulation is that the budget must be balanced in each period. Perhaps the government does not anticipate the war and its credit rating is so bad that it cannot partially finance the war with revenues anticipated to occur in period 3. Thus, the impact of the very high taxes, just in period 2, is to dramatically reduce the incentive to produce in that period and to dramatically reduce utility. This is the worst financing option. The fall in consumption from 20 widgets to 10 widgets in period 2 is particularly dramatic. Utility falls from simulation 7's level of 243.288 utils to 229.417 utils.

Simulation 9: Perpetual war; an optimal intertemporal VAT and a closed economy

The innovation here is that the war is perpetual, and anticipated. Forty widgets are required to fight the war each period. Since the war requires the same resources each period, there is no incentive for the private sector to borrow or lend. Utility for obvious reasons falls below that in any of the other simulations. The interest rate stays at its peacetime level of zero. The tax rate rises to a uniform level of 400 percent. Utility drops to its lowest level. Consumption, output, and the tax rate are constant in all three years. This illustrates Barro's point that a permanent increase in government expenditure does not push up interest rates. The higher tax rates increase the ratio of leisure to goods consumed. Since the utility function is Cobb Douglas, the share of the endowment of leisure spent on leisure stays constant at the same level as in peacetime.

How big is the marginal welfare cost of taxation?

Our simulations are simply numerical examples. How important is the marginal welfare cost (MWC) of taxation in practice?

The MWC is the incremental welfare change over the additional tax collected as the tax rises. Empirically, the MWC can be quite high. Charles Stuart (1984) estimates that for labor income in the United States it is 24 percent of the tax collected. Ballard, *et al*. (1982) estimate it to be 79 percent for the U.S., as quoted in Shoven and Walley (1984). We asked two leading practitioners of tax reform in less developed countries. They estimated 30 percent and 50 percent for the kinds of tax changes that are likely to occur in less developed countries. Also see Judd (1987), who finds very high MWC's for the taxation of capital. There are efficiency costs associated with collecting taxes which exceed those based on just looking at the tax wedge. These real-world issues consist of administrative costs of tax collection; resources used up in tax avoidance, tax compliance, and tax evasion as well as resource misallocation costs. We have not considered these in the simulations.

Warlters and Auriol (2007) provide estimates of the marginal welfare cost of tax collection for 38 African countries. The ranges for the taxation of capital are 103 percent to 7 percent; for the taxation of labor: 101 percent to 5 percent; for exports: 214 percent to 2 percent; and for imports: 23 percent to 0 percent. The figures vary considerably, depending on the country and on the type of tax. In some cases, taxes are already over the maximum revenue level. The authors also provide a useful survey of estimates by other investigators.

As the tax rate rises, taxes collected typically reach a maximum and then decline. As the rate approaches the maximum, the MWC approaches infinity. It is at this point that the MWC approaches infinity, or what is the same idea, that the Laffer curve hits its maximum.

There are of course some taxes which are desirable from a Pigovian standpoint, such as taxes on pollution and congestion. However, one runs out of these after a while. So, in general, we expect the marginal welfare cost of tax collection to rise with the amount of tax collected. Thus, if demands on the treasury increase for reasons other than war, the incentive should be to scale back all spending including that on war.

Conclusion

We have built a simple model to demonstrate that the cost of war depends on how it is financed. The tax distortion should be reckoned as part of war's cost. When budgets are already constrained by other fiscal issues, the cost of war is higher than it would have been otherwise.

A second issue is that higher taxation discourages work. So one cannot assess the employment benefit of war by just comparing war periods with others, for those other periods may suffer from the hangover of taxes needed to pay down war debt.

Notes

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Appendix A: The GAMS Code for the Model

```
* One can download GAMS from the GAMS home page. Then copy this code into the project directory.
*Then press "Run."
* This problem describes a government which wages a war in one to three periods.
* Its representative citizen has a Cobb Douglas utility function in consumption
* in the three periods and leisure in the three periods.
* All variables are in per capita terms.  We normalize the wage
* rate to equal 1 in each periods. One unit of leisure can be converted into one
* unit of the good. i.e. the marginal physical product of labor is 1. Each citizen is endowed with
* one hundred units of labor each period. This means that the sum of consumption, government
* expenditure on war, net exports, and leisure equals 100 each period. The problem is to find
* leisure in the three periods and the interest rate in each of the two periods and
* consumption in each of the three periods. There are 18 variables and between 15
* and 18 equations depending on the model. In all models, there are no more equations than variables.
* In some models there are fewer equations than variables, because some variables
* can be set optimally.
* This means we have two degrees of freedom. Thus we can set tax rates arbitrarily
* in two periods  recognizing that the tax rate in the third period must be
* that which causes the present value of government expenditure to equal the present
* value of taxes collected.
variables u,c1,c2,c3,g1,g2,g3,leisure1,leisure2,leisure3,r1,r2,t1,t2,t3,x1,x2,x3;
equations
e1,e2,e3,e4,e5,e6,e7,e8,e9,e10,e11,e12,e12A,e13,e14,e15,e16,e17,e18,e19,e20,e21,e22,e23,e24,e25,e26,e27,e28,e29,e30,e31;
e1..u=e=6*c1**0.16666667*c2**0.16666667*c3**0.16666667*leisure1**0.16666667*leisure2**0.16666667*leisure3**0.16666667;
* u is utility of the representative citizen. ci is consumption in period i. leisurei is leisure in period i.
* Leisure and consumption have identical weights in the utility function regardless of the period in which they occur.
e2..c1+g1+x1+leisure1=e=100;
e3..c2+g2+x2+leisure2=e=100;
e4..c3+g3+x3+leisure3=e=100;
* gi is government purchases of widgets in period i. xi is net exports of widgets in period i.
* Labor endowment is 100 each period. It can be converted into widgets. The output
* of widgets equals consumption plus government purchase plus net exports.
* Thus equations 2,3,and 4 are a production possibility frontier combined with the
* national income identity.
e5..c2=e=c1*(1+r1);
* ti is the advalorem tax rate in period i, expressed as a proportion of the price to the producer.
* r1 is the real interest rate between period 1 and period 2.
* r2 is the real interest rate between period 2 and period 3.
e6..c3=e=c2*(1+r2);
* Equation 5 eqauates the ratio of of the marginal utilities of widgets in
* period 1 and 2 to the relative price of widgets in periods 1 and 2.
* Equation 6 does the same for periods 2 and 3.
e7..g1=e=0;
e8..g2=e=0;
e9..g3=e=0;
e10..g2=e=1;
e11..g1=e=40;
e12..g2=e=40;
e12A..g2=e=10;
e13..g3=e=40;
* Equations 7 through 13 describe the extent to which the government is purchasing
* widgets in order to fight a war.
e14..leisure1=e=(1+t1)*c1;
e15..leisure2=e=(1+t2)*c2;
e16..leisure3=e=(1+t3)*c3;
* Equations 14-16 equate the marginal utilities of widgets and leisure to the
* relative price of goods and leisure in each of the three periods.
e17..g1+g2/(1+r1)+g3/((1+r1)*(1+r2))=e=t1*(c1+g1)/(1+t1)+t2*(c2+g2)/((1+t2)*(1+r1))+t3*(c3+g3)/(
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```
(1+t3)*(1+r1)*(1+r2));
* Equation 17 says that the present value of government spending must equal the
* present value of taxes collected. It is used when taxes are not lump sum.
E18..x1+x2/(1+r1)+x3/((1+r1)*(1+r2))=e=0;
* equation 18 says that the present value of net exports must equal zero.
* It is used in the open economy simulations. It is the intertemporal balance of
* trade constraint.
E19..x1=e=0;
e20..x2=e=0;
e21..x3=e=0;
* Equations 19-21 are used in the closed economy simulations.
e22..r1=e=0;
e23..r2=e=0;
* The world real interest rates are zero. In the open economy simulations arbitrage also keeps the domestic
real interest rates at zero.
e24..t2=e=t1;
e25..t3=e=t2;
e26..t1=e=0;
e27..t3=e=0;
e28..leisure1=E=50;
* These equations are used when there are constraints on the tax structure.
g1.L=0; g2.L=0; g3.L=0; c1.L=50; c2.L=50; c3.L=50; r1.L=0; r2.L=0; leisure1.L=50; leisure2.L=50;
leisure3.L=50; t1.L=0; t2.L=0; t3.L=0;
model peace/e1,e2,e3,e4,e5,e6,e7,e8,e9, e14,e15,e16,e19,e20,e21/;
model war2LargeLumpSumTaxOpen/e1,e2,e3,e4,e5,e6,e7,e9, e12,e14,e15,e16,e18,e22,e23/;
model war2SmallOptimalTaxClosed/e1,e2,e3,e4,e5,e6,e7,e9,e10,e14,e15,e16,e17,e19,e20,e21/;
model war2LargeLumpSumTaxClosed/e1,e2,e3,e4,e5,e6,e7,e9,e12,e14,e15,e16,e19,e20,e21/;
model war2LargeOptimumTaxClosed/  e1,e2,e3,e4,e5,e6,e7,e9,e12,e14,e15,e16,e17,e18,e19,e20,e21/;
model war2LargeUniformTaxClosed /e1,e2,e3,e4,e5,e6,e7,e9,e12,e14,e15,e16,e17,e19,e20,e21,e24,e25/;
model war2LargeUnanticipatedMediumTaxClosed
/e1,e2,e3,e4,e6,e7,e9,e12A,e14,e15,e16,e17,e19,e20,e21,e22,e25,e26,E28/;
model war2LargeUnanticipatedTaxClosed
/e1,e2,e3,e4,e6,e7,e9,e12,e14,e15,e16,e17,e19,e20,e21,e22,e25,e26,E28/;
model war2LargeBalancedBudgetClosed
/e1,e2,e3,e4,e5,e6,e7,e9,e12,e14,e15,e16,e17,e19,e20,e21,e26,e27/;
model perpetualWarLargeOptimumTaxClosed/
e1,e2,e3,e4,e5,e6,e11,e12,e13,e14,e15,e16,e17,e19,e20,e21/;
option limcol = 0;
solve peace using NLP maximizing u;
solve war2LargeLumpSumTaxOpen using NLP maximizing u;
solve war2SmallOptimalTaxClosed using NLP maximizing u;
solve war2LargeLumpSumTaxClosed using NLP maximizing u;
solve war2LargeOptimumTaxClosed using NLP maximizing u;
solve war2LargeUniformTaxClosed using NLP maximizing u;
solve peace using NLP maximizing u;
solve war2LargeUnanticipatedMediumTaxClosed using NLP maximizing u;
solve war2LargeUnanticipatedTaxClosed using NLP maximizing u;
solve war2LargeBalancedBudgetClosed using NLP maximizing u;
solve PerpetualWarLargeOptimumTaxClosed using NLP maximizing u;
```

Appendix B

Table 1. War and Peace: Economic Effects									
Simulation	1	2	3	4	5	6	7	8	9
	Perpetual peace	War in period 2 only, best tax and trade regime	Small war in period 2 only. Optimum tax. For small wars there is no deadweight loss of tax finance.	War in period 2 only. Best tax	War in period 2 only. 2nd best tax	War in period 2 only. 3rd best tax	War in period 2 only. 4th best tax	War in period 2 only. 5th best tax	Perpetual war. Optimum tax.
War in period	no war	2	2	2	2	2	2	2	1,2,3
economy	closed	open	closed	closed	closed	closed	closed	closed	closed
taxes	none	lump sum	VAT	lump sum	VAT	VAT	VAT	VAT	VAT
tax structure	none	No matter. Ricardian equivalence	optimum	No matter. Ricardian equivalence.	optimum	uniform	unanticipated war	balanced budget	optimum
Period 1	P	P	P	P	P	P	P	P	W
Period 2	P	W	W	W	W	W	W	W	W
Period 3	P	P	P	P	P	P	P	P	W
utility	300	260	299.00	253.03	246.97	246.70	243.29	229.42	134.16
Y 1	50	56.67	49.83	50	40.60	38.89	50	50	50
Y 2	50	56.67	50.33	70	62.02	63.33	60	50	50
Y 3	50	56.67	49.83	50	40.60	38.89	33.33	50	50
leisure1	50	43.33	50.17	50	59.40	61.11	50	50	50
leisure2	50	43.33	49.67	30	37.98	36.67	40	50	50
leisure3	50	43.33	50.17	50	59.40	61.11	66.67	50	50
G1	0	0	0	0	0	0	0	0	40
G2	0	40	1	40	40	40	40	40	40
G 3	0	0	0	0	0	0	0	0	40
C 1	50	43.33	49.83	50	40.60	38.89	50	50	10
C 2	50	43.33	49.83	30	22.02	23.33	20	10	10
C 3	50	43.33	49.83	50	40.60	38.89	33.33	50	10
t1	0	0	0.007	0	0.46	0.57	0	0	4
t2	0	0	0.007	0	0.73	0.57	1	4	4
t3	0	0	0.007	0	0.46	0.57	1	0	4
r1	0	0	-0.01	-0.4	-0.46	-0.40	0	-0.8	0
r2	0	0	0.01	0.667	0.84	0.67	0.67	4	0
X1	0	13.33	0	0	0	0	0	0	0
X2	0	-26.67	0	0	0	0	0	0	0
X3	0	13.33	0	0	0	0	0	0	0

Notes: Yi is output in period I; Gi is war expenditure in period I; Ci is consumption in period I; ti is the tax rate in period i expressed as a fraction of the producer price;ri is the real interest rate on a loan in period I which matures in period I +1 (it is a proportion per period); Xi is the balance of trade in period i (this is exports minus imports). All national income flows are measured in widgets per period.

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Determinants of military expenditure in Zimbabwe

Zachary Tambudzai

Although by African standards Zimbabwe's military expenditure burden of around 3.8 percent of GDP in 2009 seems modest, it represents a significant increase from the 1.7 percent reported in 2004. It is unlikely to be amenable to econometric analysis, given Zimbabwe's turbulent recent history and the general lack of transparency there. Important influences on spending are likely imbedded in the beliefs and attitudes of decisionmakers and, as in most other developing countries, it is likely to be an extremely opaque process, with many off-budget sources of income. Certainly there is evidence to suggest that in Africa security-related outlays are frequently deliberately included in nonmilitary budgets, with weapons purchases often funded from off-budget and extra-budgetary sources.[1]

This article studies influences on and identifies various types of extra-budgetary and hidden channels of funding military activities in Zimbabwe. The aim is to obtain insight into the military budgetary process and to explore institutionalized means for controlling, monitoring, and auditing the country's military expenditure. Given its colonial history, and that it shares certain institutional and governance characteristics of other southern African countires, Zimbabwe provides a particularly interesting case.

The article briefly reviews research on the military budgetary process in Africa before outlining the research method used to investigate determinants of military expenditure in Zimbabwe. It then examines factors that influenced budget allocations to the security forces in Zimbabwe up to 2009.

Military budgeting in Africa

Studies of the determinants of military expenditure are numerous, but those focusing on Africa are limited in number. Most employ econometric analyses of country or cross-country data to examine the impact of economic and strategic factors. While they yield with some interesting results, they fail to explain the processes involved. To develop a better understanding of the allocation of public spending to the military, an analysis of the underlying motivating factors is needed. These include geostrategic considerations, budgetary politics, the behavior of arms suppliers, enabling factors, such as linkages between interest groups, and underlying factors, such as military pressure groups, and the belief that military expenditure results in greater national security, status, and pride. As one analyst observed, a "highly non-transparent military sector" is a breeding ground for off-budget expenditure and corruption, which can undermine a security force's operational efficiency.[2]

This article studies influences on and identifies various types of extra-budgetary and hidden channels of funding military activities in Zimbabwe. The aim is to obtain insight into the military budgeting process and to explore institutionalized means for controlling, monitoring, and auditing the country's military expenditure.

A culture of secrecy is a common feature in the military sector in Africa, and the ruling elite in most states regard the military as a special institution. Indeed, studies of military budgeting have found that for most countries, there is no prescribed military budgeting process. For example, one study of eight African countries (Ethiopia, Ghana, Kenya, Mali, Mozambique, Nigeria, Sierra Leone, and South Africa), found that procedures for budgeting for the military were not followed in practice. Where there is a documented formal process, it is typically ignored and in most cases budgets are determined by a small faction close to the executive in an informal way, with little relation to a military plan or goal. The general public and professionals in most African states did not debate or participate in the formulation of security policy and the role of parliament was limited by the lack of experts and knowledge about the military sector. Audit reports rarely included corrupt practices in the defense ministries and were never critical of off-budget spending. Off-budget spending was evident in many military institutions and there was very little transparency and lack of scrutiny in military budgeting.[3]

Apart from the normal budget allocations there are other potential military revenue sources, including income from military business activity, special funds from nonmilitary parastatals, war levies, foreign military assistance, and criminal activities. United Nations peacekeeping operations, in which the participating countries and their soldiers are rewarded were also an important source of funds. The military were also involved in business activities to supplement their inadequate salaries and finance daily activities. Foreign exchange revenues from resource extraction and credit from friendly overseas governments for the purchase of military equipment can also be of importance.[4]

In attempting to understand the determinants of military expenditure in a country that has had the turbulent history of Zimbabwe, one would expect the culture, underlying processes, and institutional factors to play an important if not dominant role. To analyze them, it is necessary to look beyond the reported figures and delve into the underlying motivations and drivers, using qualitative rather than a quantitative data.

Research procedure

For this study, informal interviews were carried out with six categories of respondents

from government bureaus, the security sector, parliamentarians, opposition parties, civil society (including the media), and relevant academics. In line with Harris' research for South Africa, thirteen research questions (presented in the appendix) were used where possible. Given the volatile political environment in which the research was conducted, it was difficult to fulfil the planned sample size of 24 participants, but efforts were made to interact with individuals from all target groups and a response rate of 67 percent was achieved, with an average of 3 interviewees per category. When interviews were not possible, direct informal interactions with informants, telephone interviews, and email were used to elicit responses.

Information was also collected from secondary sources such as documents from various public and private archives in Zimbabwe and online government and private archival sources for the period 2005 to 2009. Internet searches provided information on more recent developments from online sources including newspapers (both private and government owned), speeches (by ministers, senior army officers, members of parliament, and senior civil servants), and nongovernmental organizations' web sites (e.g., Zimbabwe Democracy Trust, Global Integrity, and International Crisis Group). Journal articles and books written on the Zimbabwean Defence Forces (ZDF) by various military specialists provided more detail.[5]

Data analysis and processing involved the use of Nvivo 2, a qualitative data analysis software package, to assist in coding and categorizing data into various factors that influence decisionmakers when allocating resources to the military. Checking for consistency of views from interviews (triangulation) was achieved by examining and comparing findings from the six different informant categories, and comparing interview data with information collected from documents. The analysis first involved generating themes from the codes and categories identified in the textual data; second, producing a general description of the responses from informants in line with the themes generated; and third, producing a description of data obtained from various documentary sources. The secondary sources acted as "confirmatory data collection—deepening insights into and confirming patterns that seem to have appeared."[6]

Drivers of military spending

Three major themes on influences on military expenditure were identified from the responses. First, high levels of military spending were justified by beliefs and attitudes regarding external threats, regime change threats, and security. Second, military spending was promoted by the relationship between the ruling elite and the military. Third, the budgetary process was characterized by an overall lack of oversight. While markedly different responses were received from the different informants, in general they saw local, regional, and international political and security imperatives as drivers of the level and trend of Zimbabwe's military expenditure. The influences on military expenditure allocations as obtained from the informal interviews were consistent with the data obtained from the documentary sources.

Perceived threats: external and internal

Three major themes on influences on military expenditure in Zimbabwe were identified from the responses. First, high levels of military spending were justified by beliefs and attitudes regarding external threats, regime change threats, and security. Second, military spending was promoted by the relationship between the ruling elite and the military. Third, the budgetary process was characterized by an overall lack of oversight.

Most government and military officials interviewed suggested four major justifications for the allocation of funds to the military sector: state security, regime change or (external) threats, fulfilling peacekeeping duties, and the influence of regional wars or internal political instability. Informants from the other four groups (parliament, civil society, opposition, and academics) saw allocations being driven by the government's desire to curry favor with the military, the desire to maintain regional superiority, a sense of political insecurity and re-election strategy, and rent-seeking and corruption. Primary sources were consistent with government documents identifying the reasons for financing the military as the need to fulfill its constitutional role of providing national defense, the volatile and unpredictable security environment and external threats, the need for training of military personnel, regional cooperation and international peacekeeping operations, and the re-equipment and modernization program.

Government officials interviewed believed that the West pursued a regime change agenda for Zimbabwe, so the government of Zimbabwe needed to step up military training and military equipment acquisition to increase national security. Some informants within the military emphasized the influence of a necessary renewal program, to acquire new weapons following the arms embargo imposed by the West in 2002. The then-defense minister, Dr. Sekeramayi, argued that "[m]ilitary preparedness should always be top priority, even during peacetime. While there may be no direct military threats to Zimbabwe today, there may be one tomorrow." To achieve this, in 2006 the Ministry of Defence (MoD) revealed that the Zimbabwe Defence Forces had signed major contracts with Chinese companies like NORINCO, CATIC, and Polytechnologies. Funding for the renewal program also came directly from the Reserve Bank of Zimbabwe (RBZ).[7]

Up until 1993, the government used apartheid threats to justify high spending. Currently, they point to the threat of invasion by the United States and the United Kingdom. Some academics argue that the paranoia of re-colonization and invasion is influenced by the position taken by the West in classifying Zimbabwe together with rogue states like Iran and North Korea. Senior army officials expressed similar sentiments at graduation parades for newly trained soldiers. In 2006 and 2007, senior

army and air force commanders took turns to highlight the threats posed by the West to Zimbabwe and urged the soldiers to defend the country's independence.[8]

At various forums and speeches, President Mugabe has accused Britain and the white farmers of funding attempts at regime change in Zimbabwe. This was echoed by senior defense officials and commanders, who asserted that the pattern of expenditure is influenced by "the dynamic, volatile and unpredictable nature of the country's security environment." Other respondents outside government and the military establishment, however, believe the regime change argument to be a smoke screen, meant to hide the use of patronage and to ensure regime security. They argue that the state has bought the loyalty of the defense forces through salary hikes and nonpecuniary packages (farms, cars) and see the ruling party-military alliance as a way of maintaining political power and satisfying business and political rent-seeking interests.[9]

Three government and military officials interviewed indicated that there is a military threat from the West toward Zimbabwe. This is corroborated, for instance, by Brigadier General Trust Mugoba's speech in 2006 where he noted that the government had reduced army personnel by 25 percent because of "a lack of external threats and had channeled the money into social development instead." To some extent this gives credence to the assertion by civil society and opposition groups that the external threats argument is not real.[10]

The arms embargo imposed by the West is believed to have limited the military capability of the ZDF. This forced the ZANU-PF (the ruling party) regime to look for other sources of arms as well as other methods of financing the purchases, given the worsening economic conditions. In addition to normal budget allocations, the government relied on barter trade to acquire ammunition, equipment, and planes. Mugabe turned to Asia and to the Middle East and used mining and farming concessions to get more arms. China took the bulk of Zimbabwe's tobacco, diamonds, and gold in exchange for agricultural equipment and military hardware. In 2004, the Parliamentary Committee on Defence and Home Affairs was informed by the defense ministry that arms acquisitions were necessitated by an arms and spares embargo on Zimbabwe.[11]

Apart from the provision of national security by a well-trained force, there was also an element of trying to retain national pride and status achieved through participation in peacekeeping and military interventions in crises in Angola, the Democratic Republic of Congo, Lesotho, Mozambique, Rwanda, and Somalia. Zimbabwe also participated in peacekeeping operations in East Timor, Kosovo, and Sierra Leone, and more recently in Sudan's Darfur region. Zimbabwe also provides training infrastructure for the Southern Africa Development Community (SADC) to instruct peacekeepers and offer security training courses. Peacekeeping duties are an opportunity to boost the funds available to the ZDF. The proceeds from United Nations peacekeeping missions were used to purchase vehicles from Japan. There has, however, been a shift in Zimbabwe's defense policy since 2000, away from the idea of regional collaborative security of the 1990s to the preservation of the ZANU-PF party and government. Whether the external threats to national security are real or not, they seem to have a bearing on the extent of the resources allocated to national defense in Zimbabwe.[12]

The relationship between the military and the ruling elite

As expected, the research findings indicate that the ruling party (i.e., ZANU-PF) used patronage among security chiefs to retain political power. It manipulated the defense budgetary process to ensure that parliament ratified defense allocations without considering trade-offs with other departments. In addition to the budgetary allocation, a much larger amount was hidden in unallocated reserves by the Ministry of Finance (MoF) and, more recently, parliament has been called upon by the executive to condone unauthorized spending by the military, facilitated by the RBZ through quasi-fiscal policies.[13]

There is little external scrutiny of military budgets as military-related national pressure groups have had little effect and multilateral donor organizations have had no direct influence since 1999. In contrast, the suppliers of military-related goods have had considerable influence on the size of the defense budget through their connections to the military leadership and the ruling party politicians. The military incursion in the DRC in 1998 had the backing of a number of Zimbabwean entrepreneurs, who have relations with the army and senior politicians.[14]

Military and intelligence services also influence the size of the security budget through the Joint Operations Command (JOC), the ruling party, and the presidency. Human Rights Watch Zimbabwe has argued that the military defends Mugabe because they are corrupt and that the JOC members "... have dirty hands. They've enriched themselves and want to hang on to what they have and avoid charges of corruption." For instance, a company owned by the Zimbabwe Defence Forces commander's wife, ZimSafe, won some contracts to supply reflective clothing. While Mr. Muchakazi, a procurement specialist with the MoD acknowledged this, he refuted allegations of corruption in the procurement process. Other MoD officials acknowledged that the tendering process led to higher than normal prices and expressed reservations about the effectiveness of the indigenization policy on army procurement. For instance, the permanent secretary in the MoD said "... middleman ended up profiteering at the expense of taxpayers. There is a political element in these so-called middlemen and indigenous companies. If we [the defense ministry] go to established companies for our supplies, we achieve our goals and end up saving."[15]

Zimbabwe does not have an arms industry per se but it does produce ammunition for small arms. Zimbabwe Defence Industry (ZDI), a government-owned company formed in 1984, manufactures small arms and exports ammunition mainly to African countries. Comments in interviews suggested that the operations of ZDI are not transparent and not even reported in parliament. "The culture of secrecy and silence

which is characteristic of the present ZDI operations is out of step with current international trends and democratic practice."[16]

Expenditure on military equipment also appears to be fueled by elections. In 2005, military sources said, "[o]ur army has received the equipment as part of a deal to fully equip it ahead of the March parliamentary elections. Mugabe would want the army to be totally prepared in advance of the 2005 parliamentary elections to retain him in power."[17]

Militarization of state institutions emanates from Zimbabwe's political and liberation history, resulting in a brutal political culture. As Rupiya observed, the use of "the military approach" in order to solve the country's problems "... has not moved out of the revolutionary war context," illustrating the special role the military plays in the state. To this can be added the rent-seeking behavior of both the army and ZANU-PF government that leads to collective behavior to maintain or increase military spending. A military chief's stay in power is guaranteed by the ruling party, and the party's continuous hold on power is guaranteed by the military forces. The armed forces are co-opted into civilian duties and so their influence in budget allocation increases and there is no real objective debate.[18]

The secretary general of the Movement for Democratic Change (MDC) is in no doubt about the reasons behind the lack of oversight in the budgetary process. Commenting on the 2007 Supplementary Budget, Biti wrote: "Stripped [to] its bare bones the supplementary budget betrays ... the power retention agenda in which the State resources will be spend without reason or limit purely for the purposes of maintaining and reproducing power. One finds that the amounts allocated to the President's Office, the Ministry of Defence and the Ministry of Home Affairs, is a staggering ... 33 percent of the supplementary budget." The main purpose of the military budget is power retention by the ZANU-PF government. Biti also wrote, "… it is a State that is fiercely loyal to one value and one value alone; the power retention matrix."[19]

Most military analysts agree with Biti's sentiments and analysis that security forces are there to defend the regime in power rather than the country. So far, ZANU-PF has obtained favorable political results from the terror instilled by the armed forces and the veterans of the liberation war. This has encouraged politicians and government to cultivate an excellent relationship with the defense forces, especially the commanders. This is the reason why in return for a good power retention job, the army always gets monetary and nonmonetary benefits.[20]

Chitiyo and Rupiya summarised ZANU-PF's survival strategy as a military operation, the so-called Third Chimurenga. They noted that, "[b]elieving that it [ZANU-PF] faced a 'total onslaught' from internal and external opponents who wished to hijack the gains of the liberation war in modern Zimbabwe, the state responded with its own 'total offensive' (legal, political, cultural, economic and military) to ensure state survival and to preserve the gains of land redistribution exercise." Ndlovu-Gatsheni concurred with this assessment when he wrote: "These recent developments testify to the trend towards militarism in politics." He argued that ZANU-PF has used the army in a "political power game. It seems they [the army] see themselves as hired to protect the regime in power rather than the population of Zimbabwe." Rupiya also observed that "[i]n the newfound relationship, the distance between party and government was collapsed and by extension, the professional standing of the military in its national symbolism disappeared. Instead, the security organs have assumed partisan roles and functions in support of the ruling party ..."[21]

Ndlovu-Gatsheni also noted that ZANU-PF has succeeded in politicizing the army and the police. Zimbabwean defense forces commanders have repeatedly vowed not to allow anyone who did not fight in Zimbabwe's liberation war to take power as president of the country. "To keep the army on his side, President Mugabe has awarded soldiers substantial salary and allowance increases. Officers in the army have also been given a larger slice of seized white farmlands." The comments and statements from academics and military researchers show how important is the military to the ZANU-PF regime and how they are in the driving seat. This removes all superordinate rationality from the process of allocating resources to the military (i.e., "rationality" is restricted to the inside deal between military and ZANU-PF). With the bulk of decisionmakers even in cabinet having a military/security background, who can oppose a flawed budget from the Minister of Defence?[22]

The nontransparent military budgetary process

The informants made it clear that the Zimbabwe military gets special treatment in resource allocation. The military's demands are met without justification by the governing party. Ministry of Defence budget rules are not always respected, particularly with requests for additional funding and expenditure where, contrary to normal budget principles, the executive does not normally consult parliament. Most informants (63 percent) believe that in Zimbabwe, expenditure on health and education should be accorded special attention instead of spending on defense, confirming the views expressed in some secondary sources, which argue for a reprioritization of government spending to deal with economic and social problems.[23]

Hearings by the Parliamentary Committee on Defence and Home Affairs revealed that the cabinet makes military decisions without consultation with parliament, reinforcing the International Crisis Group (2000) report that ZDF intervention in the DRC had been a unilateral decision and "was done with little or no consultation with Parliament ... and until August 2000, the Zimbabwean public was provided little information about the engagement—including what it cost and casualties incurred." A member of the Defence Committee, Kasukuwere, "... queried the manner in which the purchase of military equipment had by-passed the State Procurement Board, a move he said might result in the army buying equipment which may be expensive, but having a short life span." The lack of transparency and the flouting of procedures are prone to breeding corrupt practices that seem to be rampant in military circles.

Makumbe also noted that corruption in Zimbabwe is rife because there is "currently no agency responsible for monitoring conflicts of interest among public servants who make decisions on matters of state procurement and the awarding of tenders ..." Henk and Rupiya also revealed the weakness in accountability and reported that Zimbabwe's Comptroller and Auditor-General had repeatedly called attention to irregularities in military spending, with billions of dollars unaccounted for and little indication of government interest in investigating wrongdoing or correcting the abuse in ministries.[24]

Contrary to McNutt's assertion that governments are there to be manipulated, in Zimbabwe it seems the regime had a fair share of manipulating the military to its advantage. Two-thirds of informants noted that there is no serious oversight over military spending and that normal budgetary rules and procedures are not being followed. In practice, there appears to be no sense of trade-offs in resource allocation by the executive. A government official acknowledged that "[t]he objectives as stated in the defense policy are now different. The [military] budget is designed to serve partisan interest. Currently, conditions in government simply call for a stronger army and heavily armed uniformed force to coerce citizens to obey the law and vote for the current government to stay in power. There is no civility in the decisionmaking process since everything sounds arbitrary and biased."[25]

Government documents show that the budgetary process in the military is the same as in the other government ministries and departments. The budgetary process has many discrete phases, the first stage being pre-budget meetings between January and March of every year. Parliament is involved in the budgetary process at the formulation stage through participation in a pre-budget seminar. However, Mnangagwa emphasised that the national budget in Zimbabwe is guided by nationalist principles as well as by patriotism.[26]

The official role of the parliament in military budgeting and management is to regulate and ensure accountability. "[T]he ZDF is subject to the security and administration of regulatory parliamentary and security committees. These include Budget, Public Accounts and Security committees, which censor the defense budget, scrutinize defense expenditure and monitor the activities of the defense forces, respectively." In addition, there is the Comptroller and Auditor-General, an independent officer accountable to parliament who each financial year, examines, audits, and reports on public funds property in terms of the Constitution and the Audit and Exchequer Act. However, for almost two decades, parliament has had no say in military matters. Furthermore, since 2003, the defense ministry has benefited from the RBZ's quasi-fiscal policies, not included in the national budget. In the case of citizens' participation in budget formulation, research by Global Integrity found that "[t]he sentiments of citizens are generally not respected, feared or listened to ... So though the citizens murmured disapproval at the largest budget allocation going to defence in a time of peace, nothing was done about it."[27]

These findings show that the military budgetary process is mainly a political exercise, with institutions of democracy playing a secondary role as the ruling elite can raise the military budget levels without even consulting parliament. Military purchases only come into the public domain or parliament well after deals have been concluded. The rules guiding the fiscal process are there, but ZANU-PF/military interests determine the military expenditure levels. Armament procurement as well as military interventions are deemed to be executive decisions.

Conclusion

Integrating the findings from the informal interviews and document analysis gives a view of the important institutions and processes involved in the allocation of resources to the military in Zimbabwe. Although the military budget is presented in the national budget, the final figure rests with the ruling elite, especially the presidency and the security arms of government. Military expenditure fits the aspirations of the ruling party, implying that national security is secondary to regime security. Military leaders are presented as a subset of ZANU-PF because of the close association (alliance) between the two, and the formation of the JOC shows just how influential the army has become in resource allocation decisions. Documentary evidence shows that the opposition parties believe that ZANU-PF and the military determine the levels of military expenditure. As MDC spokesperson Nelson Chamisa once said, "[i]f you look at key institutions, the army is calling the shots. Even Mugabe's campaign is being carried out by the army."[28]

This article has provided a qualitative analysis of the determinants of military expenditure in Zimbabwe. It complements econometric studies by illustrating the influence of internal historical and political dynamics on top of external threats and economic factors. The importance of the domestic-political dynamics in military expenditure allocation decisionmaking has been demonstrated, with regime security and rent-seeking/elite corruption being important factors in increasing military expenditure allocations. Other factors that influence allocations are the lack of serious oversight and accountability, the liberation ideology and mentality of the Mugabe regime, and the regime change paranoia caused by a Western arms embargo and other selective sanctions.

While Zimbabwe is a very specific case, the article does illustrate the potential importance of qualitative factors in understanding the determination of military expenditure, especially in Africa where similar conditions obtain.

Notes

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3. Special institution: Harris (2005); Omitoogun (2006). Eight countries: Omitoogun and Hutchful (2006). No prescribed military budgetary process: Henk and Rupiya (2001); Omitoogun (2006); and Omitoogun and Hutchful (2006). No debate or participation: Henk and Rupiya, (2001). Audit reports: Omitoogun and Hutchful (2006).

4. Off-budget spending: Hendrickson and Ball (2002). UN peacekeeping rewards: (Henk and Rupiya, 2001).

5. Harris: Harris (2002a; 2004a; 2004b; 2010).

6. "Confirmatory data ...": Patton (2002, p. 436).

7. One informant noted that "the military is the modern organization of the security mechanism hence the expenditure is ... justified on the need to make sure that the military is well-equipped to defend national interests." Defense top priority: [Herald] 2005. RBZ funded purchases: [Herald] 2006.

8. Apartheid threats: Chitiyo and Rupiya (2005). West paranoia: A respondent from academia had this to say: "The natural paranoia of the government is, I think, exacerbated by the position of its perceived enemies ... the West. There is an unhealthy relationship, which probably allows the government to justify its military expenditure. That such countries as Iraq and Afghanistan have been invaded, and Zimbabwe (was) placed by U.S. Secretary of State Condoleezza Rice, alongside Iran and North Korea as part of the 'axis of evil' probably raises their fears and therefore allows them to justify their expenditure." Western threats: In 2006, the Air Vice Marshal Elson Moyo "... urged the graduands to defend the country's sovereignty saying Zimbabwe was under Western siege. 'We have to defend at all cost our nation and its territorial integrity'": [ZDF News] 2006b. In 2007, General Sibanda said: "Your passing out today comes at a time when the country is facing numerous challenges, as a result of sanctions imposed on Zimbabwe and the regime change agenda of the British and Americans ...": [ZDF News] 2007.

9. Funding regime change: For instance, in 2007 Mugabe said: "There is an orchestrated, much wider and carefully planned regime change plot by internal and external enemy forces with plenty of funding from some commercial farmers and British organizations ...": [Zimbabwean] 2007. Dynamic and volatile: [The Herald] 2005.

10. No external threats: Mafunda (2006).

11. Limited capability, barter trade, China: Peta (2005), Dzamara (2007). Arms and spares embargo: [Newzimbabwe] 2004 .

12. Peacekeeping operations: [ZDF News] 2006a. Preservation of power: Chitiyo and Rupiya (2005, p. 351). Training infrastructure: Chitiyo and Rupiya (2005, p. 351).

13. Parliament approves a smaller figure: An informant, who was a member of parliament and a member of the Budget Portfolio Committee.

14. Military-related groups: An informant from civil society. Backing from the business sector: Informant from government—"Companies of those related to army chiefs are given preference as suppliers of military needs. For example, the wife of the armed forces chief, (is) the owner of a company called ZimSafe, which supplies reflective clothing to the security forces. This is a clear conflict of interest and that one cannot even imagine how that relationship affects military expenditure but that is just a single example. Another case is the ZDI [Zimbabwe Defence Industry]. The proceeds from the industry have not been accounted for and its activities are not reported to parliament."

15. Corrupt JOC: Lindow (2008, p.3). Zanu-PF business deals: [Zimbabwean] 2007. Mr. Muchakazi: [ZWNEWS] 2006.

16. Small arms industry: Nkiwane (1999). Culture of secrecy: Mlambo (1999).

17. For elections: [ZWNEWS] 2005.

18. Militarization: Rupiya (2003). Brutal political culture: Ndlovu-Gatsheni (2003b). Military approach: Rupiya (2003, pp. 251-252). Stay in power: senior opposition politician.

19. Lack of oversight: Biti (2007a). Power retention matrix: Biti (2007b).

20. Defending the regime in power: Rupiya and Chitiyo (2005); Rupiya (2007; 2008); Ndlovu-Gatsheni, (2003a; 2003b; 2006).

21. Zanu PF survival strategy: Chitiyo and Rupiya (2005, p. 359). Militarism in politics: Ndlovu-Gatsheni (2003a, pp. 28-29). Professional standing of the army: Rupiya (2008, p. 1).

22. Politicizing the army: Ndlovu-Gatsheni (2003a, pp. 28-29). Soldiers awarded substantial salaries: [ZWNEWS] 2005.

23. Informants: Parliamentarians, government officials, opposition members. Special attention: Ndlovu-Gatsheni (2003b, p. 130) and Guma (2007).

24. No consultation: International Crisis Group (2000, p. 6). MP Kasukuwere: [Newzimbabwe] 2004. Corruption in procurement: Makumbe (2004, p. 3). Accountability: Henk and Rupiya (2001, pp. 19-21). Defense forces failed to account for billions: Manyukwe (2007).

25. McNutt: McNutt (1996, p. 140).

26. Government documents: MoF (n/d). Budget guided by nationalist principles: Mnangagwa (2004).

27. Regulatory parliamentary and security committees: Chitiyo and Rupiya (2005, p. 350). Quasi-fiscal policies: Murerwa (2006, pp. 28, 40). Sentiments of citizens: Global Integrity (2004, question 33).

28. Lindow (2008, p. 2).

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Appendix: Research questions

1. What are the chief arguments used to justify Zimbabwe's level of military expenditure? In your opinion, how valid are they?
2. What do you think are the fundamental factors which determine the level and trend of Zimbabwe's military expenditure?
3. To what extent do you think the military is or should be a special case, which should get most of what it wants in terms of budgetary resources?
4. Are you familiar with Zimbabwe's budgetary decisionmaking process? To what extent are "the rules" being followed with respect to military expenditure?
5. Is there any sense within Cabinet of trade-offs between military expenditure and other government expenditure categories or is each a separate decision?
6. To what extent do pressure groups influence Zimbabwe's military expenditure decisions? Do you have any illustrations of their actions?
7. To what extent do you think beliefs or attitudes held by Zimbabwe's decisionmakers influence the country's level of military expenditure?
8. To what extent do you think that pressures from outside Zimbabwe influence its level of military expenditure?
9. How is national pride or status understood by government decisionmakers?
10. How is security understood by government decisionmakers?
11. How are budgetary allocation decisions made in both technical and political senses?
12. How are new understandings of the role of the military being used in order to maintain military expenditure levels when territorial security is of limited relevance?
13. What are the dynamics of the military pressure group operations in Zimbabwe?

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