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The Demand for Military Spending in Developing Countries

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ABSTRACT *Numerous studies have estimated demand for military expenditure in terms of economic, political and strategic variables. Ten years after the end of the Cold War, this paper attempts to ascertain if the new strategic environment has changed the pattern of determinants, by estimating cross-country demand functions for developing countries for periods during and just after the Cold War. The results suggest that, for both periods, military burden depended on neighbours' military spending and internal and external conflict. Democracy and population both relate negatively to military burden. There is little evidence of a change in the underlying relationship between the periods.*

1. Introduction

There is a diverse applied literature on the determinants of military spending in developing countries. It has attempted to identify the strategic and economic factors that influence the evolution of military burden, using both cross-country and detailed time-series case analyses (Dunne, 1996). With the end of the Cold War there has been a clear change in the strategic environment, with ramifications far beyond those countries that were directly involved in the Cold War. From a situation of two rival superpower blocks, each inclined to fight proxy conflicts through developing world client states, there is now a global US hegemony, selectively used to impose 'solutions' on conflicts in weaker states. Ideological wars have largely been replaced by conflicts over resources. The number of external conflicts has greatly diminished, while civil wars have proliferated, fuelled by ethnicity, religion and control of resources (e.g. Collier & Hoeffler, 1998).

Now that a reasonable number of years have elapsed since the end of the superpower conflict, it is possible to revisit the debate, to identify the post Cold War determinants and to compare them with the Cold War period. Of particular interest is the question of whether internal factors have become more important relative to external factors. In a unipolar world, where the only superpower tends to frown upon countries—such as Iraq—who seek to change the interstate status quo by force, the question is countries are less concerned by regional military build-ups, and relatively more concerned about the possibility of internal strife?

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This paper undertakes such an analysis. It is an attempt to evaluate the driving forces behind military spending in developing countries, comparing a period during the Cold War with the period afterwards. The sample of countries covers a wide range economically and in terms of security. It includes peaceful, low–middle income island nations with no discernible security threats, oil-rich states facing numerous long-running wars and rivalries, and impoverished sub-Saharan African nations racked by civil war and internal instability.

The next section reviews the different approaches to analysing the demand for military spending in the literature, with Section 3 presenting the sample used and the data sources. Section 4 then develops the empirical model used in the analysis and Section 5 presents the results. Finally, Section 6 offers some conclusions,

2. The Demand for Military Spending

There are two broad groups of empirical studies in the literature on the determinants of military spending. First, the arms race models developed from Lewis Fry Richardson's seminal work (Richardson, 1960), which presented arms increase in an action–reaction framework. These models have been developed in a number of ways but there are still many problems with them, both in general and in the specific application to developing countries. They are clearly more suited to analysing situations in which countries are in conflict, such as India–Pakistan (Deger & Sen, 1990) and are therefore of limited applicability. More importantly, however, they often have failed to perform well empirically (Dunne, 1996; Mohammed, 1996; Smith, 1989). More recently, this approach proved successful in analysing the military spending of pairs of countries, such as India and Pakistan, who are both engaged in an enduring rivalry, and for whom the other represents the overwhelming security issue (Dunne *et al.*, 2002), but failed in the case of Greece and Turkey. (Dunne *et al.*, 2002; Kollias & Makrydakis, 1997). This is not surprising given that Turkey, in particular, has security concerns far broader than the rivalry with Greece, such as the Kurdish situation and the potential for resource conflict with Syria and Iraq.

Second, there are those studies focusing on the economic, political and military determinants of military spending. These vary across disciplines, with international relations, political science, sociology, and economics all contributing studies within the focus of their disciplines. The most satisfactory empirical analyses have tended to take a comprehensive approach, combining all of the plausible economic, political and military influences and operationalising as many of them as possible. These models vary both in the choice of variables and in the theoretical basis, if any, for the empirical model. Some studies take a purely ad hoc approach to the empirical analysis. The more formal models have developed from the neoclassical approach, which considers the country or state as maximising a social welfare function, where security is an integral component. Security is then considered to be produced by military spending (Smith, 1980, 1995). An alternative is the 'bureaucracy' model of the state's demand for military spending, as in Gonzales & Mehay (1990).

In empirical work, most models, theoretical or atheoretical, lead to a similar estimation equation, where the demand for military expenditure is a function of economic resources and threats to security, as well as various political factors such as the nature of the state. Much of the effort in the empirical work is then put into finding as efficient a set of variables as possible to measure the various components of 'threat' against which a country may deploy military resources.

There are also case studies that are less formal in approach but which nevertheless make important contributions. At their best, they can bring together a considerable amount of historical and institutional information to complement regression analysis and can be aware of the limitations of their estimates (e.g. Dommen & Maizels, 1988).

No matter how formal the approach, in analysing developing countries the specific nature of these countries has to be taken into account. Indeed, such factors lead to serious questions being raised about the computational ability and rationality of actors assumed in formal neoclassical models (e.g. Park, 1993). In many countries, military expenditure is often independent of economic conditions and is generated mainly by the internal logic of the state. The overall economic environment may provide a constraint on military burdens over time, but the importance of the strategic factors, security and threat perceptions, both internal and external, has to be recognised. In estimating demand functions, the income variables need to be specified and these political and strategic effects quantified.

Within the empirical literature, the cross-country analyses of the demand for military spending have developed a number of ways of dealing with the complexities of the strategic variables. An interesting and fruitful approach uses the concept of a 'Security Web' developed by Rosh (1988). This defines neighbours and other countries (such as regional powers) that can affect a nation's security as being part of a country's Security Web. Rosh calculates the degree of militarisation of a nation's Security Web by averaging the military burdens of those countries in the web, finding the degree of militarisation to have a significant positive effect on a country's military burden. GDP per capita is often used to reflect the income effect. Higher income is likely to lead to higher military spending, which may or may not translate into a higher military burden. In addition, higher income can lead to structural changes, inequalities and hence conflict requiring higher military spending to maintain internal control (Maizels & Nissanke, 1986). The share of total government expenditure in GDP is used to account for the fact that the military will likely benefit from high government expenditure per se (McKinlay, 1989). The concept of incorporation of a country into the world economy is proxied by the share of trade (exports plus imports in GDP) (Rosh, 1988). In addition, there are attempts to model the dynamics of the government spending process, to allow for inertia due to some hangover from previous expenditures, commitments to programmes (Dunne *et al.*, 1984), or simply a ratchet effect as in Peacock & Wiseman (1967). Such a dynamic model is most easily operationalised by including the lagged dependent variable amongst the regressors (of course this cannot be done in a cross-section model, and there are estimation problems in using lagged dependent variables in a panel data model).

There are also many attempts to introduce political factors within the countries. The type of government can effect military spending, with military governments most likely to be higher spenders.[1] However, there is unlikely to be a simple dichotomy between military and non-military governments as, in many recent 'democracies', the military retain considerable influence. In addition, Government links with the rest of the economy can be important. The situation in developing countries is slightly different than in developed countries, as only a minority of developing countries have significant arms production. There will, however, still be a 'military industrial complex' with vested interests in maintaining or increasing military spending. These vested interests will comprise civil servants, industrialists, officials, and workers involved with the procurement and maintenance of imported weapons systems, and

possibly the production of ammunition and spares. (Dunne, 1996). It is also possible that offsets may be attached to the arms imports.[2]

The results of the studies are mixed but do tend to suggest that, in developing countries, economic conditions are not the most important determinant of military burden. Studies have found clear differences in the different types of countries and their types of governments, to the extent that some argue that the determinants are country specific and not amenable to generalisation (Hartley & Sandler, 1990). This is disputed by Hewitt (1991) who finds, for a wide sample of countries, evidence of economic and financial determinants that are common to the sample. Using a two-equation model, GDP is found to have a positive effect on military burden, with GDP squared having a negative effect, so large economies reduce their military burden as GDP increases. Indebtedness and available capital, war, land area, land borders and coastline are positive and significant. Monarchies spend most on the military, followed by military, 'other' (non-democratic) and then socialist governments. Other recent studies include Adams & Ciprut (1994), who analyse the demand for military expenditure in South East Asia using spending by allies and enemies, adjusted for distance, as the main security variable and Batchelor *et al.* (2002) who carry out a time-series analysis of South Africa's military expenditure, using a number of variables relating to South Africa's changing security environment.

Overall, it is clear that the demand for military spending can be influenced by a wide range of strategic and economic factors. Any empirical analysis across countries will need to attempt to pick up the variations in these factors, but there are likely to be problems in operationalising them, particularly data availability. The next section considers the sample and data used for this study.

3. Sample and Data

In this paper, a relatively comprehensive empirical analysis is undertaken on a cross-section of countries for a period before the end of the Cold War and one after it. This study seeks to include as many different security variables as possible. At present, there is less focus on economic variables such as integration with the world economy (imports and exports as a share of GNP), although these may be included in follow-up studies. Two separate studies are carried out, one for 1981–88 (during the Cold War), the other for 1990–97 (post Cold War).[3]

This study is concerned with developing economies and is particularly concerned with the impact of changes in Security Webs on military spending. The portion of the industrialised world that forms or formed part of the stable alliances systems, i.e. most of Europe, USA, Canada, Japan, Australia and New Zealand are therefore excluded. Still, this leaves a highly heterogeneous group: sub-Saharan Africa, semi-industrialised South America, the oil-rich Middle East, the population giants of China and India, etc. As a cross-sectional analysis, the most we may hope for is general tendencies between countries as economic, political and security factors vary.

Data for military spending, national income and population were obtained from the American Arms Control and Disarmament Agency (ACDA) for the two periods 1980–88 (during the Cold War) and 1990–97 (post Cold War). (1989 is not included in either sample as it was, in many ways, a transitional year.) There are data problems with some countries having missing values. To maintain a relatively large sample, averages were taken over available years, and a country was included if there were five or more observations for the period concerned. This gave 93 countries in

the 1981–88 study, and 111 countries for 1990–97. The samples are listed in the appendix.

Data on conflict and rivalries were constructed using four separate databases: the Dyadmid database of dyadic Militarised Interstate Disputes, the KOSIMO database of violent and non-violent conflicts, the CASCON database of conflict case-studies, and the Uppsala University Department of Peace and Conflict Research conflict database. Data on democracy comes from the POLITY98 database of democracy versus autocracy.

4. Modelling the Demand for Military Spending

In attempting an econometric analysis of the determinants of military spending it is important to have some theoretical framework to allow a specification of causality, functional form, relevant variables and the testing of implied restrictions. With a formal model, hypotheses can be well defined and tested, assumptions become explicit, and the number of parameters needed can be reduced through tests of restrictions. This is normally achieved by using a neoclassical model of the state as a rational actor maximising social welfare subject to resource constraints. The social welfare function can be determined by the state, based on individual preferences, or based on some voting rule such as the median voter. Military expenditure is then determined by balancing its opportunity cost and the security benefits it provides. Smith (1980) and Hewitt's (1991) public choice study are examples of this approach.

Thus, we can define a social welfare function where social welfare is a function of utility derived from private consumption C, military spending S, and other government spending G all conditioned on political, strategic and demographic variables Z:

$$W = W(C, S, G, Z)$$

Focusing on military spending M, the level of security will depend upon the level of military expenditure M, conditioned on demographic and strategic variables Z:

$$S = S(M, Z)$$

Maximising the social welfare function subject to this and the budget constraint

$$Y = P_m M + P_c C$$

where P_m and P_c are the prices of M and C relative to an income deflator gives a demand function:

$$M = D(Y, P_m, P_c, Z)$$

We can rewrite this equation as shares in Y rather than levels to give us the demand function commonly used in empirical work (Smith, 1989, 1995).

As we have seen in analysing LDCs the specific nature of the countries have to be taken into account, with military expenditure often being independent of economic conditions and generated mainly by the internal logic of the state. The overall economic environment may provide a constraint on military burdens over

time, but the importance of the strategic factors, security and threat perceptions, both internal and external, has to be recognised. To provide an estimable demand function requires the specification of the income variables and some way of quantifying political and strategic effects.

As in most studies of developing countries we have no separate deflator for military spending available. The share of military spending (the military burden) is therefore presented as a function of GDP and various other economic and strategic variables. Political variables, such as the type of regime, will typically relate to parameters of the demand function—for example, the relative weight of civilian expenditure and security. In regression analysis, where linear or log-linear functional forms are most easily estimated, such political variables will therefore be included in the regressors.

Population is included to capture possible size effects. It may be seen as giving some intrinsic security, reducing the need for military expenditure, or may reduce costs by allowing reliance on a large army rather than hi-technology equipment. On the other hand 'public good' theory would suggest that a large population makes military spending more effective, as it benefits a larger number of people as a 'pure public good'.

To provide an estimable demand function requires some way of quantifying political and strategic effects. In this study, a major effort is made to develop variables to represent the strategic factors, by developing the Security Web concept of Rosh (1988).

Typically, strategic variables used in theoretical and empirical models of this nature include the military expenditure of a particular rival in an arms race, the existence of armed conflict, and/or regional effects. This study seeks to combine all three in as broad a fashion as possible: the military expenditure of all relevant neighbours, classified according to the degree of hostility with the country being considered, variables for interstate and civil conflict, regional dummies, and a dummy for hostile relations with a major power.

The idea of a Security Web is to look beyond dyadic arms race models to a broader conception of the external security issues facing a country. As has been discussed, while there are a few cases (such as India and Pakistan) where two countries are engaged in a rivalry that eclipses other concerns, more often a country will need to look at a variety of regional and sub-regional factors. Thus, Turkey has a long-standing rivalry with Greece, but is also deeply affected by Middle Eastern issues, including cross-border concerns with Syria and Iraq. Argentina has a history of tension with Chile, but has also sought to rival Brazil as the dominant regional power. Even India, though absorbed by its struggle with Pakistan, must cast a nervous eye eastward to China.

Following Rosh therefore, we define country *X*'s Security Web to be all other countries capable of significantly affecting country *X*'s security. This includes neighbouring countries and regional powers capable of projecting their influence beyond their immediate land and sea borders. They may be allies, enemies, or largely neutral. Again following Rosh, superpowers are excluded on the grounds that it would be impossible to defend against them, but in this study dummy variables are constructed to take account of countries' relations with superpowers.

To measure the level of threat a country faces, Rosh uses the average military burden (military expenditure/GDP) of the Security Web. It can be argued, however, that the absolute level of military force facing a country is a

better measure of the threat it actually faces than the burden, which represents the effort the country puts into developing its military capability. A good example of this at a dyadic level is the case of India and Pakistan, two unequal rivals. India consistently has a higher level of military spending than Pakistan (about twice as much), but Pakistan spends around twice as high a proportion of national income on defence as India. Thus, Pakistan, faced with the higher absolute level of threat, devotes a higher proportion of its resources to counter it (Dunne *et al.*, 2002). This is consistent with a hypothesis that country *A*'s burden will depend on country *B*'s level of military expenditure. For this reason, while the dependent variable for each country is military burden, in this study it is the total level of military spending in the Security Web that will be used as an independent variable.

Rosh also fails to distinguish between the effect of military spending by allies, enemies and neutral countries, with the Security Web broken down into Enemies, Potential Enemies and others. This distinction is drawn in this study, using data on conflicts to divide the countries in a country's Security Web into Enemies, Potential Enemies and others. To qualify as Enemies at a given time, two countries must either currently be engaged in some form of armed conflict (possibly short of all-out war), or must have gone to (all-out) war in the past, with the grievance still unresolved.[4]

To qualify as Potential Enemies, countries must be involved in a dispute with either a history of, or clear potential for, militarised confrontation.[5] Anything involving a show of force (e.g. 'dispatching troops or vessels') would be enough to make countries Potential Enemies as long as the dispute continues. Events such as 'breaking diplomatic relations' are treated as borderline, and dependent on what other factors are present.

This study therefore uses three variables to proxy a country's external threats: the total military expenditure of the Security Web (*SW*), the total military expenditure of Potential Enemies (*PE*), and the total military expenditure of Enemies (*E*). When aggregating these totals, each is made a subset of the next; *E* is included in *PE* and *PE* in *SW*. Thus, in the regression analysis, the coefficient of *PE* will indicate the additional effect of a country being a rival rather than a friendly or neutral neighbour, and the coefficient of *E*, the differential effect of being an outright enemy rather than merely a potential enemy.

While missing military spending data did lead to the exclusion of some countries, it did not seem sensible to exclude countries owing to incomplete data on their Security Web. So when computing the Security Web, judgement was used to assign a reasonable figure for missing years; usually, the most recently available figure for military burden was applied to the current level of GDP to give an estimate of the level of military expenditure for a given year. Sometimes a subsequent figure was used as a best guess and, occasionally, missing years were interpolated when there had been a big change. This can be justified both on the basis of necessity and because the aggregation involved in the construction of the variable makes these computations unlikely significantly to affect the final figure. In addition, one could argue that it is the sort of process neighbouring countries would have to do in assessing the security threat of a country with non-transparent defence expenditure. Where there is an almost complete absence of data (e.g. Afghanistan, Somalia) a separate 'Unknown Threat' variable was created for the country's neighbours. This is the population of the country whose military expenditure is unknown, doubled for a potential enemy and quadrupled for an enemy. A full

classification of the Security Webs, Potential Enemies, etc, for each country, is included in the Appendix.

Moving beyond the Security Web variable, other strategic factors were considered. An index of civil conflict was constructed from the conflict databases, ranging from zero to four for each country-year. Level four represents all-out, generalised civil war.[6] In addition, an External War dummy was constructed, which took the value one if a country was engaged in an all-out war and zero otherwise. This was to account for the fact that if a country is at war it will not only be responding to the threat of the other country's military force, but will need to replenish stocks of arms and ammunitions used up in the fighting. While superpowers' military spending were not generally included in the Security Web totals, dummies were included for proximity to the USA, the USSR and China, and another dummy, *GPE*, was included to pick up a relation of enmity with a superpower.[7] Finally, a dummy was included for Middle East countries, to allow for the fact that the other strategic dummies may not fully capture 'bad neighbourhood' or 'contagion' effects.[8]

It is widely found that democratic countries spend less on the military than non-democracies (e.g. Rosh, 1988; Hewitt, 1991; Maizels & Nissanke, 1986). Autocratic states are more likely to rely at least partly on the military to retain their grip on power, while dictatorships are more likely to rely on a culture and ideology of militarism to justify their rule.[9] Totalitarian states are also more likely to be able to maintain unjustifiable and inefficient levels of spending by the military and other governmental departments in pursuance of the interests of the public elite rather than the country as a whole.[10] Rather than creating a simple dummy, the POLITY98 database allows the construction of a variable to reflect the degree of democracy in a country. It give figures for democracy and autocracy, broken down into various subcategories, for all states from 1800 onwards, covering institutional aspects of democracy; the competitiveness and openness of executive recruitment, constraints on executive power, diversity of levels of power, etc. Factors such as respect for human rights, press freedom, etc are not counted. The variable used in the study is the difference between the value of the DEMOCRACY and that of the AUTOCRACY variable.

The general empirical model resulting from the above discussion is:

Log Military Burden = *LMB*(Log *Y*, Log *POP*, External War, Civil War, Log *SW* military expenditure, Log *PE* military expenditure, Log *E* military expenditure, Log Unknown Threat, Democracy, China dummy, USSR dummy, US dummy, Middle East dummy, Great Power Enemy dummy).

5. Results

Table 1 gives the means and coefficient of variation values for the expenditure and strategic variables for the Cold War and Post Cold War samples. Care must be taken in comparing the values for the two periods as the samples differ and some of the data may not always be directly comparable.[11] It is, however, worth noting some of the larger differences between the two periods. As would be expected, it shows the average military burden fell from 0.053 during the Cold War to 0.043 after the Cold War,[12] with the average for External War falling dramatically from 0.059 to 0.024,

Table 1. Variables used: means and coefficient of variation

Variable	Cold War		Post Cold War	
	Mean	Coeff. Var.	Mean	Coeff. Var.
M: Military Expenditure	2415.767	2.87	2203.98	2.98
Y: GNP	43468.83	2.80	66033.58	3.75
POP: population (millions)	37.94	3.53	38.67	3.67
EW: External War dummy	0.059	3.72	0.024	3.85
CW: Civil War dummy	0.76	1.78	0.98	1.31
E: Military Expenditure of Enemies	2866.315	3.24	2312.89	3.76
PE: military spending of 'Potential Enemies'	7868.509	5.47	4704.92	2.93
SW: military spending of all countries in Security Web	19698.22	4.12	13801.33	2.73
GPE: Great Power Enemy dummy	0.08	3.46	0.06	3.90
DEM: Democracy-Autocracy	−2.74	−2.34	0.37	17.83
MB: Military Burden	0.053	1.15	0.043	1.16

Note: All expenditure variables and GNP are constant US$ million: constant 1997 for post-Cold War, constant $US 1991 rebased to 1997 using the US deflator for Cold War.

more than could be accounted for by the somewhat different sample. The Democracy variable also changes considerably, from a negative figure (more 'autocracy' than 'democracy') to a positive one, with all of the Security Web variables having considerably lower values, although the proportions of Enemies and Potential Enemies in the total of Security Web are not much different.

Log linear equations[13] were estimated, for the Cold War period and the post Cold War period and the full results for the cross-section of countries over each period are shown in Table 2, with summary statistics and diagnostic tests in Tables 3 and 4. Looking at the Cold War figures, the equation provides a relatively good fit for a cross-section regression, with an R^2 of over 0.6. The signs of the coefficients are as expected, although the income term (*LY*) is insignificant. As the dependant variable is log military burden (i.e. Log M – Log Y), this means that the coefficient of log Y on log M is one, suggesting that, across countries, military spending rises more or less in proportion to income. This can be interpreted as reflecting a combination of the role of military spending as defensive, deterring attack, which would suggest a negative coefficient (the larger the income, the smaller the proportion needed for deterrence) and the use of military capability as a means of power projection, which is relevant only for countries with higher incomes. A low income elasticity of deterrence could be balanced by the high income elasticity of power projection, giving an overall elasticity of roughly unity. The possibility of the effect of income being non-linear was tested for by adding a squared log income term, but this was insignificant. Population (*LPOP*) has a significant negative impact on military burden. The fact that it is negative is interesting, suggesting either that a large population is considered to offer some autonomous security in itself, or that small countries have to spend more on hi-technology weaponry rather than relying on a large army. Another explanation could be that higher populations place greater extra demands on civil consumption needs than on security needs. The effect remains even when the two population giants, China and India, are excluded from the sample.

Table 2. Estimation results

Variable	Cold War (93 observations) Coefficient	T-ratio	Post Cold War (111 observations) Coefficient	T-ratio
Constant	−4.09	−9.3	−3.87	−11.28***
LY	−0.015	−0.23	−0.019	−0.41
LPOP	−0.18	−2.65**	−0.13	−2.50**
EW	0.58	1.81*	0.083	0.14
CW (*BCW*[(i)])	0.094	1.98*	0.26	1.75*
LSW	0.064	2.07**	0.051	2.02**
LPE	0.084	3.23***	0.054	2.60**
LE	0.0058	0.24	0.030	1.34
DEM	−0.034	−3.17***	−0.037	−4.32***
CHIN[(ii)]	0.67	3.37***	0.36	2.43**
MEAST[(iii)]	0.70	3.25***	0.46	2.24**
GPE[(iv)]	0.29	1.22	0.33	1.29

(i) 'Big Civil War' (see below)
(ii) China proximity dummy
(iii) Middle East dummy
(iv) Great Power Enemy dummy.
* Significant at 10% level; ** Significant at 5% level;
*** Significant at 1% level.

Table 3.

	Summary statistics				
	R-squared	R-bar squared	F-stat.	S.E. of regression	Mean of LMB
Cold War	0.661	0.614	14.33	0.563	−3.377
Post Cold War	0.614	0.571	14.32	0.520	−3.519

Table 4.

Diagnostic Tests	Cold War chsq-stat	P value	Post Cold War chsq-stat	P value
Heteroscedasticity (regression of sqd. residuals on sqd.) Fitted values	0.014	0.905	0.576	0.45
Normality (Bera–Jarque tests)	3.23	0.199	0.176	0.92
Ramsey's RESET test for functional misspecification using square of fitted values	3.73	0.053	1.58	0.21

As regards the strategic variables, military burden (*LMB*) does seem to be increased by increases in military expenditure in the surrounding region (*LSW*), although the extra spending of hostile countries, Potential Enemies (*LPE*), has a more marked effect. The insignificance of the Enemies' military expenditure variable does not mean that an Enemy's military expenditure has no effect, as it is included in *PE*, and in *SW*, so the effects are cumulative. It does suggest that the Enemy/Potential Enemy distinction may be unnecessary and that distinguishing hostile and non-hostile neighbours might be enough. The Great Power Enemy dummy did not prove significant. As the countries with a value of one were mostly US enemies, this suggests that they do not treat US power as a threat they can defend against—or that in the Cold War environment, they look to the USSR or China.

The existence of an external war (*EW*) would also appear to be important. At first sight, the coefficient of 0.58 is much greater than that for Civil War, which is only 0.094; however, given that Civil War is on a scale from zero to four, while External War only from zero to one, the coefficients are of comparable magnitude.[14] The China proximity dummy is also significant and positive, suggesting that excluding China from the Security Web of most of her neighbours may not have been appropriate. The Middle East dummy is very highly significant, suggesting a strong 'contagion' effect for all countries in the region resulting from the various conflicts there.

Basic diagnostic tests were fairly satisfactory: The Bera–Jarque test for normality based on the skew and kurtosis of the residuals and the test for heteroscedasticity based on a regression of the squared residuals on the squared fitted values were both insignificant; however, Ramsey's RESET test for functional form misspecification based on a regression of the residuals on the regressors and the squared fitted values gave a significant result at the 10% level, suggesting some misspecification. However, this problem disappeared when the insignificant variables, *LY*, *LE* and *GPE*, were deleted from the model. This also improves the $\bar{R}^2$ statistic, and the significance of the War variables.

Moving on to the post Cold War figures, the model again seems to work relatively well with an $\bar{R}^2$ of 0.57. The picture does seem surprisingly similar, but there are a number of differences worth noting. Most strikingly, the External War variable becomes completely insignificant (although it was only significant at the 10% level before), probably reflecting the rarity of full-scale interstate wars in the 1990–97 period, rather than the importance of such conflicts in determining military spending.[15] The Civil War dummy also failed to be significant in the post Cold War period. One concern with this result was that the dummy was failing to distinguish minor 'coups' and major internal conflicts and that this was more important in the second period. A modified variable was constructed, a 'Big Civil War' dummy (*BCW*), which was set to one if a country's average *CW* score was three or higher, zero otherwise and this proved significant. Otherwise, the coefficients remained similar, although for LSW, CHIN and MEAST, they are markedly lower. As these are variables relating to generally high military expenditure or tension in the region, rather than specific points of conflict, this would be expected.

The tests for heteroscedasticity, normality of residuals and functional form misspecification, as used in the Cold War regression, were all insignificant.

To consider the robustness of these results some further specification tests were carried out. As remarked above, the high coefficient and significance of the China proximity dummy in both periods, may suggest that excluding China's military spending from the Security Web was wrong. Adding China to the Security Web

figures for the countries near to China (and the Potential Enemy figure in the case of South Korea), only had the effect of improving the significance of *LSW* (the main variable affected by this) in both samples.[16] Interestingly, even when China's military expenditure was included in neighbouring Security Webs, the China dummy remained significant in the Cold War sample, (although not in the post Cold War sample), suggesting that there is some 'regional tension' effect here akin to that in the Middle East that had not been adequately captured.[17]

In creating the Security Web variables, Potential Enemies' expenditure was included in the Security Web value and that of Enemies included in the Potential Enemies figure. This nesting was to detect whether additional effects could be observed for spending by more hostile powers as distinct from less. Thus the significance of both the Security Web and the Potential Enemies variables (*LSW* and *LPE*) suggest that the effect of spending by hostile neighbours is indeed distinguishable from that of non-hostile ones. An alternative to this is to treat the categories of non-hostile, somewhat hostile and very hostile separately. This was done for both samples, using the data with Chinese military spending restored. The results using the Cox's J-test, an encompassing F-test, the Akaike Information Criterion and the Schwarz Bayesian Criterion all favoured the original nested specification. A test was also undertaken to see whether the use of levels rather than burdens in the construction of the Security Web was supported by the data. For the Cold War sample, total income for the Security Web (*LSWY*) and for Potential Enemies (*LPEY*) were included in the regression in logs. They were individually and jointly insignificant, which means the hypothesis that only the level of military expenditure in the Security Web/Potential Enemies is relevant cannot be rejected.[18]

An important concern in models of this form is simultaneity bias, caused by the other countries' military spending variables being affected by that of the home country. To test whether this was a problem *LSW* and *LPE* were regressed on all the other significant independent variables from the Cold War study, and also on variables for the total income of the countries in the respective groups. The fitted values from these regressions were kept, and a variable addition test was performed to add these fitted values to the main regression for the Cold War study. The fitted values were jointly and individually insignificant, even at the 10% level.

We have seen that the results across the two periods are remarkably similar and it is of interest to consider a test for whether these differences are significant. To do this, the data for the two periods were combined into a single dataset, rebasing the 1991 figures to 1997, and giving most countries two separate observations, although a substantial number only had an observation for one period. A regression was then run on the combined sample, using all the significant regressors in either one of the models. A Chow test for structural stability across the two samples was clearly insignificant, as was the *F*-statistic for the Predictive Failure test (Chow's second test). Additionally, a regression on the whole sample with level and slope dummies to distinguish between the periods, gave coefficients for the dummy variables that were individually and jointly insignificant. Thus, there is no evidence of a change in the patterns of determinants of military spending between the two periods, although the data problems mean this is far from conclusive.

In addition to possible differences between the periods, it is interesting to consider differences between different subsets of the two samples. Both the Cold War and the Post Cold War sample were divided into three regional subsets: Africa (excluding Egypt), Latin America and the Caribbean, and Asia and the Middle East (including Egypt).[19]

The separate regressions for each region appeared to give some quite different results, in both periods. In particular, there are few significant variables for Africa. However, in general, variables are either of the same sign as in the main regression, or are insignificant. Interestingly, Latin America and the Caribbean shows a negative coefficient for GDP (on military burden) for both periods, and in the post Cold War period shows a positive coefficient for population and democracy, contrary to the general result. (Democracy comes out negative again in the Cold War period.)

However, in each period, an adapted Chow test for structural stability accepts the hypothesis that the coefficients of all the variables are the same[20], so no firm conclusions can be drawn from any apparent differences, while the robustness of the model for the whole sample is supported.

6. Conclusions

This paper has provided a detailed empirical analysis of the demand for military spending in developing countries during and after the Cold War. Surprisingly, there seems to be very little difference in the results for the two periods, suggesting that there has been little change in determinants, despite the major changes in the strategic environment. Both before and after the Cold War, states responded in kind to military spending, even by non-hostile neighbours, although hostile neighbours clearly have a bigger effect. There were some differences in the results, which suggested that external wars were more important than civil war during the Cold War, but not after (although this may be due to a lack of external wars) and that the effect of non-hostile military spending may have declined at the end of the Cold War.

Overall, it would appear that while the prevalence of civil conflict has increased relative to inter-state war since the end of the Cold War, increasing the proportion of military spending devoted to internal threat, there is very little evidence that the underlying relationship between different classes of threat and military spending in developing countries has changed since the fall of the Berlin Wall.

Notes

Based on a paper presented to the Second *CesA/IDN International Conference on Defence Economics and Security in Mediterranean and Sub-Saharan Africa*, Lisbon, June 2000. We are grateful to the participants for comments.

1. A strong military may be needed to keep dissent suppressed, and the military needs to be kept loyal to the government, possibly with good salaries and modern weapons.
2. Offsets are where the arms exporter agrees to invest in the purchasing country to 'offset' the cost of the purchase. Such offsets may involve the local production of some of the imported weapons, or investment in the local arms industry or indeed local industry in general. See for example Martin (1996) for a discussion of the economics of offsets.
3. In each case, the data for each country are averaged over the eight-year period in question.
4. Thus, the continuing dispute over Kashmir makes India and Pakistan Enemies, even during the times when they are not at war, while Israel and Jordan ceased to be Enemies following the Peace Treaty of 1994.
5. The KOSIMO database of violent and non-violent conflicts is very detailed, and includes information on all steps taken by a party to a dispute, such as 'fully fledged war', 'intervention or invasion', 'military force', 'sporadic military incidents', 'dispatching troops or vessels', 'concentrating troops on border', 'breaking diplomatic relations', 'breaking agreements' 'trade sanctions', 'notes of protest', 'mediation', 'negotiations', 'agreements', 'fulfilling demands', etc.
6. Level 1 would apply to situations such as China in Tibet (where strong military force is used against non-violent or disorganised opposition) or Northern Ireland post-ceasefire (not in the sample of course), where an armed opposition remains despite a general absence of actual fighting.

7. Exceptions were made for Taiwan and India, for whom China was included in the Security Web totals, in the Enemy or Potential Enemy category as appropriate.
8. It is worth noting that, as data are averaged over an eight year period, 'dummy' variables will not always take zero or one values—for example, a country involved in an external war for four of the eight years would have a value of 0.5 for that variable.
9. This can also be present in democracies, but is perhaps more marked in non-democracies.
10. Implying a 'corruption' or 'bureaucracy' model of spending rather than a neo-classical welfare maximization model.
11. ACDA re-estimate their data between different editions of their *World Military Expenditures and Arms Transfers* publication and as the data for the two periods come from different editions, they may not be directly comparable.
12. The average for military burden is the average of the individual military burdens over the sample, not total military expenditure divided by total income.
13. For both periods, a log-linear specification worked far better than a linear specification.
14. The restriction that the coefficient of *EW* is four times the coefficient of *CW* is accepted by an *F*-test.
15. The 1990–91 GulfWar of course falls into this category, but apart from this there is only the Armenia–Azerbaijan conflict, with military expenditure data only available for the latter, the brief Peru–Ecuador flare-up of 1995, whose classification as a full-scale war is somewhat questionable and Vietnam's involvement in Cambodia. Israel's occupation of the Lebanon was treated as 'half' an external war.
16. The significance of other variables was not affected, except that Great Power Enemy becomes significant (10% level) and positive for the post Cold War period.
17. In the post Cold War period, the China dummy becomes insignificant, perhaps reflecting the defusing of these ideological tensions, as China moved more towards Capitalism and participation in the global economy.
18. If the model using the military burden of the Security Web/Potential Enemies were correct, this would give an equation of the form:

$$LMB = \ldots + B_1(LSW\text{-}LSWY) + B_2(LPE\text{-}LPEY)$$

and therefore we would expect the coefficient of *LSWY* to be negative and of equal magnitude to the coefficient for *LSW*, and similarly for Potential Enemies. This is strongly rejected.
19. It would, in principle, be preferable to separate Asia from the Middle East, but the latter region is not large enough to give sufficient degrees of freedom in the regression. Although Asia and the Middle East are still fairly heterogeneous, these regions together represent the major Cold War geopolitical battlegrounds, and the largest markets by far for the global arms trade, so it is reasonably logical to put them together.
20. The Chow test is performed by comparing the Residual Sum of Squares (*RSS*) for the whole sample (*RRSS*), with the sum of the *RSS* from the three regional regressions (*URSS*), and calculating $F = ((RRSS\text{-}URSS)/df_1)/(URSS/df_2)$, where df_1 is the number of degrees of freedom lost by imposing identical coefficients, and df_2 is the sum of the degrees of freedom of the three regional regressions. However, as the regional dummies for China and the Middle East only apply to the Asia/Middle East region, these are forced to have zero coefficients for the other regions, and thus do not count towards either df_1 or df_2. In the Cold War case, we get $F(18,63) = 0.91$, and in the post Cold War case, $F(18,80) = 1.08$, in both cases clearly insignificant.

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Appendix: Data Sources and Construction of the Security Web

Data Sources

ACDA World Military Expenditures & Arms Transfers 1991–1992

ACDA World Military Expenditures & Arms Transfers 1998

Dyadic Militarised Interstate Disputes (DYMID1.0), Zeev Maoz, Tel-Aviv University, August 1999, available at http://spirit.tau.ac.il/~zeevmaoz/

Cascon historical database of conflict cases, 1999, available at http://web.mit.edu/cascon

Polity98 Dataset on Democracy versus Autocracy, Kristian S. Gleditsch, 2000, available at http://k-gleditsch.socsci.gla.ac.uk/Polity.html

Armed Conflict, 1989–98, Wallensteen, P. & Sollenberg, M., University of Uppsala Department of Peace & Conflict Research, available at http://www.pcr.uu.se/data.htm, based on data published in *Armed Conflict, 1989–98*, Wallensteen, P. & Sollenberg, M., *Journal of Peace Research*, 36(5), 1999.

The KOSIMO violent and non-violent conflict databank, The Heidelberg Institute of International Conflict Research, 2000, available at http://www.hiik.de/en/kosimo/kosimo.htm.

Dataset

A spreadsheet containing all the military expenditure, military burden, income, population, Security Web, Potential Enemies, Enemies, Great Power Enemies and other relevant variables is available on request.

Table of Security Webs of Countries in the Study

Table A1 lists the Security Web, Potential Enemies and Enemies of each country in the study, as well as the External and Civil War status of each country. The GPE status is also noted. Lists of countries relating

Table A1. Security webs and external and civil war status of countries in either of the two samples

(Countries are in both samples unless otherwise stated.)

Where a country is bracketed as part of a security web/enemies etc, its mileux has not been included in the relevant total, though in most cases an appropriate dummy will have been switched on.

Country	Enemies	Potential Enemies	Other Security Web[1]	External War[2]	Civil War[3]
Algeria		Morocco 1973–88	Libya, Mali, Mauritania, Niger, Tunisia		(2) 1988–91 (3) 92–97
Angola (Post Cold War only)			South Africa, Zambia, DRC, Congo (Brazzaville), Namibia (from 1990)		(3) 90–92 (4) 1993–94 (2) 1995–96 (3) 1997
Argentina	(UK 1982–89: GPE = 0.5)	(UK 81, 90–97), Chile 1981–84	Brazil, Uruguay, Bolivia	1982	
Azerbaijan (Post CW only)	Armenia 1991–97		Georgia, Iran, Turkey	1991–94	(4) 1991–94 (1) 1995–97
Bahrain		Qatar 1986–91, Iraq[4] 1990–97	Saudi Arabia		
Bangladesh		Burma 1981–97	India		(3) 81–87 (1) 88–97
Barbados			None		
Belize		Guatemala 1981–91	Mexico		
Benin			Burkina Faso, Niger, Nigeria, Togo		
Bolivia		Chile 1981–97, Peru 1981–97	Argentina, Brazil, Paraguay		
Botswana			South Africa, Zambia, Zimbabwe, Namibia (from 1990)		

Brazil			Argentina, Bolivia, Colombia, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela	
Brunei (Post CW only)			Indonesia, Malaysia	
Burkina Faso	Mali 1985–86	Mali 1981–84, 87–96	Ghana, Ivory Coast, Benin, Niger, Nigeria, Togo	
Burma		Bangladesh 1981–97	India, Laos, Thailand, (China)[5]	(3) 1981–91 (4) 1992 (3) 1993 (4) 1994 (3) 1995–97
Burundi			DRC, Rwanda, Tanzania	(4) 1988, 1993–97
Cambodia (Post CW only)		Thailand 1990–97	Laos, Vietnam	(4) 1990 (2) 1991–97
Cameroon		Nigeria 1990–97	CAR, Chad, Congo (Brazzaville), Equatorial Guinea, Gabon	
CAR			Cameroon, Chad, DRC, Congo (Brazzaville), Sudan	
Chad	Libya 83–94, Nigeria 1983	Nigeria 1984–93	Cameroon, CAR, Niger, Sudan	(1) 81 (4) 82–89 (1) 90 (3) 91–94 (2) 95–97
Chile		Argentina 1981–84, Bolivia 1981–97	Peru	
China	India 1981–93 Taiwan 1981–97 Vietnam 1981–90	USSR 1981–91, Vietnam 1991–97, Afghanistan 1981–88	Burma, North Korea, South Korea, Mongolia, Nepal, Pakistan, Bhutan	

Table A1. *(Continued.)*

Country	Enemies	Potential Enemies	Other Security Web[1]	External War[2]	Civil War[3]
Colombia		Venezuela 1981–97	Brazil, Panama, Ecuador, Peru		(3) 81–97
Congo (Brazzaville)			Angola, Cameroon, CAR, DRC, Gabon, Nigeria		(3) 1993–95 (4) 1997
Costa Rica		Nicaragua 85	Panama		
Cuba	(USA 1981–97: GPE = 1) South Africa[6] 1981–88		Dominican Republic, Haiti		
Cyprus	Turkey 1981–97		Greece		(1) 81–97
Djibouti (Post CW only)			Ethiopia, Somalia, Yemen		(3) 1991–94
Dominican Republic			Cuba, Haiti		
Ecuador	Peru 1981–97		Colombia	1981, 1995	
Egypt		Sudan 1992–97, Iraq[2] 1990–91, Libya 1981–87	Israel, Jordan, Saudi Arabia		(2) 1988–99
El Salvador		Honduras 1981–87	Guatemala		(4) 1981–1992
Ethiopia	Somalia 1981–88	Sudan 1981–86	Kenya, South Yemen (until 1989), Yemen (from 1990), Eritrea (from 1993)		(4) 198–91 (1) 1992–97
Fiji			None		
Gabon			Cameroon, Congo (Brazzaville), Equatorial Guinea, Nigeria		
Gambia (Post CW only)			Senegal		

Georgia (Post CW only)					(2) 1991–92 (3) 93 (1) 94–97
Ghana		Togo 1993–94	Burkina Faso, Nigeria, Ivory Coast		(3) 1994–97
Guatemala		Belize 1981–91	El Salvador, Honduras, Mexico		(4) 1981–97
Guinea (Post CW only)			Guinea Bissau, Ivory Coast, Nigeria, Mali, Senegal, Sierra Leone, Liberia		
Guinea Bissau			Guinea, Senegal		
Guyana			Venezuela, Brazil, Suriname		
Haiti			Dominican Republic, Cuba		(3) 1991–94
Honduras		El Salvador 1981–87	Guatemala, Belize, Nicaragua		
India	China 1981–93 Pakistan 1981–97	Afghanistan 1981–88	Bhutan, Burma, Nepal, Sri Lanka		(3) 1981–87 (4) 88–97
Indonesia			Malaysia, Papua New Guinea, Philippines, (China)[3]		(4) 1981–97[7]
Iran	Iraq 1981–97, Saudi Arabia 1987, (USA 1981–97: GPE = 1)	Saudi Arabia 1988–96 Turkey 1991–97	Pakistan	1981–88	(3) 81 (2) 82–88 (1) 92–97
Iraq	Israel 1981–97, Iran 1981–97, Kuwait 1990–97, Saudi 1990–97, Syria 1990–97, Turkey 1990–97, (USA 1990–97: GPE = 1)	Bahrain, Oman, Qatar, UAE 1990–97, Egypt 1990–91		1981–88, 1990–91	(4) 1981–86 (4) 1991 (2) 1992–97
Israel	Iraq 1981–97 Syria 1981–97 Jordan 1981–94, Lebanon 1982–97	Saudi 1981–97, Lebanon 1981		= 1:1982–85; = 0.5 1986–97	(2) 1987–93

Table A1. *(Continued.)*

Country	Enemies	Potential Enemies	Other Security Web[1]	External War[2]	Civil War[3]
Ivory Coast			Burkina Faso, Ghana, Guinea, Liberia, Nigeria, Mali		
Jamaica			None		
Jordan	Israel 1981–94		Egypt, Iraq, Syria		
Kazakhstan (Post CW only)			Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan		
Kenya		Uganda 1987–89	Ethiopia, Somali, Sudan, Tanzania		(1) 1991–97
Korea, North	South Korea 1981–97, (USA 1981–97: GPE = 1)		China		
Korea, South	North Korea 1981–97	(China 1981–97: GPE = 0.5)[3]			
Kuwait	Iraq 1990–97		Iran, Saudi Arabia	1990–91	
Kyrgyzstan (Post CW only)			Kazakhstan, Tajikistan, Uzbekistan, (China)[iii]		
Laos (Post CW only)		Thailand 1981–92	(China)[3], Burma, Cambodia, Vietnam		
Lebanon	Israel 1982–97	Israel 1981	Syria		(4) 1981–90 (2) 1991–97
Lesotho (Post CW only)			South Africa		
Liberia (Cold War only)			Guinea, Ivory Coast, Nigeria, Sierra Leone		(4) 1989–95

Libya	Chad 1983–94	Egypt 1981–87 (USA 1981–97: GPE = 1)	Algeria, Niger, Sudan, Tunisia	1981–89	
Madagascar			None		
Malawi		Zambia 1981–86	Mozambique, Tanzania		
Malaysia			Indonesia, Philippines, Thailand (China)[3]		
Mali	Burkina Faso 1985–86	Burkina Faso 1981–84, 1985–96	Algeria, Guinea, Ivory Coast, Mauritania, Niger, Nigeria, Senegal		(2) 1990–94
Mauritania	Senegal 1989–90	Senegal 1991–97	Algeria, Mali, Morocco		
Mauritius			None		
Mexico			Belize, Guatemala		(2) 1994–97
Mongolia			(China)[3]		
Morocco		Algeria 1981–88	Mauritania	1981–91[8]	
Mozambique	South Africa 1981–84	South Africa 1985–90	Malawi, Tanzania, Zambia, Zimbabwe		(4) 81–92 (1) 93–94
Namibia (Post CW only)			Angola, Botswana, South Africa, Zambia, Zimbabwe		
Nepal			(India) (China)		(1) 1987–97
Nicaragua		Costa Rica 1985, (USA 1981–90: GPE = 1)	Honduras		(4) 81–90 (2) 1991–94
Niger			Algeria, Benin, Burkina Faso, Cameroon, Chad, Libya, Mali, Nigeria		(3) 1990–95
Nigeria	Chad 1983	Chad 1984–97, Cameroon 1991–97	Benin, Niger		(3) 1993–97

Table A1. *(Continued.)*

Country	Enemies	Potential Enemies	Other Security Web[1]	External War[2]	Civil War[3]
Oman		Iraq 1990–97[9] S. Yemen (Aden) 1981–89 Yemen 1990–92	Saudi Arabia, UAE		
Pakistan	India 1981–97	Afghanistan 1981–97	Iran		(3) 1981–97
Panama	(USA 1989: GPE = 1)		Colombia, Costa Rica		
Papua New Guinea			Indonesia		(3) 1988–97
Paraguay			Argentina, Bolivia, Brazil		
Peru	Ecuador 1981–97	Bolivia 1981–97	Brazil, Chile, Colombia	1981, 1995	(4) 1981–96 (2) 97
Philippines			Indonesia, Malaysia (China)[3]		(3) 1981–97
Qatar (Post CW only)		Bahrain 1986–91 Iraq 1990–97 Saudi Arabia 1990–97			
Rwanda			Burundi, DRC, Tanzania, Uganda		(4) 1990–94 (3) 1995–97
Saudi Arabia	Iran 1987 Iraq 1990–97	Iran 1988–96 Qatar 1990–97 Yemen 1992–97 Israel 1981–97	Bahrain, Jordan, Egypt, UAE		
Senegal	Mauritania 1990–91	Mauritania 1992–97	Gambia, Guinea, Guinea Bissau, Mali		(3) 1982–97
Sierra Leone			Guinea, Liberia, Nigeria		(4) 1991–97
Singapore			Indonesia, Malaysia (China)[3]		

Somalia (Cold War only)	Ethiopia 1981–88		Kenya		(4) 1988–97
South Africa	Angola 1981–88, Cuba 1981–88[10] Mozambique 81–84	Mozambique 85–90 Zimbabwe 1981–90 Zambia 1981–90	Botswana, Swaziland, Lesotho, Namibia (from 1990)		(3) 90–94
Sri Lanka			India		(4) 1983–97
Sudan	Uganda 1992–97	Egypt 1992–97 Eritrea 1994–97 Ethiopia 1981–86	CAR, Chad, Kenya, Libya, DRC, Uganda		(4) 1983–97
Suriname (Post CW only)			Brazil, Guyana		(3) 1986–92 (2) 94–97
Swaziland (Post CW only)			Mozambique, South Africa		
Syria	Israel 1981–97 Iraq 1990–97	Turkey 1990–97	Jordan, Lebanon	1982, 1990–91	(3) 1982
Taiwan	China 1981–97				
Tajikistan			Afghanistan, Kyrgyzstan, Pakistan, Uzbekistan, (China)[3]		(1) 1990–91 (4) 1992 (3) 1993–97
Tanzania			Burundi, Kenya, DRC, Rwanda, Mozambique, Zambia, Uganda		
Thailand	Cambodia 1981–87 Laos 1983–88 Vietnam 1981–87	Laos 1981–82, 89–92	Cambodia 1988–97		(1) 91–92
Togo		Ghana 1993–94	Benin, Burkina Faso, Nigeria		(2) 1991–94
Trinidad & Tobago (Post CW only)			None		

Table A1. (*Continued.*)

Country	Enemies	Potential Enemies	Other Security Web[1]	External War[2]	Civil War[3]
Tunisia			Algeria, Libya		(2) 1981–87
Turkey	Greece 1981–97 Cyprus 1981–97 Iraq 1990–97	Syria 1990–97, (USSR 1981–90: GPE = 1)	Iran, Georgia (from 1992), Armenia (from 1992)		(1) 1984–88 (3) 1989–97
UAE		Iraq 1990–97[11]	Oman, Saudi Arabia		
Uganda	Sudan 1992–97	Kenya 1987–89	DRC, Rwanda, Tanzania		(2) 1981–86 89–91, (3) 94–97
Uruguay			Argentina, Brazil		
Uzbekistan (Post CW only)			Kazakhstan, Kyrgyzstan, Tajikistan		
Venezuela		Colombia 1981–97	Brazil, Guyana	1981–90	
Vietnam (Post CW only)	(China 1981–97)[3], (USA 1981–90); GPE = 1.5 to 90, = 0.5 91–97; Thailand 1981–87	Thailand 1988–97	Laos, Cambodia		
Yemen (North Yemen till 1990)		Eritrea 1995–97, Saudi 1992–97, Oman 1990–92, South Yemen 1981–89			(1) 1991–93 (4) 94 (1) 95–97
South Yemen (Aden) (Post CW only)		Oman 1981–89, North Yemen 1981–89	Ethiopia, Saudi Arabia		(4) 1986

Zaire (DRC) (Cold War only)		Zambia 1983–87	Angola, Burundi, Congo(Brazzaville), Rwanda, Sudan, Tanzania, Uganda	(3) 91–95 (4) 96–97
Zambia (Post CW only)	Zaire/DRC 1981–82	Zaire/DRC 1983–87 Malawi 1981–86 Zimbabwe 1981–87, South Africa 1981–90	Angola, Botswana, Mozambique	
Zimbabwe		South Africa 1981–90 Zambia 1981–87	Botswana, Mozambique, Namibia (from 1990)	(2) 1983

1. Except where otherwise stated, countries listed in the Enemies or Potential Enemies column for some years are part of the Security Web for the remainder of the relevant period.
2. Lists years for which External War dummy is set to 1. (Occasionally to 0.5, where stated.)
3. Lists years when Civil War variable is set to a given level, (1) to (4). Variable set to 0 for all other years.
4. The classification of Enemies and Potential Enemies of Iraq was troublesome; to classify every country that was part of the multi-national force as an enemy would seem excessive; in addition, countries bordering Iraq might not see such a pressing continuing security threat from Iraq after the end of the Gulf War. What I have done is to classify Kuwait, Saudi Arabia, Syria and Turkey, being neighbours and important participants, as enemies from 1990 onwards, the other Gulf states: Bahrain, Qatar, Oman and UAE as Potential Enemies from 1990 onwards, and Egypt, as a more distant participant, as a Potential Enemy for 1990–91 only, with Iraq and Egypt not in each others' Security Web thereafter. Israel and Iran were both Enemies of Iraq throughout 1981–97 for other reasons. Clearly alternative classifications to these could reasonably be used.
5. In the initial specification, China was not included in the Security Web for these countries, but the China dummy was set to 1.
6. South Africa and Cuba are only included in each other's Security Web while they are enemies.
7. Resulting from a combination of the East Timor, West Papua and Aceh conflicts, though individually they probably fall below the level 4 threshold. East Timor is counted as an internal conflict, as this is how Indonesia would see it, and as this seems a better representation of the character of the war, i.e. a guerrilla insurgency. (I would have classified the war as external from 1976–77, during the initial conquest of the territory.)
8. I have treated the war between Morocco and the Polisario Front as an External War rather than a Civil War (in contradistinction to the East Timor conflict) as this seemed to better represent the nature of the warfare in this case.
9. Iraq is not in Oman's Security Web prior to 1990
10. Cuba and South Africa are only included in each other's Security Webs when they are enemies.
11. Iraq is not in UAE's Security Web before 1990.

to some of the other security variables are also given below. Note that many of the countries listed in the table were included in only one sample: first, many countries came into existence in the post Cold War period (while South Yemen disappeared), and secondly, in many cases sufficient military expenditure data were only available for one sample (usually post Cold War). A country was included in a particular sample provided that military expenditure data were available for at least five of the eight years in the period. The table notes which countries are only included in one sample.

Unquantified Threat

As has been noted, there were a few countries for whom military expenditure data were so completely lacking that it did not seem reasonable to include figures for their expenditure in their neighbours' Security Web totals. These countries were classified as an 'Unquantifiable Threat'. In an attempt partially to quantify this, a variable *UQT* was constructed for each country in the sample, which totalled the population of 'Unquantifiable Threat' countries in their Security Web, multiplied by two if the country was a Potential Enemy and by four if they were an enemy. The *UQT* variable never proved significant in any estimation. The countries classified as Unquantifiable Threats are as follows:

Afghanistan 1989–97
Angola 1981–82
Cambodia 1981–90
Cape Verde 1984–88
Laos 1981–82, 1987–90
Lebanon 1987–88
Liberia 1989–97
Somalia 1991–97
Vietnam 1981–85, 1987–88

China

In the initial specification, China was excluded from the Security Web of all countries except India and Taiwan. Instead, a China Proximity dummy was set to one in all of China's neighbours (except India and Taiwan), and all countries bordering the South China Sea. In the cases of South Korea and Vietnam, the Great Power Enemy variable was credited with an extra 0.5. In a subsequent specification, China's military expenditure was included in the Security Web totals.

The China dummy was set to one for the following countries: Brunei, Burma, Cambodia, Indonesia, Kazakhstan, North Korea, South Korea, Kyrgyzstan, Laos, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Singapore, Thailand, Vietnam.

USA and USSR/Russia

The military expenditure of the USSR, Russia and the USA was excluded from all Security Web totals, except for China, for whom the Soviet Union was included. USA and USSR proximity dummies were constructed for neighbouring countries or those in the direct sphere of influence. The USSR dummy represents either USSR or Russia proximity, and its value changes for some countries. The relevant countries are:

USA: Barbados, Belize, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Trinidad & Tobago.
USSR: Azerbaijan, Georgia, Iran (until 1991), Kazakhstan, Kyrgyzstan, Mongolia, Pakistan (till 1991), Tajikistan, Turkey, Uzbekistan.

The USSR and USA dummies were never significant.

Middle East

The following countries were classified as being in the Middle East and had the MEAST dummy set to one: Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen (North Yemen), South Yemen.