Birkbeck Working Papers in Economics & Finance

Military Spending and Democracy

Jennifer Brauner
Birkbeck, University of London

March 2014

Military Spending and Democracy[1]

Jennifer Brauner

Department of Economics
Birkbeck College, University of London
Malet St, London WC1E 7HX
Mobile: 07902045238
j.brauner@mail.bbk.ac.uk

March 2014

ABSTRACT

This paper examines empirically whether democracies allocate fewer resources to the military than dictatorships do. It employs a panel of up to 112 countries over the period 1960-2000 to estimate a standard demand for military spending model. While papers on the determinants of military spending generally include democracy as a control variable, with a few exceptions, it is not the focus of their enquiry. This paper addresses resulting problems in the existing literature concerning data quality and the appropriate measurement of key variables, as well as the question of causality between military spending and democracy. It finds that democracies spend less on the military as a percentage of GDP than autocracies do and that causality runs from regime type to military spending.

Keywords: military expenditure, regime type, political economy, defense economics, democracy

I. INTRODUCTION

The 1990s saw the spread of democracy to many countries, particularly in the former Communist bloc, but also throughout the rest of the developing world. It brought with it an easing of tension in international relations and ended history's greatest arms race. It has been argued in the political science literature that democratisation has a demilitarising effect. This idea dates back to the philosopher Immanuel Kant (1795, p. 94), who argued in his essay *Perpetual Peace* that "standing armies (miles perpetuus) shall be abolished in course of time", as countries increasingly embrace the ideas of liberalism.

It follows that democracies should spend less on the military than autocracies do. The objective of this paper is to examine this hypothesis. I model my investigation on the empirical literature on the demand for military expenditure. While papers in this genre generally include democracy as a

---

control variable, with a few exceptions, it is not the focus of their enquiry. Hence, problems in empirically assessing the effect of democracy on military expenditures have been overlooked. In particular, problems concerning data quality and the appropriate measurement of the key variables, as well as the question of causality have not been addressed.

This paper investigates empirically whether democracies have lower military expenditures than autocracies do. It employs a panel of up to 112 countries over the period 1960-2000 to estimate a standard demand for military spending, controlling for a number of economic and strategic variables, while emphasising the effect of democracy. In particular, it attempts to address the above mentioned problems in the existing literature. This paper is structures as follow. First, I introduce the theoretical reasons for expecting democracies to allocate few resources to the military than autocracies do. Subsequently, I review the literature on the demand for military spending, focusing in particular on findings regarding the effect of democracy. Next, I briefly introduce the data and methodology employed in this paper, before turning to the empirical results.

Initially, I estimate a standard demand for military expenditure model to capture the effect of democracy. However, as I shall explain below, there are reasons to believe that causality between military spending and democracy may run the other way. Thus, I also estimate at 2SLS model and follow up with a Granger causality test.

II. THEORY

There are several reasons why one might expect democracies to spend less on the military than autocracies. One line of reasoning suggests that democratic leaders are accountable to the broader public which tends to prioritize social spending over spending on the military. Rosh (1988, pp. 676-681) argues that this is because "the degree of openness of the political process with regard to debates on resource extraction and allocations serves to limit both the public economy and the military burden of a given state". He hypothesizes that "the greater the extent a country is governed by the rule of law, where decisions as to allocations are debated openly by elected representatives and alternative priorities are able to compete in this open arena, the smaller may be a state's military burden". Hewitt (1992, p. 131) also argues that "the policies of democracies are closer to the desires of the public, in which case the higher military spending in countries dominated by other forms of government would reflect a greater preference for military expenditure by the leadership relative to the population".

Nordhaus, Russet and Oneal (2012, p. 498) restate this argument: "Autocrats are able to extract private goods from rents associated with a successful use of military force internationally and impose much of the cost of fighting, and the price of any failures, on the general population". Kimenyi and Mbaku (1995) make a similar argument: in dictatorships, competition for rents is dominated by groups who have a comparative advantage in violence, whereas in democracies, where rent-seeking by the military is confined to political lobbying, military expenditures will be lower.

Another reason why democracies might be expected to have lower military spending is that they are less likely to go to war. The so-called Democratic Peace Theory, dating back to to the Philosopher Immanuel Kant (1795), argues that democracies do not go to war with other democracies (see also, Doyle 1986; Russet 1993). In addition, scholars have presented evidence that democratic leaders are

more risk-averse towards war in general than dictators are. Bueno de Mesquita, Morrow, Siverson and Smith (1999) argue that because they risk being voted out of office if they lose, democratic leaders are more careful to enter a war. Jackson and Morelli (2007, p 1354) suggest that while in democracies leaders face the same costs and benefits from war as the average citizen does, dictators gain disproportionately more from war. They reason that "in an authoritarian regime, it may be that a leader can keep a disproportionate share of the gains from a war. It may also be that the leader sees other gains from war, in personal recognition or power". Dictatorships' higher propensity for war will be reflected in their higher defense budgets.

Finally, military spending may be higher in dictatorships because the dictators often lack popular legitimacy and rely instead (at least in part) on the military to maintain power. Not only are autocracies more likely to experience violent uprising, they are also more incline than democracies to meet it with large-scale force (see, for example, Goldsmith 2003). However, Acemoglu, Ticchi and Vindigni (2010, p. 2) argue that a powerful military is a "double edged sword". On the one hand, a more powerful military is more effective in putting down uprisings. On the other hand, a more powerful military is better positioned to orchestrate a military coup. Thus, to ensure its loyalty, a dictator must make greater concessions to the military, which will be reflected in a higher defense budget.

III. LITERATURE REVIEW

The research on the determinants of military expenditure is substantial, dating back to the 1980s and before. While a number of studies consider the effect of regime type, barring a few exceptions, this has not been the focus. Moreover, with the development of more sophisticated econometric techniques and availability of more reliable data, many studies are now outdated. In this section, I review some of the more recent papers.

Dunne and Perlo-Freeman (2003) investigate the demand for military spending in developing countries using a panel of 98 countries from 1981 to 1997. While regime type is not the focus of this study, they do control for the effect of democracy using the POLITY98 index. Estimating a static fixed effects model, the authors find that a one unit increase in democracy leads to a 0.014 unit decrease in military burden. Using a dynamic panel, however, they find that democracy is insignificant. Similarly, Goldsmith (2003) investigates the determinant of military spending, but studies a wider sample: he assembles "an extensive dataset, covering all states in the international system (as listed by COW) for just over a century, from 1886-1989" (Goldsmith 2003, p. 560). He finds that regime type has a significant negative effect on the defense burden around -0.002. This result is robust across all models (including fixed effects). Collier and Hoeffler (2007) focus on the effect of arms races on military spending. Nevertheless, they also find that democracy, as measured by the Polity III index, has a significant negative effect on military spending. Using global data for the period 1960–99, they find that "a dictatorial society will spend 2% of GDP more on the military, controlling for other characteristics, than a fully democratic society" (Collier and Hoeffler 2007, p. 10) (Most recently, Nordhaus, Oneal, and Russett (2012), in considering the effects of the international security environment on national military expenditures, find a semi-elasticity of military expenditures with respect to democracy of -0.03. "These results were less robust than [their] estimates of the impact of the threat environment, but they indicate clearly that democracies spend substantially less on the military than do autocracies" (Nordhaus, et al 2012, p. 505).

To the best of my knowledge, only two studies focus explicitly on the effect of democracy on military expenditure. Yildrim and Sezgin (2005) use a panel of 92 countries for the period $1987 - 1997$ and find that in a random effects model an increase in democracy decreases military burden by 0.27 units. However, once fixed effects are included, the effect of democracy is no longer significant. Fordham and Walker (2005) use data "a wide a range of states since 1816" (Fordham and Walker 2005, p. 141) and find support for the liberal argument that democracy has a demilitarizing effect.

Moreover, the paper by Kimenyi and Mbaku (1995) is the only paper that accounts for the possibility of reverse causality between military expenditure and democracy. Focusing on a cross-section of 87 developing countries in the year 1980 and using an instrumental variable approach, they find a negative relationship between military expenditures as a percentage of government expenditure and Bollen's Political Democracy Index.

The above review of the literature evidences that democracy appears to have a negative effect on military spending. This paper attempts to update and expand, as well as address a number of shortcomings in these studies. Firstly, the quality of the military expenditure data in some of the above studies is questionable. This thesis contends that the best data on military expenditure is that published by SIPRI. However, SIPRI itself states that the data found in yearbooks prior to 1988 is unusable. While some studies (for example, Collier and Hoeffler, 2007) simply ignore this advice, other studies avoid this problem by focusing their analysis on the period after 1988 (for example, Dunne and Perlo-Freeman, 2003). Doing so disregards information prior to 1988. Studies focusing on longer time spans tend to employ COW data, which is generally considered less reliable. Clearly there is a trade-off between quality of data and richness of analysis that comes from studying a longer time-period. I agree with Nordhaus et al (2012) that the most reasonable approach is to focus on the period 1960 to present and combine COW data with SIPRI data. Thus, the present analysis not only updates and expands upon existing studies on the determinants of military expenditure; it also employs higher quality data.

Secondly, largely because the effect of regime type was not the primary focus of the majority of the studies review above, the question of how democracy is best measured is not addressed in this literature. The Freedom House and Polity indices, which have been the preferred measures in this literature, have been widely criticized (see, for example, Gleditsch and Ward 1997; Cheibub, Gandhi and Veerland 2010). These continuous scale measures have been condemned for conflating important differences between regime types. For example, Gleditsch and Ward (1997, p.380) argue that "vastly different temporal, spatial, and social contexts support the same autocracy scale value". Critics of these measures propose categorical measures, which group countries into categories such as democracy/autocracy as the alternative. However, it can be argued that categorical measures of regime type equally obscure important information. Categorizing countries into either democracies or autocracies implicitly assumes that all democracies/autocracies are equal. It seems reasonable to argue that some democracies are more democratic than others, etc. In addition the question arises of how many categories regimes should be classified into. While Cheibub et al. (2010) propose a dichotomous measure, research on democracies and dictatorships has found that so-called anocracies/hybrid regimes/semi-democracies behave differently from both full democracies and autocracies. Moreover, empirical studies have found that the inclusion of a third middle category makes a significant difference for results (see, for example, Epstein, Bates, Goldstone, Kristensen and O'Halloran 2006). In this paper, I address the question of choice of measure by using two types of measures: a discrete ordinal variable (Polity IV) and a categorical measure (PRC).

Finally, as mentioned above, with the exception of Kimenyi and Mbaku (1995), none consider the possibility of reverse causality. Military spending may reflect the degree of political power of the

military, and a politically powerful military may, in turn, hinder the transition to and consolidation of democracy. This argument is laid out in Acemoglu, Ticchi and Vingini (2008, p. 4):

> "If the elite create a powerful military to prevent democratization, then the military also plays an important role in democratic politics until it is reformed, and such reform is not instantaneous. In particular, we show that faced with a powerful military, a newly-emerging democratic regime will either need to make costly concessions or face a high probability of a coup. This coup threat disappears once the military is reformed. Interestingly however, it is the anticipation that the military will be reformed as soon as the opportunity arises that makes it difficult to control the military during the early phases of a democratic regime - because this creates a commitment problem, making it impossible for democratic governments to make credible promises to compensate soldiers for not taking actions against democracy".

Kimenyi and Mbaku's investigation is limited to cross-sectional study of the year 1980, and can thus hardly be considered definitive. This paper investigates this issue in more depth.

IV. DATA AND METHODOLOGY

DATA

This paper uses a panel of up to 112 countries over the period 1960-2000. The arguably best data on military expenditures is supplied by the Stockholm International Peace Research Institute (SIPRI). Regrettably, SIPRI does not provide data before 1988. However, years before then are interesting for my research, as they yield so many more examples of dictatorships. The Correlates of War (COW) National Material Capabilities database supplies data on military expenditures from 1960 onwards. Unfortunately, the Correlates of War project is less meticulous about documenting its data collection process than the Stockholm International Peace Research Institute is, and is thus generally considered less reliable. Following Nordhaus, Oneal and Russet (2012), I use COW data from 1960 to 1987 and SIPRI data from 1988 to 2000. COW data are in current USD. I transform them into constant USD using the US CPI with 2005 as the base year. SIPRI data are in constant 2008 USD. I transform all data into percentages of GDP using GDP figures (in constant 2000 USD) from the World Bank World Development Indicators to get a measure of military burden. To account for potential discrepancies between the two data sets, I include a dummy which equals 1 when the source is SIPRI and zero when the source is COW. This dummy must be interpreted carefully. In addition to picking up differences in the sources, it will pick up a "Cold War effect" because the SIPRI data corresponds with the post-Cold War era. As an additional robustness check, I run separate regressions on the SIPRI and COW datasets alone to check whether my results hold.

I use two measures of democracy: Marshall and Jaggers (2002) Polity IV and Reich's (2002) dataset of political regime change (PRC). The Polity scheme is a continuous scale measure that examines concurrent qualities of democratic and autocratic authority in governing institutions. It consists of six component measures that record key qualities of executive recruitment, constraints on executive authority, and political competition. The Polity Score ranks countries according to a 21-point scale ranging from -10 (hereditary monarchy) to +10 (consolidated democracy). Reich's (2002) Political Regime Change is a categorical measure, which groups countries into autocracies (PRC=0), semi-democracies (PRC=1) and democracies (PRC=2), according to the definitions outlined by Diamond,

Linz and Lipset (1990). The strength of this dataset lies in the fact that it is designed "specifically for the purpose of classifying regimes, providing a single, categorical measure of regime type, instead of leaving the researcher the task of designing such a variable from the data that may not be easily or meaningfully transformed into a categorical measure" (Reich 2002, p. 18).

Dummy variables on wars - internal and external - are from the Correlates of War Project. Data on GDP per capita (in constant 2000 USD) and total population are taken from the World Bank World Development Indicators; and data on openness, defined as exports plus imports divided by GDP (in 2005 constant US Dollars) are from the Penn World Tables.

I transform military burden, GDP per capita, population, and openness into logs to scale down the variance and reduce the effect of outliers. Table 1 outlines the summary statistics for all variables.

[Table 1 about here]

METHODOLOGY

I estimated a standard demand for military expenditure model (see for example Dunne and Perlo-Freeman, 2003). I regress the log of military burden on democracy (Polity IV or Reich), intrastate war, interstate war, log GDP per capita, log population and log openness.

$$Log\ Burden_{it} = \beta_0 + \beta_1 Democracy_{it} + \beta_2 Intrastate\ War_{it} + \beta_3 Interstate\ War_{it} + \beta_4 \log GDP\ per\ capita_{it} + \beta_5 \log Population_{it} + \beta_6 \log Openness_{it} + u_{it}$$

Internal and external wars pick up immediate threats. A country engaged in war will not only give greater priority to military spending as a matter of urgency, but will also need to restock arms and ammunition used in fighting (see, for example, Hewitt, 1992).

GDP per capita is a measure of wealth, while population is a measure of size. While the former is expected to have a positive effect on military spending, the literature is divided on what effect the latter should have. While Kimenyi and Mbaku (1995) argue that larger countries require bigger defence forces, and Hewitt (1992) maintains that larger countries tend to be major regional or global military powers, Dunne and Perlo-Freeman (2003, p. 468) contend that "a large population is considered to offer some autonomous security in itself". Moreover, countries with large populations may be more likely to rely on manpower, while small countries turn instead to high-tech weaponry, which is relatively more expensive.

Openness is a proxy for economic integration. The rationale behind the inclusion of this variable is that the more open a country is, the more peaceful will be its relationships with other countries, and therefore the less need it has for defence spending. However, the opposite has been argued for developing countries: the level of economic integration may, in fact, be a source of discontent, as dependence on the world market renders their economies more vulnerable to fluctuations in world prices. In addition, the benefits of trade only accrue to certain groups (i.e. the elites). In anticipation of resulting internal dissent developing countries may become more militarized with increasing openness (Rosh, 1988). It is worth noting that while it could be argued that the fact that arms trade is included by definition in total trade could lead to problems of simultaneity, it makes up such a small proportion of that this is unlikely to pose a problem.

The baseline model is a one-way fixed effects model estimated with the combined data from SIPRI and COW. I include a dummy in this regression to control for any differences between the two data sets. In addition, I control for time effects in a two-way fixed effects model. As mentioned above, I also run separate regressions on the SIPRI and COW datasets alone as additional robustness checks. I control for group-wise serial correlation and heteroscedasticity[2] by reporting robust standard errors. I run two sets of regressions, first using Polity IV and second PRC as the measure of democracy.

VI. RESULTS

POLITY IV

Table 2 summarizes the results for regressions using Polity IV as the measure of democracy. Polity IV is significant and negatively correlated with military burden throughout all regressions, with the exception of regression 4, the two-way fixed effects model using SIPRI data only. In the baseline model, a one unit increase in Polity IV leads to a 2%[3] decrease in military burden. The transformation of an absolute dictatorship into a perfect democracy results in a 40%[4] decrease in military burden. Thus it can be said that democratization has a demilitarizing effect.

[Table 2 about here]

Intrastate war has a positive effect on military burden, which is significant in both the mixed sources and COW only regressions. In the baseline model, the presence of intrastate war raises the military burden of a country by a 62.58 %[5] . The lack of significance in the SIPRI only regressions is likely due to the shorter time period under study, a time period during which there were substantially fewer intrastate wars. Interstate war, on the other hand, though positive, is insignificant. Interstate war may be correlated with democracy, with fewer democracies going to war than dictatorships (as proposed by the democratic peace theory outlined above). This may explain why these results are insignificant.

Log GDP per capita is consistently negative, but significant only in regressions 2, 3 and 6. Log population switches signs. This could be explained by population picking up trends in the one-way fixed effects model that are captured by the time fixed effects in the two-way fixed effects model. Moreover, this variable is insignificant (with the exception of regression 1). Trade appears to have a positive impact on military burden and is significant in the mixed sources regressions. However, in the SIPRI only and COW only regressions the significance disappears. This may be due to the problem of simultaneity, which, as mentioned above, is the result of the definition of data on imports and exports including arms trade.

---

[2] The presence of serial correlation is likely because the model under consideration is static. The presence of heteroscedasticity can be explained by the fact that the variability of military expenditures differs between countries.

[3] Treating Polity IV as a continuous regressor, the interpretation of its coefficient, b, is that it is the partial derivative of $\ln(Y)$ with respect to X. So, $100*b$ (or $100*(-0.02)=-2$) is the percentage change in Y for a 1 unit change in X, other things held equal.

[4] A transformation of an absolute dictatorship into a perfect is represented by a change in Polity IV from -10 to 10, or a 20 unit increase. The effect of Polity IV on the log of military burden is thus calculated by multiplying the effect of a one unit increase (as shown in footnote 18) by 20.

[5] If the intrastate war dummy switches from 0 to 1, the % impact of intrastate war on military burden is $100[\exp(0.486) - 1]=62.58$.

7

Generally, the presence of year dummies does not change the results beyond a loss in statistical precision. However, in the mixed sources regressions some problems do appear: in addition to log population changing sign, the sign and size of the source dummy and the constant change too. Again this might be explained by trends, which are otherwise captured by the time fixed effects, being captured by the source dummy in the one-way fixed effects model. In particular, because the source dummy equals when the data sources is SIPRI, and SIPRI data roughly corresponds with the post-Cold War period (1988-2000), it may be picking up post-Cold War effects.

POLITICAL REGIME CHANGE

Table 3 summarizes the results for regressions using Political Regime Change as the measure of democracy. The results are comparable in sign, size and significance to the results with Polity IV. PRC is significant and negatively correlated with military burden throughout all regressions, with the exception of regressions 2 and 6, the two-way fixed effects models using mixed sources and COW data only, respectively. In the baseline model, a change from autocracy to semi-democracy, or from semi-democracy to democracy leads to an approximately 9%[6] decrease in military burden. This is further evidence that democratization has a demilitarizing effect.

[Table 3 about here]

VII. CAUSALITY

In order to address the issue, raised above, of endogeneity or reverse causality of democracy, I estimate the model using two-stage least squares estimation (2SLS). Endogeneity biases the coefficient estimates. By applying the weak exogeneity assumption, which assumes that current and past values of the instruments are uncorrelated with the current period error, one can instrument democracy with a lag of itself (Cameron and Trivedi 2005, ch. 22). It is reasonable to assume that, in the absence of shocks, the level of democracy last year is correlated with the level of democracy this year. Furthermore, it is logical that the military burden today does not affect democracy yesterday, so that the lagged level of democracy is uncorrelated with the error[7].

If endogeneity is, indeed, a problem, one should expect the results from the 2SLS regressions to differ considerably from the results of the fixed effects model. Table 4 compares the results from the baseline model to those using 2SLS. The results are, in fact, very similar, suggesting that endogeneity is not a problem.

[Table 4 about here]

Nevertheless, the results from the 2SLS estimation are not entirely satisfactory because the model is only just-identified. It is more efficient to over-identify the model (Baum 2006, p. 191). Theoretically this could be done by including more instruments, particularly those that can be excluded from the right-hand side of the equation (Cameron and Trivedi 2005, p. 757). However, the literature does not identify any such variables. In addition, one might test for endogeneity using a Hausman test.

---

[6] If PRC switches from 0 to 1, the % impact of democracy on military burden is 100[exp(-0.096) − 1]=-9.15.
[7] However, this requires that military burden is not serially correlated, which maybe unlikely. Thus, this appropriateness of this instrument should not be overstated.

However, this test is likely to have low power as the differences between OLS and 2SLS are very small.

Following the example set by Harrison (1996), I double-check the direction of the relationship by testing for Granger causality. This is done by estimating the equation:

$$\Delta y_{it} = \alpha_0 + \alpha_1 \Delta y_{it-1} + \alpha_2 \Delta y_{it-2} + \beta_1 \Delta x_{it-1} + \beta_2 \Delta x_{it-2} + u_{it}$$

where Δ indicates the first difference. X is said to Granger 'cause' y, if, using an F-test, one can reject the hypothesis that the βs are jointly equal to zero. By switching the dependent and independent variables in the above equation one can then test whether y also Granger 'causes' x.

Table 5 summarizes the results from this test using Polity IV as the measure of democracy. In the regression with the first difference of military burden as the dependent variable, the null hypothesis that the differenced lags of democracy are jointly insignificant is rejected. Democracy can therefore be said to Granger 'cause' military burden. In the reversed regression, in which the first difference of democracy is the dependent variable, the null hypothesis that the differenced lags of military burden are jointly insignificant cannot be rejected. Military burden does not Granger 'cause' democracy. These results are consistent with those from the panel IV estimation. Therefore, it seems safe to conclude that the direction of causality flows from democracy to military burden.

[Table 5 about here]

IX. CONCLUSION

This paper has examined the relationship between military expenditures and democracy. This paper represents the first in depth investigation of this relationship. While papers on the determinants of military expenditures generally include democracy as a control variable, with a few exceptions, it is not the focus of their enquiry. Thus aspects of this relationship, in particular, problems concerning data quality, the appropriate measurement of the key variables, and the question of causality have been overlooked. This paper represents the first in depth investigation into these issues. It found that democracies spend less on the military as a percentage of GDP than autocracies do. The difference in spending is substantial: an absolute dictatorship spends around 40% more than a full democracy. Moreover, causality runs from democracy to military expenditure.

These finding have interesting policy implications: they suggest that democratization has a demilitarizing effect. This could prove interesting in the world of development aid, in which there is much debate about how prescriptive aid organizations should be. With evidence regarding the positive effect of democracy on growth being mixed, and dictatorships like China successfully forging their own paths towards economic development, democracy promotion has come to be seen as Western-centric. The findings of this paper suggest a different reason why democratization may still be worth pursuing: it leads to lower military expenditures. Not only will this free up resources for

9

other areas of spending, such as health and education, it may also create a more peaceful environment. Both of these things are likely to be good for growth in the long-run.

REFERENCES

Acemoglu, D., Ticchi, D., and Vindigni, A. (2010), "A Theory of Military Dictatorships", *American Economic Journal: Macroeconomics*, **2**(1), 1-42.

Baum, C. F. (2006), *An introduction to modern econometrics using Stata*, College Station, Tex.: Stata Press.

Bueno de Mesquita, B., Morrow, J. D., Siverson, R. M. and Smith, A. (1999), "An Institutional Explanation of the Democratic Peace" *The American Political Science Review*. **93**(4): 791-807.

Cameron, A. C. and Trivedi, P. K. (2005), *Microeconometrics : Methods and Applications*, Cambridge: Cambridge University Press, 2005.

Cheibub, J. A., Gandhi, J. and Vreeland, J. R. (2010), "Democracy and dictatorship revisited", *Public Choice* **143**(1-2): 67–101.

Diamond, L., Linz, J., Lipset, S.M. (1990), *Democracy in Developing Countries, Volume 4: Latin America*, Boulder, CO: Lynne Rienner.

Doyle, M. W. (1986), "Liberalism and World Politics" *The American Political Science Review*, **80**(4): 1151-1169.

Dunne, J. P. and Mohammed, N. A. L. (1995), "Military Spending in Sub-Saharan Africa: Some Evidence from 1967-85", *Journal of Peace Research*, **32**(3), 331-343.

Dunne, J. P. and Perlo-Freeman, S. (2003), "The demand for military spending in developing countries: a dynamic panel", *Defense and Peace Economics*, **14**(6): 461-474.

Epstein, D. L., Bates, R., Goldstone, J. ,Kristensen, I. and O'Halloran, S. (2006), "Democratic Transitions", *American Journal of Political Science*, **50**(3), 551-569.

Fordham, B. O. and Walker, T. C. (2005), "Kantian Liberalism, Regime Type , and Military Resource Allocation: Do Democracies Spend Less?", *International Studies Quarterly*, **49**: 141-157.

Gleditsch, K. S., and Ward, M. D. (1997), "Double Take", *Journal of Conflict Resolution*, **41**(3), 361-383.

Goldsmith, B. E. (2003), "Bearing the Defense Burden, 1886-1989", *Journal of Conflict Resolution*, **47**(5), 551-573.

Hewitt, D. P. (1992), "Military Expenditures Worldwide: Determinants and Trends, 1972-1988," *Journal of Public Policy*, **12**(2): 105-152.

Jackson, M. O. and Morelli, M. (2007), "Political Bias and War," *American Economic Review*, **97**(4): 1353-1373.

Kant, I. (1795 [1991]), ''Perpetual Peace'', in *Kant's Political Writings*, 2nd ed., Nisbet, H. B. and Reiss, H. (eds.), Cambridge: Cambridge.

Kimenyi, M. S. and Mbaku, J. M. (1995), "Rents, military elites, and political democracy", *European Journal of Political Economy*, **11**: 669-708.

11

Nordhaus, W., Oneal, J. R., and Russett, B. (2012), "The Effects of the International Security Environment on National Military Expenditures: A Multi-country Study", *International Organization*, **66**(3).

Rosh, R. M. (1988), "Third World Militarization Security Webs and the States they Ensnare", *Journal of Conflict Resolution*, **32**(4): 671-698.

Russett, B. M. (1993), *Grasping the Democratic Peace: Principles for a Post-Cold War World,* Princeton: Princeton University Press.

Sezgin, S. and Yildirim, J. (2005), "Democracy and Military Expenditure: A Cross-Country Evidence," *Transition Studies Review*, **12**(1): 93-100.

DATA

Correlates of War (2007), *Intra-State War Data (v4.0)*, Correlates of War, University of Michigan, [online] available at <http://www.correlatesofwar.org/> [accessed 06/05/2011].

Correlates of War (2007), *Inter-State War Data (v4.0),* Correlates of War, University of Michigan, accessed 6 May 2011 <http://www.correlatesofwar.org/> [accessed 06/05/2011].

Correlates of War (2010), *Correlates of War Project National Material Capabilities Data Documentation Version (v4.0)*, Correlates of War, University of Michigan [online] available at <http://www.correlatesofwar.org/> [accessed on 14/08/2012].

Gurr, T., Marshall, M. and Jaggers, K. (2009), *Polity IV Annual Time-Series 1800-2009*, Polity IV Project, Societal-Systems Research Inc., Colorado State University, [online] available at <http://www.systemicpeace.org/polity/polity4.htm> [accessed 06/05/2011].

Heston, A., Summers, R. and Aten, B. (2009), *Penn World Table Version 6.3*, Center for International Comparisons of Production, Income and Prices, University of Pennsylvania, [online] available at <http://pwt.econ.upenn.edu/php_site/pwt_index.php> [accessed 06/05/2011].

Reich, G. (2002), "Categorizing Political Regimes: New Data for Old Problems", *Democratization*, vol. 9, no. 4, pp. 1-24.

SIPRI (2013), *SIPRI Military Expenditure Database,* Stockholm International Peace Research Institute, [online] latest version available at <http://www.sipri.org/research/armaments/milex> [accessed on 06/05/2011].

World Bank (2011), *World Bank Development Indicators*, World Bank, Washington, D.C, [online] available at <http://data.worldbank.org/indicator> [accessed on 06/05/2011].

APPENDIX A:

TABLES

Table 1. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Burden (SIPRI)	1341	4.160611	3.534496	0	50.24831
Burden (COW)	4097	5.895802	10.23722	0	139.8255
Burden (Mixed)	4134	5.86E+00	1.01E+01	0	1.40E+02
Polity IV	5645	1.094774	7.447481	-10	10
PRC	3877	.823317	.9293922	0	2
Interstate war	4790	0.020042	0.140158	0	1
Intrastate war	4791	0.08349	0.27665	0	1
GDP per capita	4337	4.84E+03	7.15E+03	0.021254	4.65E+04
Population	4797	3.29E+07	1.15E+08	41700	1.26E+09
Openness	4595	65.97842	50.06869	4.262921	622.6263

Table 2. Regression results with Polity IV as measure of democracy

Dependent variable is log military burden	Regression/Estimation Method					
	(1)	(2)	(3)	(4)	(5)	(6)
	One-way Fixed Effects	Two-way Fixed Effects	One-way Fixed Effects	Two-way Fixed Effects	One-way Fixed Effects	Two-way Fixed Effects
	Mixed sources	Mixed Sources	SIPRI	SIPRI	COW	COW
Polity IV	-0.02***	-0.015**	-0.012*	-0.010	-0.029***	-0.017***
	(-0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
Interstate war	0.15	0.165	0.059	0.044	0.122	0.143
	(0.113)	(0.112)	(0.068)	(0.070)	(0.124)	(0.115)
Intrastate war	0.486***	0.373***	0.094	0.093	0.532***	0.405***
	(0.096)	(0.083)	(0.081)	(0.084)	(0.094)	(0.082)
Log GDP pc	-0.164	-0.464*	-0.518**	-0.393	-0.241	-0.429*
	(0.235)	(0.253)	(0.246)	(0.262)	(0.214)	(0.239)
Log population	0.346***	-0.373	-0.415	0.135	0.129	-0.088
	(0.13)	(0.240)	(0.310)	(0.526)	(0.124)	(0.241)
Log Openness	0.360***	0.235**	-0.031	0.034	0.183	0.165
	(0.112)	(0.107)	(0.139)	(0.155)	(0.111)	(0.110)
Source	-0.294***	0.0219	-	-	-	-
	-0.078	(.1363)	-	-	-	-
Constant	-4.468**	8.961*	11.981***	1.847	0.182	4.523
	(2.154)	(4.94)	(4.293)	(8.858)	(1.848)	(4.842)
Year dummies	No	Yes	No	Yes	No	Yes
	-		-		-	
N	3891	3891	1248	1248	3874	3874
Groups	112	112	107	107	111	111
R-Sq within	0.1117	0.2108	0.119	0.1459	0.0918	0.2144
R-Sq btw	0.049	0.0023	0.0055	0.0067	0.062	0.0235
R-Sq overall	0.0654	0.0078	0.004	0.0078	0.0732	0.0432
AIC	6309.724	5929.125	126.257	111.605	6494.388	6012.679

Robust standard errors in ();*** p<0.01, ** p<0.05, * p<0.1

Table 3. Regression results with PRC as measure of democracy

Dependent variable is log military burden	Regression/Estimation Method					
	(1)	(2)	(3)	(4)	(5)	(6)
	One-way Fixed Effects	Two-way Fixed Effects	One-way Fixed Effects	Two-way Fixed Effects	One-way Fixed Effects	Two-way Fixed Effects
	Mixed sources	Mixed Sources	SIPRI	SIPRI	COW	COW
PRC	-0.096**	-0.074	-0.135***	-0.124***	-0.177***	-0.068
	(0.046)	(0.051)	(0.044)	(0.042)	(0.047)	(0.049)
Interstate war	0.134	0.139	0.042	0.039	0.107	0.116
	(0.119)	(0.119)	(0.061)	(0.064)	(0.129)	(0.121)
Intrastate war	0.46***	0.364***	0.103	0.108	0.484***	0.378***
	(0.096)	(0.086)	(0.081)	(0.084)	(0.096)	(0.084)
Log GDP pc	-0.157	-0.505*	-0.428	-0.307	-0.218	-0.486*
	(0.25)	(0.265)	(0.266)	(0.278)	(0.223)	(0.249)
Log population	0.395***	-0.46*	-0.58*	-0.175	0.138	-0.13
	(0.133)	(0.252)	(0.364)	(0.538)	(0.126)	(0.262)
Log Openness	0.389***	0.247**	-0.069	-0.022	0.195	0.172
	(0.114)	(0.109)	(0.151)	(0.172)	(0.119)	(0.113)
Source	-0.330***	-0.06	-	-	-	-
	(0.079)	(0.153)	-	-	-	-
Constant	-5.504**	10.817**	16.125***	6.534	0.019	5.592
	(2.248)	(5.361)	(5.188)	(9.371)	(1.944)	(5.435)
Year dummies	No	Yes	No	Yes	No	Yes
	-			-		-
N	3446	3446	966	966	3433	3433
Groups	102	102	95	95	101	101
R-Sq within	0.1154	0.2136	0.1748	0.1926	0.078	0.2086
R-Sq between	0.0535	0.0018	0.002	0.0036	0.0738	0.0252
R-Sq overall	0.0707	0.0057	0.0012	0.0027	0.0758	0.0369
AIC	5477.466	5149.676	-91.143	-90.18	5624.69	5178.471

Robust standard errors in ();*** p<0.01, ** p<0.05, * p<0.1

Table 4. 2SLS regression results

Dependent variable is log military burden	(1) One-way Fixed Effects Polity IV	(2) 2SLS Polity IV	(3) One-way Fixed Effects PRC	(4) 2SLS PRC
Democracy	-0.02***	-0.023***	-0.096**	-0.145***
	(-0.006)	(0.006)	(0.046)	(0.045)
Interstate war	0.15	0.134	0.134	0.116
	(0.113)	(0.113)	(0.119)	(0.127)
Intrastate war	0.486***	0.495***	0.46***	0.474***
	(0.096)	(0.099)	(0.096)	(0.098)
Log GDP pc	-0.164	-0.223	-0.157	-0.216
	(0.235)	(0.240)	(0.25)	(0.231)
Log population	0.346***	0.275**	0.395***	0.325***
	(0.13)	(0.131)	(0.133)	(0.118)
Log Openness	0.360***	0.369***	0.389***	0.396***
	(0.112)	(0.105)	(0.114)	(0.104)
Source	-0.294***	-0.260***	-0.330***	-0.301***
	(-0.078)	(0.077)	(0.079)	(0.070)
Constant	-4.468**	-2.929	-5.504**	-3.774**
	(2.154)	(2.145)	(2.248)	(1.806)
N	3891	3821	3446	3379
Groups	112	112	102	102
R-Sq within	0.1117	0.1168	0.1154	0.1196
R-Sq between	0.049	0.0461	0.0535	0.0498
R-Sq overall	0.0654	0.0596	0.0707	0.0652

Robust standard errors in (); $*** p<0.01, ** p<0.05, * p<0.1$

Table 5. Granger causality

Polity IV→Military burden (F-test)[1]	Military burden → Polity IV (F-test)[2]
3.86*	1.11
[0.0241]	[0.3321]

P-value in []

[1] Tests for the joint significance of the differenced lagged values of democracy on the first difference of military burden.

[2] Tests for the joint significance of the differenced lagged values of military burden on the first difference of democracy.

Null hypothesis: X does NOT Granger cause Y. * indicates the rejection of the null hypothesis.