

Democracy and the Preparation for War: Does Regime Type Affect States' Anticipation of Casualties?

ERIK GARTZKE

Columbia University

Immanuel Kant and more recent expositors of the democratic peace thesis suggest that citizens in a republic sanction leaders for resorting to war because, in part, citizens are loath to shed their own blood. This Kantian thesis in turn implies substitution. Just as consumers confronted with price shocks shift consumption to less affected goods rather than simply curtailing consumption, democratic leaders facing retribution for casualties can limit losses, not just by avoiding military contests, but also by substituting capital (ships, tanks, aircraft) for labor (soldiers, sailors, airmen) in the provision of security. A simple consumer choice model shows that citizens' leverage over leaders implies that democracies should consume disproportionately more capital in preparing for—and conducting—defense. Numerous anecdotes assert that democracies *do* shelter labor with capital, especially during war, but tests of defense-factor allocations on factor endowments, regime-type, and other variables show that defense-factor usage is explained by basic economic theory and not by democracy.

Early in September 1996, ostensibly in response to the incursion of Iraqi mechanized units into the Kurdish city of Erbil, President Clinton ordered U.S. forces in the Persian Gulf to launch two salvos of Tomahawk cruise missiles against Iraqi military targets south of the 33rd parallel. The decision was unpopular abroad, even among staunch U.S. allies. Indeed, cynical observers noted that the Clinton administration had strong domestic incentives favoring aggressive action in the Gulf. Republican presidential nominee Robert Dole had made it clear that he intended to question Clinton's foreign policy competence if the president failed to act (see Mitchell, 1996; Nagourney, 1996).

Left almost unnoticed in the fevered armchair analysis of the U.S. strike on Iraq was an assumption about how democracies fight that, though widely accepted, has yet to be examined empirically. Pundits noted the selection of cruise missiles in place of a more conventional attack. Fear of casualties, particularly so close to an election, was thought to have led administration officials to choose the costly pilotless weapons. Recent events in the former Yugoslavia echo this theme. In the Bosnia and Kosovo crises, NATO leaders restricted military action to air strikes and cruise missile attacks, apparently to limit allied casualties. Tactics elsewhere (in Vietnam, Korea, WWII) also appear to reflect democratic sensitivity to loss of

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life.¹ Anecdote thus seems to support the notion that democratic militaries protect personnel by substituting capital-intensive weaponry.

A modest extension of liberal theory adds intellectual foundations to anecdote. Kantian republics are loath to fight because of war's bloody consequences for citizens and because casualties threaten leader tenure. The democratic peace thesis revises Kant's argument for dyads while retaining the same basic vision of citizen motives. The Kantian logic is incomplete, however, unless leaders are permitted to act strategically. As the examples above illustrate, office holders compelled to use force can still limit their exposure to public disapproval by limiting the exposure of citizens to fire. Liberal theory and anecdote thus combine to suggest that democracies tend to construct militaries that substitute capital-intensive weapons for personnel (labor).²

In spite of the plausibility of the argument, the evidence provided here suggests that democracies do not generally substitute capital for labor in preparing for—or conducting—military foreign policy. Data on factor allocations to defense from a large sample of states support the idea that states make decisions about capital and labor that are largely consistent with the relative abundance of these factors in their economies. Capital-abundant states buy more weapons while labor-abundant states hire more personnel. Democracies do not appear to disproportionately protect their citizens. Further, data for the United States show that at least one democracy allocated capital and labor in efficient proportions in wars across a large period of history.³

Literature

The idea that democracies have additional incentives to shelter the lives of citizens in providing for national security can be supported in several ways. The literature on democratic pacifism implies that democracies protect voters from negative repercussions of international interaction. Kantian republics are pacific because those who sanction force and those who shed blood are linked in a single entity (the citizen). "If the consent of the citizens is required in order to decide that war should be declared . . . nothing is more natural than that they would be very cautious in commencing such a poor game, decreeing for themselves all the calamities of war" (Kant, 1957:12–13). First among the calamities of war, according to Kant, is having to fight.

Contemporary studies of the democratic peace modify Kant's proposition to the more finite dyadic claim (cf. Maoz and Russett, 1993; Russett, 1993; Rousseau et al., 1996; Oneal and Russett, 1997).⁴ While the general pacifism of democracies is not robustly supported, the observation of the democratic peace is thought to reconcile with Kant's logic if democracies must play *realpolitik* because of threats from nondemocracies (cf. Maoz and Russett, 1993; Russett,

¹ The effect on democratic foreign policy of enemy casualties, especially among noncombatants, is indeterminate. The suffering of citizens in the enemy state might serve to weaken democratic resolve (empathy). Conversely, concern about friendly casualties may lead democracies to adopt war fighting strategies that *increase* harm to noncombatants (bombing).

² Defense effort is affected by a myriad of influences (cf. Sandler and Hartley, 1995). By looking at factor ratios rather than absolute levels of defense, I can treat defense effort as given and focus instead on why ratios vary among states. Instead of asking *how much* security states produce, I ask why regimes differ in *how* they produce given levels of security.

³ Wartime capital losses are difficult to obtain. I initially assess states' peacetime efforts, assuming that states anticipate future wartime needs. Smith (1977) notes that domestic politics explanations of defense effort are overstated. Domestic factors clearly matter, but studies claiming to demonstrate domestic determinants typically ignore the strategic context.

⁴ The literature is reviewed elsewhere (see Gleditsch, 1992; Starr, 1992; Morgan, 1993; Hagan, 1994; Chan, 1997). Some debate continues about the empirical observation (cf. Gartzke, 1998, 2000; Wolfson et al., 1998; James et al., 1999).

1993).⁵ Citizens in a republic prevail on their leaders to remain peaceful if they anticipate reciprocal behavior from other states. When their leaders confront autocrats, republican citizens expect no reciprocation, recognize the occasional need for war, and thus fail to sanction their leaders.

Even when facing nondemocracies, however, the leader is likely to be concerned about the political consequences of battlefield losses. Research on public opinion and war emphasizes a relationship between casualties and public perceptions of the competence of leaders (Mueller, 1973, 1994; Gartner and Myers, 1995; Gartner and Segura, 1997; Gartner et al., 1997).⁶ If democratic leaders are constrained by fear of high casualty counts, then measures that minimize casualties are disproportionately beneficial.⁷

A broader literature seeks to identify precise mechanisms acting on leaders and thus linking domestic and international processes (cf. Putnam, 1988; Fearon, 1994; Smith, 1996; Schultz, 1998, 1999). Still, avoiding war is only the most obvious mechanism by which politicians can minimize negative domestic consequences of violent international interaction. Democratic leaders forced to play *realpolitik* still have incentives to seek to construct and maintain military structures that minimize casualties. By purchasing capital-intensive military goods, democratic leaders shelter citizens and reduce domestic censure. Various theories of domestic politics thus imply that democracies will emphasize capital in the preparation for, and conduct of, national security.

Other work shows that democracies may be more effective at waging war. Democracies are more likely to win contests that they initiate and slightly more likely to win wars in general (Reiter and Stam, 1998a). Reiter and Stam (1998b) find that democracies provide better logistics, initiative, and leadership but that these advantages dwindle in long contests. Bennett and Stam (1998) also show that republics have an advantage on the battlefield, but that the advantage shifts to autocracies after roughly eighteen months of war. Democratic leaders must respond to public discontent with long wars. As discontent grows, democracies are vulnerable and are more willing to bargain. Democratic leaders cannot assure citizens bloodless contests. On the other hand, democratic leaders *can* limit casualties by building forces that make intensive use of capital goods.

Domestic politics arguments emphasize democratic preoccupation with casualties, implying different defense production functions in dissimilar regimes. Below I ask whether democracies are more protective of their citizens, sheltering labor at the expense of capital in preparing for war. One concern is that states differ both in the threats they face and in their perceptions of threat. It is difficult to assess states' decisions about the *quantity* of defense. Instead, I assess the *ratio* of factor inputs states use to produce given levels of security. Economic theory provides precise expectations for factor inputs to production, defining efficient production in terms of a ratio of factors equivalent to the relative availability (the factor price) of inputs in the economy.⁸ States that depart from efficient production incur economic burdens, perhaps for domestic political benefit.

⁵ For a discussion of the argument for democratic pacifism see Ray, 1997.

⁶ A controversy centers around whether the political effect of casualties is log cumulative (Mueller, 1973, 1994) or whether marginal effects are more important (Gartner and Myers, 1995; Gartner and Segura, 1997; Gartner et al., 1997).

⁷ Strategy, and even tactics, in both major post-WWII conflicts (Korea and Vietnam) appear to have been influenced by presidential concerns about the consequence of casualties on public opinion (see Mueller, 1973; Karnow, 1983). Note also the reliance on a "nuclear umbrella" rather than a large conventional force strategy in the early post-WWII period.

⁸ Very large consumers of factors (such as a government) could distort prices. However, since the government is likely to consume both factors in large quantities, it is not immediately clear that the net effect is distorting to the factor ratio.

Discussion

It has long been argued that democracies protect their citizens in war by sacrificing material resources. Stalin complained that Roosevelt and Churchill fought from the air while the Soviets lost millions in battles on the steppe (Stalin, 1945). In the Korean conflict, the heavy use of artillery and air power by Western democracies contrasted sharply with the “human wave” tactics of the Chinese and North Koreans (George, 1967). In Vietnam, a “body count mentality” led U.S. commanders to adopt early “smart” weapons while bombing exceeded that of any other conflict (Karnow, 1983). The argument often contains a certain conceit, but one need not embrace bigotry to claim that democracies shelter citizens—“labor” in economic terms—over capital.

Conversely, the conservation of life attributed to democratic political regimes could potentially be an artifact of wealth. Economic theory asserts that states abundant in capital and in which labor is costly should rely more on capital in defense. In the aftermath of the Gulf War, Kuwait rewarded members of the coalition opposing Iraq with lucrative contracts to identify and destroy unexploded ordinance. Western members of the coalition in turn let contracts to private firms with sophisticated gear for remote mine identification and destruction. Bangladesh participated with its own military personnel. Soldiers given wooden probes and minimal instruction were lined up at arm’s length and marched across the desert floor. Casualty figures are difficult to ascertain, but the bulk of roughly eighty deaths appears to have occurred in non-Western contingents. The Bangladeshi approach was certainly not responsive to human casualties, though, at the time, Bangladesh was nominally *more democratic* than France (Polity data: France 8, Bangladesh 9; Jagers and Gurr, 1995).

Almost all sovereign states construct and maintain institutions for defense.⁹ Finite budgets mean that states must make two allocation decisions. The first, obvious, decision is to determine the size of efforts for defense. Predictable trade-offs exist between given levels of spending and alternatives. Attempts can be made to identify “reasonable” expenditures, but such efforts generally possess inherent shortcomings (Sandler and Hartley, 1995). Defense spending is not readily judged in that one cannot determine whether spending is excessive or inadequate unless one can ascertain actors’ preferences given subjective perceptions of threat.

The second allocation decision involves what to purchase with a given defense budget. A simple production model of national defense assumes that states possess various combinations of inputs in the form of factors. Factors are basic building blocks of economic activity such as capital, labor, land, resources, and knowledge.¹⁰ I focus on allocation of capital and labor.¹¹ Unlike deciding *how much* defense, choosing *which resources* to allocate (capital versus labor) occurs in the context of clearly defined expectations. The absolute level of defense effort is not directly relevant. An analogue might be income (GDP per capita). Economic size is weighted by population. Societies with large economies can still

⁹ States may construct militaries to suppress political dissent or reward supporters. While important, these motives do not by themselves account for military institutions. Rewarding supporters can be done through civilian institutions or directly, minimizing transactions costs. Suppression of dissent is often achieved by special police or paramilitary forces. Indeed, given their capabilities, the military is frequently the object of supervision. Regular military forces are typically used in suppressive roles only when domestic dissent starts to take on the character of a military contest. Given coups and military putsches, autocrats may be more secure domestically without a military (relying on paramilitary units). The primary motive for militaries must thus be linked to their foreign policy role, where the claims posed here best apply.

¹⁰ See Stolper and Samuelson, 1941, and Alt and Chrystal, 1983, for a discussion and application of factor models.

¹¹ Using two factors is arbitrary. However, capital and labor should prove sufficient to describe and assess the model.

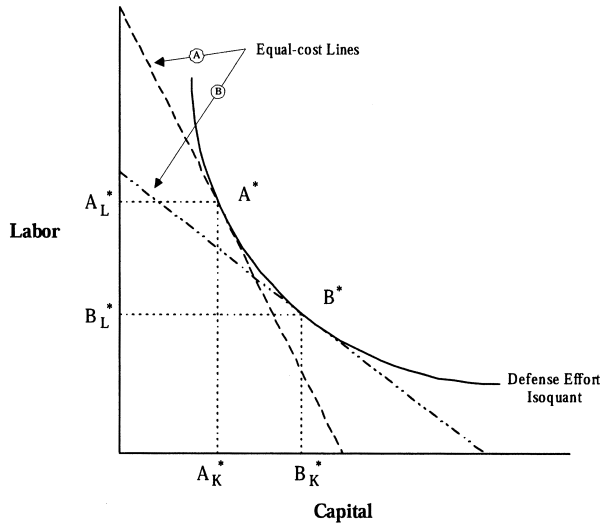


FIG. 1. Efficient Production Technologies for Countries A and B

have small average incomes (China) and societies with small economies can have large average incomes (Luxembourg). Similarly, states that spend very little on security in absolute terms can still use a relatively high proportion of capital in producing defense (Luxembourg), whereas states with very large security efforts can spend relatively little on capital (China).

Figure 1 illustrates the circumstances described above. Two states (labeled the ubiquitous “A” and “B”) exogenously determine optimal levels of national defense.¹² Two dashed lines, “Equal-cost Lines,” identify defense budget constraints, the resources available to each state for providing security. The amount of capital and labor that serve as inputs to defense are measured on the axes.¹³ The slope of the equal-cost lines measures the capital/labor ratio, effectively the relative price of factors in each economy. States can consume capital and labor in quantities (and in a ratio) equal to any point within the triangle formed by the equal-cost line and the axes. If we assume that all resources are consumed then defense effort occurs along the appropriate equal-cost line. To increase inputs of labor, states must decrease inputs of capital, etc.

In the figure, A’s equal-cost line is steeper, implying that A’s economy is relatively abundant in labor while B possesses abundant capital. The slope of the equal-cost line is the relative factor price. Different slopes represent different trade-offs for consuming factors in each economy. The “Defense Effort Isoquant” depicts all possible combinations of capital and labor that achieve a given level of defense output.¹⁴ Defense effort increases as one moves from the origin. The isoquant is convex to the origin, indicating that both factors are needed to produce security. So, for a given level of security effort, how much of each factor should each state use? The appropriate decision depends on the assumed character of state decision-making.

¹² In determining its optimal spending level, the state has already weighed relevant “guns vs. butter” issues.

¹³ I assume autarkic markets for defense, an assumption that may be *least* implausible in defense. The labor pool is restricted largely to citizens. Capital is expended abroad, but only when local facilities are unable to suffice. Indeed, big capital spenders on defense are extremely parochial in purchasing, seeing domestic sourcing as yet another security issue.

¹⁴ The shape of the defense effort isoquant, convex with respect to the origin (declining marginal product), is a common generalization. All militaries expend some capital and labor. It is variance in the ratio that the model seeks to predict.

The Unitary State

Efficient decision-making should reflect variation in relevant conditions. One condition relevant for states concerned with the provision of security is the relative abundance of national factor endowments. Economic theory tells us that items can be made with various combinations of inputs (the production possibilities set). For a given quantity of output desired, there may be a variety of combinations of inputs that will suffice. Still, not all combinations of inputs are equal; each production possibility poses opportunity costs. Using only labor or only capital in defense makes these factors scarce domestically, raising production costs for other goods and services. The substitution of capital for labor in defense is thus a dimension along which one can evaluate the decision-making of states without attempting to compare preferences or perceptions of threat.

Conventional economic theory suggests that a state, intent on maximizing security for a given pool of resources, should consume factors in roughly the proportion with which the state is endowed. State decision-makers can vary inputs of labor and capital obtainable with a given budget by moving along the appropriate equal-cost line. States intent only on efficient defense (the most bang for the buck) should place the mix of factors at a point on the equal-cost line that uses a given amount of resources to greatest effect, a point equal to the ratio of factors available to the state (Kreps, 1990:273–274). In Figure 1, A's equal-cost line (steeper line) shows the trade-offs available to A for a given quantity of defense effort. Moving along the dashed line represents "swaps" of capital and labor that have equal value in A's economy.¹⁵ Note that the quantity of resources allocated to defense does not directly impact the analysis. Shifting the equal-cost line to the left reduces A's expenditure on defense, but these changes do not alter the chosen factor ratio. A new defense effort isoquant drawn just tangent to any new equal-cost line will show that the optimal factor ratio remains unchanged. Returning the line to the right, the point at which it is just tangent to the defense effort isoquant is at A*. Thus, if we treat state A as a unitary decision-maker, the expected allocation of capital and labor will be A_L^* and A_K^* or, generally, the proportion A_L^*/A_K^* , the capital/labor ratio of that economy.¹⁶

Unitary State Hypothesis: States are expected to respond to relative national endowments of capital and labor [the implicit relative (autarkic) price] in the allocation of factor inputs to defense.¹⁷

¹⁵ Assuming the equal-cost line is concave is not necessary for the argument. Government spending can drive up prices.

¹⁶ One may pose several criticisms. First, poor states cannot afford pricey weapons. Perhaps variation in capital/labor is best explained by size and national income. This concern ignores the effect of factor ratios. While poor states *do* spend less on defense, they also purchase capital goods, showing a willingness to absorb the opportunity costs of going without additional purchases of labor. In 1989, China and Japan spent about the same on defense (\$45 vs. \$35 billion) but China used almost sixteen times as much labor (3.9 million vs. 0.25 million; U.S. Arms Control, 1996:69, 80). As China grew rapidly in the 1990s, it drastically reduced personnel and increased spending on hardware *without much altering total defense effort* (Joffe, 1987; Dellios, 1989). Second, military concerns may trump efficiency. This argument is really one about characteristics of the defense production function. Effective security equals high-tech weapons. Such claims (allowing quasi-concavity) do not confound expectations of the model, but the argument itself is based on a false premise. Powerful states still hire military labor, implying a declining marginal product for factor inputs. An army with twice as many tanks as tank drivers is losing some of the potential of capital investments. New capital or labor may increase capabilities, but each seldom does so equally. Variation would seem to be explained by relative price.

¹⁷ A reviewer notes that the unitary state hypothesis involves domestic politics. Decisions result from the interaction of domestic interests favoring one factor or another. Such a claim is ubiquitous. To matter, domestic political processes must differ. Waltz himself recognizes that domestic politics is at the root of international processes. The key question for realists (and others) is whether states may be said to act *as if* they are unitary. Do

Domestic Constraints

The unitary state model can be challenged. It would obviously be *irrational* for political actors to ignore the domestic political situation when making decisions about the allocation of factors to defense. Downs (1957) argues that elected officials respond to the preferences of constituents. Since labor is distributed much more democratically than capital, the interests of owners of labor should be better represented in a democracy than in other forms of government (Dahl, 1989). Democratic leaders are more likely to conform to the wishes of the owners of labor than leaders in an autocracy. A re-interpretation of Kant's argument is thus that owners of labor tend to resist the confiscation (draft), endangerment (war, etc.), or destruction of their asset (life). It has long been understood that contemporary voluntary force structures are a product of democratic political institutions (Binkin and Kaufmann, 1989). Democracies may minimize loss of life where possible in an effort to protect labor due to the greater political influence of that factor in a democratic state (Mueller, 1994). In authoritarian regimes, leaders arguably face fewer constraints while those that exist are linked to elites. The tendency is for autocrats to treat capital factor endowments as state or elite property (Olson, 1991).

Bruce Bueno de Mesquita and David Lalman find support for "the common and crucial assumption that democratic leaders anticipate, on average, higher domestic political costs for the use of force than do non-democratic leaders" (1992:155). Yet, the implication—that democratic leaders should be loath to use force—follows only to the extent that democratic leaders are unable to manipulate conditions affecting the costs they are said to face. Faced with domestic sanctions, democratic leaders have incentives to construct military institutions designed to minimize casualties. Substitution of capital goods for labor allows states to field military forces that use fewer personnel for a given level of combat power. Going to war with missiles and satellites rather than infantry regiments poses major potential normative benefits for democratic leaders. Anecdote asserts that this is exactly what democracies do, but the assertion begs systematic assessment.

Domestic Constraint Hypothesis: Regimes are expected to make different decisions about factor allocations to defense (controlling for relative endowments of capital and labor). Democracies are expected to substitute capital for labor, so that democracy is a positive (significant) predictor of capital inputs to defense.¹⁸

states evaluate the relative value of inputs of capital and labor in essentially the same manner, or does domestic decision-making differ across states? One must ask not whether different decisions are made in response to different environmental conditions, but whether the same environmental conditions lead to different decisions because of different domestic decision processes.

¹⁸ Though derived from the Kantian argument and the literature, the directionality implied by the DOMESTIC CONSTRAINT HYPOTHESIS (that regime-type increases capital allocations to defense) could be challenged on theoretical or empirical grounds. It might be that capital-abundant or labor-abundant democracies behave differently (each favoring its abundant factor). Alternatively, unanticipated intervening forces might somehow be associated with the relative factor abundance of the society. To determine whether such effects confound the analysis, I constructed a separate interaction term between regime-type and the capital/labor ratio. A simple interaction term reports very high collinearity among the variables (.96 between the interaction term and the capital/labor ratio) and cannot be used in a regression. I therefore first constructed a dummy variable from the capital/labor ratio, where states below the mean ratio (labor abundant) were coded "0" and those above (capital abundant) were coded "1." I then used the product of this dummy (separate dummies were constructed for the basic capital/labor data and for the interpolated data) and the regime score to produce the interaction terms. Neither interaction term is significant. Introducing the interaction term slightly strengthens results above those reported in the analysis for the capital/labor ratio while further weakening findings for regime-type. I omit these results from the study to save space and because they fail to provide additional insight.

Research Design and Data

Testing the hypotheses involves assessing the effect of ratios of national factor endowments and of regime-type on the allocation of capital and labor to defense. Standard data on defense effort fail to catalogue factor allocations to defense. This study includes newly compiled data on defense factor allocations (documented in the Appendix). In addition, while factor endowments are widely studied in economics, available data are limited by the need for lengthy time-series of national accounts statistics. Capital stock is calculated as the summed, depreciated value of gross investments in capital goods over a decade or more (King and Levine, 1994).¹⁹

Data

I construct a composite data set from a variety of sources to test the hypotheses. Data on factor allocations to defense are provided by several sources discussed below and in the Appendix. Per capitized capital stock data (the ratio of capital to labor in the society) are provided by King and Levine (1994). Secondary corroborating analysis (not reported here) uses capital stock figures from the Penn World Tables (PWT5.6) documented in Summers and Heston, 1991. Gross domestic product (GDP) and population data are also from PWT5.6. Composite regime scores, constructed several ways for comparison, come from Polity III data (Gurr, 1989; Jagers and Gurr, 1995). Unreported corroborating analysis was also conducted using the Gastil democracy data (Freedom House, 2000).²⁰ A measure of regime duration comes from Polity IV.²¹ Alliance data are from the Correlates of War project (Singer and Small, 1966, 1990).²² Indicators of major power status and relative capability (CINC scores) are from the COW National Material Capabilities Data (Small and Singer, 1982). Finally, enduring rivals are identified by a list compiled from work by Paul Diehl (Bennett, 1996, 1997, 1998).

I construct the data set using newly compiled data on factor allocations to defense (data detailed in the Appendix). NATO reports defense expenditure data by category of purchase. Terms differ between documents, but the division is generally into four categories, "personnel," "other expenditures" (usually operations and intelligence costs), "equipment," and "infrastructure." I combine the first two categories as "operating costs" (personnel, etc.) and the last two categories as "capital costs" (weapons, equipment, and infrastructure).²³ In addition to the NATO data, Nicole Ball has collected data on defense expenditures by allocation for many developing countries using the United Nations categorization (similar to that of NATO, but not distinguishing between personnel and related expenditures). Total coverage is extensive, including ninety-nine countries from 1950 to 1997. However, these data and some independent variables possess multiple missing cases. The data set also includes a measure of democracy similar to that coded by Oneal and Russett (1999).²⁴

¹⁹ This analysis involves a number of compromises that, while defensible, are subject to debate and refinement.

²⁰ The Gastil Freedom House democracy data are available on-line at <http://www.freedomhouse.org/ratings>.

²¹ Values are coded beginning in 1950. Polity 98 data are available on-line at <http://members.aol.com/CSPmgm/cspframe.htm>.

²² Correlates of War alliance data were provided by Kristian S. Gleditsch (with updates by Lebrun and Bennett).

²³ Results using the categories "personnel" and "equipment" are essentially the same. Inclusion of "other expenditures" and "infrastructure" makes these data more compatible with the organization of the SIPRI and Ball data sets.

²⁴ A large number of operationalizations of democracy were examined without notable differences in results.

Research Design

The task in assessing the arguments posed above is to identify the effect of national factor endowments and regime-type on factor allocations to defense. Capital/labor ratios in defense and in the larger economy are the dependent variable and chief independent variable, respectively. Several variables are included to measure the effect of democracy on factor allocations to defense. REGIME-TYPE measures the difference in the Polity data scores for democracy (DEMOC) and autocracy (AUTOC). The resulting value is increased by ten (10) and then divided by two (2) so that the domain of the composite score is the same as the original variables (0 to 10). DEMOCRACY? is a dichotomous variable for regime-type (measured several ways in tests). Regime-type per se may not affect states' factor allocations to defense. REGIME DURATION measures the number of years (data coded both as linear and as natural log) since the last regime change or since 1950 (beginning in 1950).

A number of other variables are included in the data set to address possible confounding effects. Use of ratios of economic factors and inputs to defense implies that most other variables are extraneous. Factor ratios should not be significantly affected by the quantity of security since efficient production (in terms of factor inputs) depends largely on a "recipe" of inputs identified by the production function. However, tests including other variables offer greater confidence in the results. It is possible, for example, that wealth effects are related to national income (states with large GDPs might allocate factors differently than poor states). I include the natural log of GDP to assess whether high-income states spend defense effort differently.

Mean income (GDP per capita) is an alternative method of measuring the key independent variable. I examine GDP per capita in separate regressions not reported in this study and find equivalent results. The capital/labor ratio is the theoretically preferred indicator because it measures wealth (stocks) rather than just average income (flows). Economic theory makes a distinction between capital factor endowments (summed and depreciated over a decade or more) and income, though the two correlate at a high level. Differences in the two variables occur when national income grows at a higher rate than investment or when an economy declines (Russia). Because the two variables are highly collinear (0.90 to 0.96, depending on construction) and related conceptually, they should not be regressed together (any more than measures of democracy, etc.).

The nature of security concerns may also influence states' allocation of capital and labor to defense. Alliances may be meant in part to facilitate "burden sharing" among states with compatible security interests. Alliances could also facilitate trade in complementary "security goods," allowing specialization and shifting allocations in states' defense efforts (Morrow, 1991). For this reason I include several indicators of alliance status in the regressions. The first variable, ALLIANCES?, is a dummy coded to identify whether a state has ongoing alliance commitments. A second variable, ALLIANCE WEIGHT, measures the proportion of actual to potential alliance ties (total dyads in system year). ALLIANCE WEIGHT has the advantage of being an ordinal measure of the degree to which a state is formally committed internationally. Presumably, states with many partners are more likely to alter their defense efforts than states with just one or two allies. To assess this possibility directly, I also examine variables that measure either the average or sum of partner capital factor allocations. PARTNER CAP. CONTRIB. shows the effect of allies' factor allocations on a state's own allocation to defense. Only average PARTNER CAP. CONTRIB. is reported since the sum variable is always insignificant.

A second dimension of security concern involves threat. States with ongoing threats may be forced to pay more attention to efficiency in factor allocations to

security. Conversely, democracies experiencing threats may be more eager to substitute capital for labor to avoid anticipated casualties. Threat is an omnipresent concept in international relations, but it is difficult to measure. Values are subjective because threat resides in the minds of the leaders and the people of a society (Bolks, 1999). I take a conservative approach, including an indicator for whether states are subject to an enduring rivalry based on Bennett’s data. While states certainly experience threats other than from enduring rivalries, rivalries are *most likely* to be anticipated and adjusted for in long-term projects such as defense capitalization. Rivalries should thus be sufficient (if not necessary) to indicate whether confounding effects are likely to exist. If *any* societies alter the allocation of factors in response to perceived foreign dangers, enduring rivals are most likely to exhibit such behavior.

Finally, major powers may have special security needs mandating additional infusion of capital. Most states’ security concerns are local. Major powers may perceive a need to project power requiring investment in costly weaponry. Ships and aircraft are essential implements of power projection. I include a dummy for major power status (MAJOR POWER?, designated by the COW criteria) as well as Composite Indicators of National Capabilities (CINC) scores in the analysis. The basic equation estimated appears below:

$$\frac{\text{DEFENSE_}\$ (\text{CAPITAL})}{\text{DEFENSE_}\$ (\text{TOTAL})} = \beta_0 + \beta_1 \text{CAPITAL/LABOR} + \beta_2 \text{REGIME_TYPE} \\ + \beta_3 \text{GDP} + \beta_4 \text{ALLIANCES?} + \beta_5 \text{RIVALRY?} \\ + \beta_6 \text{MAJOR_POWER?} + \epsilon,$$

where DEFENSE_\$(CAPITAL)/DEFENSE_\$(TOTAL) measures the ratio of defense spending on capital goods to total defense effort, CAPITAL/LABOR measures the relative factor abundance of capital and labor in the society, REGIME_TYPE reports the level of state democracy, GDP is the log of gross domestic product, and ALLIANCES?, RIVALRY?, and MAJOR POWER? indicate whether the state is allied, whether the state is experiencing a rivalry, and whether the state is a major power, respectively. β ’s are estimated using OLS with Huber/White robust standard errors.

Predictions for the key theoretical variables are summarized below. Each hypothesis is identified in the row heading. Sign value predictions for the two key independent variables are listed in columns two and three. The unitary state model predicts that states provision security consistent with the efficiency criteria of the economic theory of factor endowments. The regime-type argument suggests that the efficient provision of security is modified by domestic politics (democracies shelter labor). There also exist two null hypotheses. If the factor endowment explanation is flawed, then the capital/labor ratio will be negative and significant or nonsignificant. If regime-type has an unanticipated effect, then the variable may be negative and significant.

<i>Model</i>	<i>Capital/Labor</i>	<i>Regime-Type</i>
UNITARY STATE	‘+’	---
DOMESTIC CONSTRAINT	‘+’	‘+’

Analysis

The results of analysis of the effect of factor endowments and regime-type on states’ allocation of factors to defense are contained in two tables and one figure.

Table 1 lists the results of three OLS regressions with robust standard errors and controlling for the effect of clustering in units (states). Model I, the basic model, follows the specification outlined in the research design section. The CAPITAL/LABOR variable is highly significant in the expected direction. States endowed with more capital make greater use of that factor in constructing security. The log of GDP has a significant and positive effect on capital contributions to defense. Large economies spend relatively more on capital defense goods. Alliances have a negative effect on capital contributions to defense. Alliance partners may encourage states to spend more on labor. MAJOR POWER? and the CONSTANT are also significant. The conjecture about the effect of major power status on capital allocations to defense appears correct. REGIME-TYPE is not significant, though it is just short of the 0.05 level. Interestingly, the coefficient is negative so that democracies appear to spend less on capital.

The results of Model I may be an artifact of sample size. Model II offers a much larger sample with interpolated data for the capital stock variables. Results for the key variables are largely the same as in Model I. The effect of factor

TABLE 1. Predicting Factor Allocations to Defense Effort (OLS Estimates)
(Huber-White Robust S. E. and Controlling for Clustering in Monad)
Dependent Variable: Ratio of Capital Defense Spending (UN Capital Costs nominal
millions \$ U.S.) to Total Defense Spending (Capital and
Operating Costs, nominal millions \$ U.S.)

<i>Variable</i>	<i>I. Basic Model</i> <i>(robust S.E., clustering)</i>	<i>II. Interpolated Data</i> <i>(robust S.E., clustering)</i>	<i>III. Alternate Variables</i> <i>(robust S.E., clustering)</i>
Capital/Labor (King and Levine, 1994)	$4.27 \times 10^{-6***}$ (1.25×10^{-6})	$4.78 \times 10^{-6***}$ (1.42×10^{-6})	$6.52 \times 10^{-6***}$ (1.90×10^{-6})
Regime-Type (Oneal and Russett, 1997)	-0.0071 (0.0037)	-0.0021 (0.0029)	
Regime Duration (Ln[# years] - Polity 98)			-0.0103 (0.0098)
Log of GDP (Summers and Heston, 1991)	0.0285** (0.0096)	0.0166 (0.0090)	0.0237* (0.0091)
Alliances? (COW Alliance Data)	-0.0627** (0.0214)	-0.0565* (0.0273)	
Partner Cap. Contrib. (avg[ally? * cap/lab])			$-3.41 \times 10^{-6*}$ (1.63×10^{-6})
Alliance Weight (# allies/# states)			-0.0073 (0.1306)
Rivalry? (Bennett, 1997)	-0.0328 (0.0325)	-0.0028 (0.0427)	0.0013 (0.0522)
Major Power? (COW Capabilities)	0.0737** (0.0236)	0.0423 (0.0260)	
CINC Score (Small and Singer, 1982)			-0.4758 (0.4517)
Constant	-0.4806* (0.2040)	-0.2400 (0.2110)	-0.4268 (0.2250)
N	763	2248	2068
F	73.55	23.31	14.83
Prob. > F	0.0000	0.0000	0.0000
Adj. R ²	0.3126	0.2465	0.2536
RMSE	0.1199	0.1196	0.1196

*p < .05, two-tailed test; **p < .01, two-tailed test; ***p < .001, two-tailed test.
Values in parentheses () are standard errors.

endowments and regime-type are the same.²⁵ A state with the highest capital/labor ratio uses 2.44 times the proportion of capital to total defense effort as the most labor abundant state (37.4% as opposed to 10.9%). A one standard deviation increase in the capital/labor ratio results in a 31 percent increase in capital allocations to defense. Logged GDP has a slightly stronger effect than the capital/labor ratio (36% increase in capital use for a one standard deviation increase in logged GDP), but democracy actually decreases capital use slightly (1 s.d. increase in democracy results in a 6% decrease in defense capital usage). Log GDP, major power status, and the constant are not significant in Model II. ALLIANCES? remains significant at a lower level. Differences appear largely due to sample selection (most missing values are for minor powers).

Results in Models I and II might be an artifact of variable construction or model specification. I examined numerous specifications and constructions of variables (particularly regime-type), as well as different indicators. In no case was an indicator of democracy significant in these analyses. Alliance status is usually significant, though at modest levels. National product is significant in some analyses and not in others, as is major power status. Rivalry status is never significant. Model III offers an alternative specification. In place of REGIME-TYPE, REGIME DURATION assesses whether durability is the salient indicator. REGIME DURATION is logged (natural log) to examine the possibility that the effect of duration is nonlinear. REGIME DURATION (linear and not) is insignificant. ALLIANCE WEIGHT assesses the cumulative effect of alliance commitments. Though in some respects a better indicator of the likelihood of specialization in alliance goods, this variable too is insignificant. I also examine whether ally capital contributions matter. PARTNER CAP. CONTRIB. is significant and negative. The more capital intensive the effort of allies, the less capital a state contributes to its own defense. The finding may result from specialization within alliances or free riding, or states may choose partners with complementary factor endowments (Morrow, 1991). Model III also replaces the MAJOR POWER dummy with CINC, a measure of the portion of systemic capabilities attributable to a single state. An interval measure of power is arguably a better indicator than major power status but CINC appears insignificant.

Another potential source of error is the distinction between preparation and actual conduct of war. Perhaps states allocate factors to defense differently while fighting than while at peace. The rivalry variable suggests that states with ongoing threats do not change production functions for security, but the immediate proximity of conflict might be necessary. Table 2 investigates the claim that states allocate factors differently in war and peace. Note also that Table 2 uses a dichotomous variable for regime-type (DEMOCRACY?). Some discontinuity in the effect of regimes might make it difficult for REGIME-TYPE to demonstrate significance. Dichotomous measures of regime-type have proven extremely robust (cf. Oneal and Russett, 1997; Gartzke, 1998). DEMOCRACY equals one (1) if a state's REGIME-TYPE score exceeds seven (7) and zero (0) otherwise.²⁶

Model IV is similar to Model II, but uses the dichotomous democracy variable and a new variable, MILITARIZED DISPUTE?, a dummy variable for the presence of militarized interstate disputes (MID; Jones et al., 1996). The variable is significant and positive. States experiencing disputes contribute a greater portion of capital in producing security. The capital/labor ratio and alliance status are also signif-

²⁵ Collinearity between the capital/labor ratio and REGIME-TYPE is 0.56 (high enough to generate spurious anecdotes but not high enough for multicollinearity). With CAPITAL/LABOR omitted, REGIME-TYPE is insignificant in both samples.

²⁶ I examined alternative constructions of dichotomous variables (>5, =10, etc.) as well as the Gastil/Freedom House data (trichotomous variable and an ordinal composite) with the same results. Results are available from the author.

TABLE 2. Predicting Factor Allocations to Defense Effort in Times of War (OLS Estimates)
 (Huber-White Robust S. E. and Controlling for Clustering in Monad)
 Dependent Variable: Ratio of Capital Defense Spending (UN Capital Costs nominal
 millions \$ U.S.) to Total Defense Spending (Capital and
 Operating Costs, nominal millions \$ U.S.)

<i>Variable</i>	<i>IV. Interpolated Data</i> <i>(robust S.E., clustering)</i>	<i>V. MID Sample</i> <i>(robust S.E., clustering)</i>	<i>VI. Sample of Wars</i> <i>(robust S.E., clustering)</i>
Capital/Labor (King and Levine, 1994)	$4.65 \times 10^{-6***}$ (1.38×10^{-6})	$7.54 \times 10^{-6**}$ (2.35×10^{-6})	$1.18 \times 10^{-5***}$ (4.08×10^{-6})
Democracy? (Dichotomous [dem. \geq 7])	-0.0039 (0.0210)	-0.0069 (0.0354)	-0.0233 (0.0647)
Log of GDP (Summers and Heston, 1991)	0.0148 (0.0090)	0.0032 (0.0145)	-0.0097 (0.0188)
Alliances? (COW Alliance Data)	-0.0534* (0.0262)	-0.0945* (0.0444)	-0.1767* (0.0672)
Rivalry? (Bennett, 1997)	-0.0169 (0.0387)	-0.0018 (0.0428)	0.0626 (0.0572)
Major Power? (COW Capabilities)	0.0298 (0.0261)	0.0379 (0.0328)	0.0404 (0.0628)
Militarized Dispute? (Jones et al., 1996)	0.0358* (0.0150)		
Constant	-0.2191 (0.2117)	0.1021 (0.3393)	0.4068 (0.4490)
N	2248	849	125
F	22.81	15.92	4.50
Prob. > F	0.0000	0.0000	0.0034
Adj. R ²	0.2578	0.2858	0.5341
RMSE	0.1187	0.1357	0.1155

*p < .05, two-tailed test; **p < .01, two-tailed test; ***p < .001, two-tailed test.
 Values in parentheses () are standard errors.

icant. The dispute variable may be significant for several reasons. It might be that states that use a greater portion of capital in producing security are also more likely to experience disputes. MIDs are more common among large, developed states. Another possibility is that states allocate capital and labor differently in war and peace. Model IV invites additional assessment; democracies may protect labor only during disputes or wars.

Models V and VI assess whether democracies substitute labor for capital during disputes (Model V) or during wars (Model VI). As the results demonstrate, DEMOCRACY? continues to have no effect on the production of security. Both the capital/labor ratio and the alliance dummy are significant (CAPITAL/LABOR is less significant). In all of the analyses, controlling for a variety of other causes, states appear to allocate factors to defense according to economic efficiency and not as a response to variation in regime-type.

Finally, I examine the effect of factor allocations on estimates of actual factor war costs (casualties and capital losses). Few estimates of the capital costs of war exist and even these are suspect. However, a few statistics are available for U.S. wars from the Revolution to the Persian Gulf. National accounts statistics also exist for this period.²⁷ A second question has to do with temporal variation. The analysis above covers only recent decades. Behavior may differ over extensive time periods. The lack of data makes such analysis problematic, but we can at least examine the U.S. case to determine whether there is reason for concern.

²⁷ War cost data are from the Civil War Center: www.cwc.lsu.edu, U.S. national accounts statistics from Mitchell, 1992.

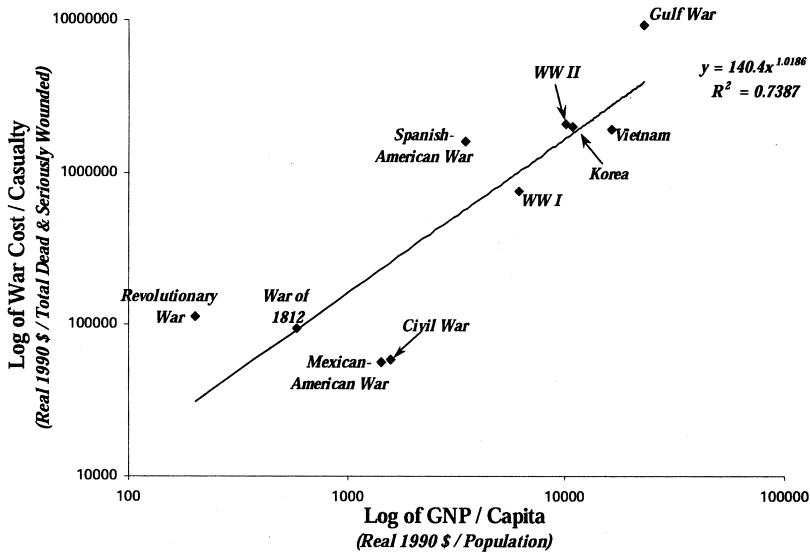


FIG. 2. War Costs per Casualty on GNP per Capita (All Values in Real 1990 \$)

Figure 2 plots the log of war costs (1990 dollars) per battle death or serious injury on GNP per capita (1990 dollars). GNP is used in place of capital stock because stock data are unavailable. Logged GNP is used to control for trending common in financial time-series. Data are converted to real 1990 dollars using a CPI deflator.²⁸ Figure 2 shows a relationship that is consistent with earlier analysis. As the United States becomes wealthier, it generally allocates higher proportions of capital to its contests. The relationship is strong, with most U.S. wars appearing in chronological sequence, in spite of substantial variation in casualties (from 293 U.S. deaths in the Gulf War to 558,052 deaths on both sides in the Civil War) and in economic costs (from \$0.7 billion for the War of 1812 to \$2,091 billion for World War II in constant 1990 dollars). The strongest relationship between national factor endowments and factor allocations to war appears with the dawn of the twentieth century. The wider availability of capital and changes in military technology in the last 100 years make it possible for societies to vary in the construction of military forces. Prior to the twentieth century, land forces were largely composed of traditional arms (infantry, cavalry, and artillery). Results for the eighteenth and nineteenth centuries may reflect increased casualty rates from improved weapons (percussion cap rifles, more accurate and lethal artillery) and a failure of tactics to adapt to the new, more lethal battlefield. While weapon lethality increased, the basic cost and utilization of capital goods was largely unaltered until later innovations (battleships, tanks, aircraft, etc.). In sum, at least since the twentieth century (if not before), a state's relative endowments of capital and labor appear to be strong predictors of the way a state structures its military effort. Democracies do not appear to shelter citizens by substituting capital for labor in preparing for, or perhaps conducting, defense.

Conclusion

Whether in the construction of military institutions or in the actual prosecution of war, states are required to expend finite assets in the form of capital and labor

²⁸ Details of the CPI constructed by Robert Sahr are available on-line at: www.orst.edu/Dept/pol_sci/fac/sahr/sahr.htm.

to achieve security goals. The exact quantities of each productive factor necessary is a function both of the security desired by the state and the amount of the other factor that is being used. Kantian liberalism notes that efficient production of security may clash with other political objectives for the republican state. War contrasts with citizens' interests in survival so that citizens have incentives to use their political influence to attempt to avert casualty-causing contests.

The advent of quantitative studies of international politics seems to bear out the Kantian perspective, if largely only under the special circumstance of the dyad. Yet, linkages between domestic politics and peace are not yet convincingly articulated. If domestic constraints among democracies hinder the use or threat of force, they do so discreetly. With few exceptions, democracies prepare for war with vigor comparable to nondemocracies. Democracies are about as likely generally to use or threaten force. One possible solution for the tension between the Kantian argument and the apparent willingness of democracies to fight is that democracies engage in substitution. Democratic leaders may blunt some of the effects of representation by preparing militaries less likely to produce casualties. This study suggests that such a conjecture is wrong; democracies do not act as if they are more sensitive to casualties in their preparation for, and conduct of, war. Democratic leaders fail to take actions one expects if they fear domestic repercussions from casualty counts.

While regime-type appears not to matter, the results show that wealth *does* influence states' decisions in constructing military forces. These findings should not detract from the observation of the democratic peace. Rather, they offer some caution about an account of the democratic peace based on the Kantian argument. If democracies make no effort to substitute capital for labor in their military structures, then either citizens do not behave as Kant suggests or leaders do not respond as if they are subject to sanctions from citizens. The explanation for the democratic peace must then be motivated by another logic. Here, I offer no alternative. Instead, by delimiting current explanations, I hope to encourage clearer accounts to follow.

Appendix: Disaggregated Military Expenditure Data

Data Collection Description:

The military factor data set contains a compilation of statistics on countries' allocations of defense effort to operations (predominantly salaries, benefits, and other costs associated with renting labor) or capital (acquisition and maintenance of capital goods). The data set was designed to address questions about how regime-type affects states' decisions about security, but may potentially be useful in a variety of other applications. Coverage is incomplete but the temporal domain ranges from 1950 to 1997, with 99 countries represented.

Data Sources:

I transcribe data from four sources. The sources do not use identical reporting formats. I adopt the UN reporting format also used by Nicole Ball (see (2) below, pp. 37–39). So, “operation cost” and “other operation cost” in the SIPRI data are regarded as “operating cost,” while “infrastructure” and “procurement” are regarded as “procurement and construction cost.”

(1) References in United Nations Military Expenditure Data:

A/51/209, A/50/277, A/50/277/Add.1, A/49/190, A/49/190/Corr.1-2, A/49/190/Add.1-3, A/49/190/Add.3/Corr.1, A/48/271, A/47/271, A/46/381, A/INF/45/5, A/INF/45/5/Add.1, A/44/422, A/44/422/Add.1-2, A/43/567,

A/42/573, A/42/573/Add.1, A/41/622, A/41/622/Add.1-2, A/40/313, A/40/313/Add.1-3, A/39/521, A/39/521/Add.1-2, A/39/521/Corr.1-2, A/38/434, A/37/418, A/37/418/Add.1, A/36/353, A/36/353/Add.1-2, A/35/479.

- (2) Ball, Nicole. 1984. *Third-World Security Expenditure: A Statistical Compendium*. FOA Report C 10250-M5. National Defense Research Institute, Stockholm, Sweden.
- (3) NATO Press Release M-DPC-2(97)147 (December 2, 1997).
- (4) SIPRI Yearbook:
 1. Table 5B.3. "World military expenditure, in current price figures" in Stockholm International Peace Research Institute. 1982. *SIPRI Yearbook 1982*. Oxford: Oxford University Press.
 2. Table 12.5. "NATO distribution of military expenditures by category, 1980–93" in Stockholm International Peace Research Institute. 1994. *SIPRI Yearbook 1994*. Oxford: Oxford University Press.
 3. Table 12.1. "NATO distribution of military expenditures by category, 1985–1994" in Stockholm International Peace Research Institute. 1995. *SIPRI Yearbook 1995*. Oxford: Oxford University Press.
 4. Table 8.1. "NATO distribution of military expenditures by category, 1986–1995" in Stockholm International Peace Research Institute. 1996. *SIPRI Yearbook 1996*. Oxford: Oxford University Press.

There may be two observations in 1979 and 1984 for several NATO countries. If REFERENCE equals "3" (SIPRI yearbooks and NATO press release), observations in 1979 are actually averages from 1974 to 1979, and observations in 1984 are averages from 1980 to 1984. If "refer" is equal to "2" (a series of UN documents), observations in 1979 are observations only in 1979, and observations in 1984 are observations only in 1984.

Nicole Ball's source data include all types of security expenditures, possibly including policy expenditures, para-military expenditures, military expenditures, and civil defense.

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