DEC notes
Research findings

Measuring the peace dividend

Will the end of the Cold War and the resulting decline in military spending mean higher economic growth? New research shows that countries that cut military spending do reap long-term benefits—and the bigger the cuts, the greater the growth

High levels of military spending are widely assumed to retard long-run economic growth. In an insecure region, the argument goes, countries must devote a disproportionate share of their resources to "unproductive" military spending. As each country tries to outspend its neighbors to ensure its own security, military spending rises higher and higher, yielding no increase—and perhaps even a decrease—in overall security. High military spending is thought to slow long-run growth in two ways. First, it may absorb resources that would otherwise have been available for growth-enhancing investments, such as productive capital, education, and market-oriented technological innovation. Second, high military spending may exacerbate economic distortions that reduce the efficiency of resource allocation, thereby lowering total factor productivity.

If high military spending does affect growth in these ways, the converse is also likely to be true: sustained cuts in military spending will lead to higher long-run growth—the "peace dividend." The end of the Cold War—and of proxy conflicts in Asia, Africa, and Latin America—and the move toward a comprehensive peace in the Middle East have stirred fresh interest in determining whether a peace dividend exists and how significant it may be.

Casual empiricism

The view that low levels of military spending are associated with strong growth, and vice versa, is usually supported by casual empiricism. For example, the strict limits on military expenditures imposed on Germany and Japan after World War II—combined with the Allies' guarantee of their security—allowed these countries to devote large shares of their total factor endowments to productive capital formation, contributing to their impressive economic performance during the succeeding five decades. The success of these countries has led most economists to presume that, on average, a country with a relatively low ratio of military expenditure to GDP is likely to enjoy relatively strong long-run growth.

Yet not all military spending is unambiguously counterproductive, or even unproductive, in an economic sense. Military spending may benefit the economy by improving national security, thereby facilitating increased private investment and growth. In developing countries military training may improve the level of education and discipline of the labor force and act as a stabilizing influence in society (see, for example, Thompson 1974). Military capital expenditure can also have productive civilian uses:

RIGOROUS THEORETICAL AND EMPIRICAL ANALYSES ARE REQUIRED TO DETERMINE WHETHER MILITARY SPENDING IS ECONOMICALLY UNPRODUCTIVE

many countries continue to benefit from transportation networks originally constructed for military purposes.

But the question of whether, and to what extent, military spending is economically unproductive cannot be resolved by historical generalizations and anecdotes; rigorous theoretical and empirical analysis are needed. The estimation problems inherent in such analysis are daunting: because increases in growth resulting from cuts in military spending would be expected to appear only after a lag of at least several years, the beneficial effects of large military spending cuts may be hard to disentangle from other factors. These problems have made it difficult to measure the size of the peace dividend—or to establish unequivocally that it exists. Uncertainty about the effect of military spending—in particular the lack of robust, quantified estimates of the improvements in living standards that could result from sustained lower levels of military spending—makes it difficult to persuade national governments that military spending cuts will improve people's lives—that fewer guns will indeed mean more butter.

In Eastern Europe and the Middle East, where military spending ratios have been high, cuts in military spending could increase capacity output in the long run by nearly 50 percent

Quantitative answers

"The Peace Dividend: Military Spending Cuts and Economic Growth," by Malcolm Knight (IMF), Norman Loayza (World Bank), and Delano Villanueva (IMF), provides quantitative answers to the question of whether cuts in military spending enhance growth by showing how much productive investment is likely to increase in response to cuts in military spending and how much the associated improvements in the efficiency of resource allocation will increase long-run output. The paper extends a standard neoclassical growth model to take account of important links between military spending, productive investment, and the long-run growth of per capita output (box 1). It uses an econometric technique to consistently estimate the model from a panel of time-series and cross-section data for a large sample of industrial and developing countries.

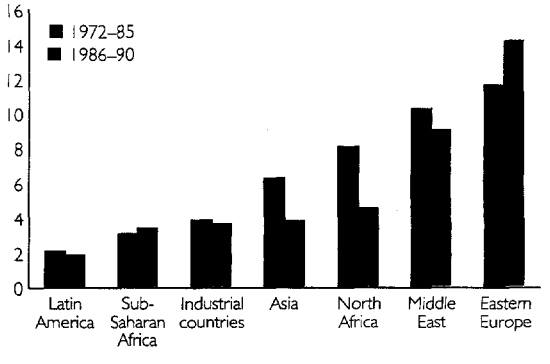
The results show clearly that military spending is economically unproductive. When the military spending ratio is added to a growth equation that already includes the determinants suggested by standard theory, the direct effect of higher military spending on per capita output growth is unambiguously negative. The indirect impact of military spending on economic growth by way of its negative effect on productive investment is also negative—and statistically significant. The model indicates that, all other things being equal, a 10 percent cut in the military spending ratio (say, from 10 percent of GDP to 9 percent) would result in an increase in the per capita GDP growth rate of 0.07 percentage points (say, from 3.00 percent to 3.07 percent).

Using the estimated parameters on the effect of military spending on investment and output growth, the study presents two simulations that suggest the rough magnitude of the peace dividend in every region of the world. The first simulation assumes that over the long run military spending is kept at the levels maintained during the late 1980s (figure 1). The second simulation assumes that as a result of lasting global peace military spending is reduced below those levels.

The first simulation indicates that, if sustained, the improved security conditions and leveling off of military expenditures would lead

Figure 1. Average military spending as a share of gross domestic product, by region

Percentage of GDP



Source: Knight, Loayza, and Villanueva 1996.

Box 1. Model, data, and methodology

The regression model is based on a version of the Solow neoclassical growth model, extended in two ways. First, in addition to the investment ratio, the population growth rate, and the initial level of per capita GDP as determinants of per capita GDP growth, the model includes a proxy for human capital investment based on secondary school enrollments, a proxy for international trade restrictions based on average tariffs on intermediate and capital goods, a proxy for the incidence of wars based on the number of years of international wars over the time period, and a measure of military spending as a share of GDP. Second, an investment regression is estimated in which the ratio of investment to GDP is determined by, among other factors, the share of GDP devoted to military spending. (The military spending data are from the 1992 Yearbook of the Stockholm International Peace Research Institute).

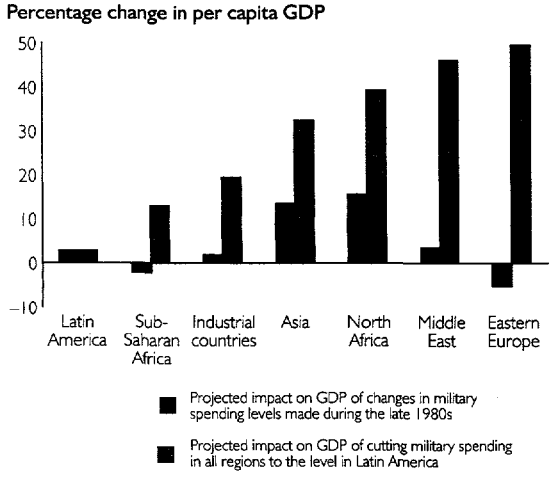
The sample consists of pooled time-series and cross-sectional data for 79 countries for 1970–85. The countries come from every region in the world except Eastern Europe, where reliable national account data are not available. For the time-series dimension the data set is divided into three nonoverlapping five-year intervals. This approach provides a simple way of averaging out short-run cyclical variations in the rate of capacity utilization, thereby helping to ensure that this variable approximates long-run output growth. Since panel data are available for most of the variables of interest, it is possible to account for both country-specific and time specific unobserved factors. Country-specific factors are especially important. A number of factors that are unique to each country (government policies, resource endowments, social institutions, cultural traits) may well be correlated with the regressors considered in the model. Failing to account for them would lead to inconsistent estimates of the parameters. Country specific factors are controlled for using the methodology proposed by Chamberlain (1982, 1983), commonly known as the π-matrix technique, and time-specific factors are controlled for by removing the time mean from each variable.

The policy implication is straightforward: fewer guns do indeed imply more butter

to substantial gains in per capita output over the long run. The geographic regions that experienced the largest reductions in military spending ratios during the late 1980s would eventually benefit the most from these cuts (figure 2). The simulation indicates that in the long run the lower military spending ratios would result in a gain in per capita output relative to the baseline level that would have prevailed had military spending not been cut of 16 percent in North Africa, nearly 14 percent in Asia, and 3.6 percent in the Middle East. Even for industrial and Latin American countries, where cuts in military spending were more modest during the late 1980s, per capita output levels would be 2.0 percent and 2.9 percent higher than in the baseline paths. By contrast, military spending ratios rose in Eastern Europe and Sub-Saharan Africa during the second half of the 1980s. If these higher levels of military spending had been maintained, per capita GDP would have been lower in the long run by about 5.3 percent in Eastern Europe and 2.3 percent in Sub-Saharan Africa. Military spending ratios began to decline in both regions toward the end of the 1980s, however, and recent data suggest that this declining trend has continued.

The second simulation indicates that deeper cuts in military spending would result in an even larger peace dividend. An improvement in secu-

Figure 2. Long-run change in per capita gross domestic product resulting from changes in the military spending ratio



Source: Knight, Loayza, and Villanueva 1996.

rity that allowed military spending ratios in all regions to fall to the levels that exist in Latin America (where no major armed conflicts have occurred in the past fifty years) would result in very large long-run gains in capacity output in most regions (see figure 2). In Eastern Europe and the Middle East, where military spending ratios have been high, cuts in military spending could increase capacity output in the long run by nearly 50 percent over the levels that would have prevailed if military spending ratios had remained at 1972–85 levels. Though less spectacular than in these cases, the peace dividend for other regions would be very large in the long run.

These simulation results may actually understate the positive effects of enhanced international security on growth. The simulations explicitly assume that all determinants of investment and growth other than military spending would remain unchanged, even if a generalized peace were achieved; in fact, improvements in international security would almost certainly result in improvements in the other economic variables that affect economic growth. As political tensions subsided, more and more countries would be able to dismantle barriers to free international exchange of goods, services, and financial assets. In this way, a generalized peace would foster economic interdependence, more open trading systems, and associated gains from specialization. Improved international security would also allow national education programs to concentrate on productive skills, and participation in education systems could rise markedly in countries in which political insecurity has long limited educational opportunities.

The central policy implication of this study is straightforward: fewer guns do indeed imply more butter. In a world in which international tensions are diminishing, reductions in military spending should be viewed as attractive structural policy elements of macroeconomic packages designed to enhance growth.

—by Malcolm Knight and Norman Loayza

Further reading

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This *DECnote* was prepared by Malcolm Knight of the International Monetary Fund and Norman Loayza in the Policy Research Department of the World Bank. *DECnotes* transmit key research findings to Bank Group managers and staff. They are drawn from the work of individual Bank researchers and do not necessarily represent the views of the World Bank and its member countries—and therefore should not be attributed to the World Bank or its affiliates. *DECnotes* are produced by the Research Advisory Staff. We welcome your questions and comments; please e-mail them to the authors or to Evelyn Alfaro, RAD.