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The Impact of Worldwide Military Spending Cuts on Developing Countries

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Abstract

This paper investigates the economic impact of a coordinated reduction in military expenditures of 20 percent using a specially modified version of the MULTIMOD world economic model. Simulation results indicate that in developing countries the present value of consumption increases by 46 percent of 1992 GDP, compared to military expenditures cuts, in present value terms, of 33 percent of 1992 GDP. The gains reflect both the release of domestic resources and a positive international economic externality due to enhanced trade and lower world interest rates. Accordingly, the net debtor developing country gains exceed those of industrial countries. Examination of individual developing country economies confirms the significance of the external trade effect on the pattern and level of gains.

JEL Classification Numbers:

E62; F17; H56

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Summary

Recent developments indicate a precipitous fall in world military spending is underway. Between 1985 and 1990, world military expenditures as a ratio to GDP are estimated to have fallen by over 20 percent or slightly less than 1 percent of GDP. The drop in arms trade is even greater, approaching 50 percent in monetary terms. Although there are a number of well publicized exceptions, the trend is widespread. Significant decreases in military expenditures and trade are evident in the most parts of the developing world, as well as among the former cold war combatants.

Recent simulation-based research, concentrating on industrial countries, indicates that a drop in military spending will tend to have negative short term effects on overall output and employment. The purpose of this paper is to investigate the economic impact of reducing military spending in developing countries in more detail. The IMF's MULTIMOD world economic model was modified to include greater geographic differentiation of developing countries. In the process, several important equations, including those for consumption, investment and trade, were re-estimated. These changes constitute a complete reformulation of the developing country sector in MULTIMOD. Overall, the paper finds substantial long term economic gains to developing countries from cutting military spending. However, the short-run effect on total output, which includes military expenditures, is ambiguous, depending to a large extent upon the underlying level of military spending as well as other assumptions.

Cutting military spending by 20 percent worldwide could produce a long run increase in private consumption 0.8 percent in developing countries of and 2.1 percent in private investment. These gains in turn produce a rise in economic welfare, estimated to be $1.45 trillion in 1993 prices, which in present value terms is 46 percent of 1992 GDP compared to military expenditure cuts of 33 percent of 1992 GDP. The welfare gains across individual developing countries are affected by a number of factors. Larger gains in welfare are associated with larger cuts in military spending, larger cuts in military imports, higher ratios of commodities exports, and close bilateral trade links with the U.S. On the other hand, triangular patterns of trade in which countries import from Japan and export to the United States are associated with lower welfare benefits, due to an unfavorable terms of trade effect. Overall, the developing country region of the world which benefits the most from military spending cuts is Africa.

These results are relatively insensitive to the timing of the military spending cuts or expectations about the future, although these factors do have an impact on the size of the short-term losses in output. By contrast, if part of the military expenditures are assumed to represent a fall in productive investment, the short-term impact on output is relatively unaffected but the estimated gains in economic welfare fall significantly.

I. Introduction

Recent developments indicate a precipitous fall in world military spending is underway. Between 1985 and 1990, world military expenditures are estimated to have fallen by over 20 percent or slightly less than 1 percent of GDP. The drop in arms trade is even greater, approaching 50 percent in monetary terms. Although there are a number of well publicized exceptions, the trend is widespread--significant decreases in military expenditures and trade are evident in the most parts of the developing world, as well as among the former cold war combatants.

Recent simulation-based research, concentrating on industrial countries, indicates that a drop in military spending will tend to have negative short term effects on overall output and employment. At the same time, a decrease in military spending is found to allow an immediate boost to private sector consumption and investment by a combination of lower taxes, lower domestic and world interest rates, and increased world trade. This increase in private sector activity sets in motion a sequence of events that leads to a growth in GDP in the medium term. Thus, even though decreasing military spending may lead to an initial drop in economic activity in industrial countries, after the initial drop, output is boosted beyond what would have been achieved if military spending were maintained at the same level in proportion to GDP. 1/

The purpose of this paper is to investigate the economic impact of reducing military spending in developing countries in more detail. The results might be different for developing countries than for industrial countries for a number of reasons. First, in many of the poorer developing countries military spending tends to be quite low, even in proportion to GDP. Second, the military in developing countries tends to depend almost entirely on imports of military equipment and consequently, military expenditures on domestically produced goods are limited and highly concentrated on personnel costs.

This paper examines the economic impact of a coordinated cut by all countries of 20 percent of military spending (using the average level of military spending in 1987-89 as the basis). At the same time, arms exports,

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1/ This result was found in CBO (1992), McKibbin and Thurman (1992), and a study by some of the same authors, Bayoumi, Hewitt and Schiff (1993). A number of other simulation studies find similar results, but tend either to concentrate on the short term impact--in which case they conclude that cutting military spending is economically harmful--or on the long term effects--in which case they conclude that cutting military spending is beneficial to the economy. See Atesoglu and Mueller (1990), Thomas, Stekler and Glass (1991), Lowenstein and Peach (1992), all of which focus on the impact of domestic cuts in military spending on the U.S. economy. Leontief and Dutchin (1983) and Cunningham and Ruffing (1992) examine developing countries as well as industrial countries.

imports, and their associated financing are also cut by 20 percent. The IMF's MULTIMOD macroeconomic model, which is used regularly in the Fund's work in the World Economic Outlook, is the basis for the analysis. A new variant of MULTIMOD was developed for this paper, which includes three major changes. The net debtor developing countries region was sub-divided into four geographic/economic regions: Western Hemisphere, Africa, newly industrialized economies, and other developing countries. Also, the determinants of the components of aggregate demand in these regions were remodeled to make them more compatible with the industrial countries by having private consumption and investment depend on forward-looking measures of wealth. Finally, the supply side of the model was reformulated to make it more similar, although not identical, to the prototype industrial country. The main feature that distinguishes the non-oil exporting developing countries from industrial countries in this version of the model is a financing constraint on external trade. 1/

For the industrial countries, the results are quite similar to those obtained in the previous simulation studies. For developing countries, the results depend to a large extent on their pattern of military spending and assumptions regarding the nature and timing of the cuts. In general, the worldwide cut in military expenditures is beneficial to the developing countries.

In order to disaggregate the impact of military cuts into its external component and the effect that is internal to developing countries, a variant of the main case is investigate in which developing countries cut their military spending and industrialized countries do not. In this alternative, the developing countries are found to experience a modest economic downturn, followed by a mild recovery in the medium term. 2/ In the long term there is an increase in output as private consumption and, more importantly, private investment replaces military activity.

In the main case where all countries cut their military expenditures, the developing countries benefit extensively from increased demand for their exports by industrialized countries and lower world interest rates which relaxes their external trade constraint. The overall benefits to developing countries are found to be nearly 60 percent higher than in the variant where only developing countries decrease their military spending. The decline in output in the early periods is eliminated, there is a substantial increase

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1/ See Bayoumi, Hewitt and Symansky (1993) for a fuller description of the changes to MULTIMOD.

2/ The pattern of output in this simulation is one year of positive GDP effects followed by a few years of output declines, before showing the long run improvement. This pattern is largely due to the gradual nature of the spending cuts. If the total cut occurred in the first year, output would be negative for 2 years, followed by output gains thereafter. Therefore, because of the pattern of these cuts, the distribution between short-term and medium-term becomes somewhat blurred.

in private sector consumption and investment activity, and there is no negative effect on economic activity from decreased military spending. In the medium term GDP growth is accentuated. The long-run increase in private consumption is estimated at 0.8 percent and in private investment at 2.1 percent. This leads to gains in economic welfare with an estimated present value of $1.45 trillion (46 percent of 1993 GDP) compared to decreased military spending of $1.04 trillion (33 percent of 1993 GDP).

Several limitations of the MULTIMOD framework--and indeed most simulation studies of this sort--constrain the analysis. The model includes very broad classifications of alternative forms of government expenditures and revenues. Similarly, since the model relies on aggregate national production functions, this precludes consideration of sectoral dislocations, which normally accompany the switch from military to civilian spending. Thus, the structure of the model does not permit an in depth analysis of conversion issues or the distributional and social consequences which will accompany such a major reallocation of resources. Instead, assumptions are needed as to how the released resources are used.

In these simulations it is assumed that lower military spending leads to a decrease in personal and business taxes by an amount that leaves the long term level of the deficit unchanged in proportion to GDP. Hence, these scenarios concentrate on the public versus private use of resources dimension. Bayoumi, Hewitt, and Schiff (1993) examine a variant where the deficit target is altered. Larger short term losses in economic output result, but are offset by larger medium term gains. The long term overall economic effect is about the same. Alternatively, if the resources were used for higher government spending, the economic gains would depend upon the relative mix between consumption and investment and on the efficiency of the investment. Assuming the same split between consumption and investment as the private sector and a market rate of return on this investment, the economic gains from raising nonmilitary government spending so as to leave total government spending unchanged would be similar to those reported in these simulations where taxes are cut.

The paper is organized in the following manner. Section 2 reviews the pattern of military expenditures, describes MULTIMOD, and discusses issues related to the measurement of welfare. Section 3 present the results of the main simulations. Section 4 discusses the impact on individual developing countries. Section 5 discusses the results for the alternative simulations. Section 6 reviews the major conclusions.

II. Background

1. Trade in military spending, military imports, and military exports

Between 1985 and 1990, the world has witnessed a drop in military spending of over 20 percent in proportion to GDP, from 5.6 percent to 4.3 percent of world GDP (see Hewitt, 1993, for full details). The change

has been widespread as more than half the countries lowered expenditure significantly relative to GDP and only a small fraction increased expenditures substantially.

World military spending is dominated by industrialized countries which account for over 55 percent of the world total. However, since they account for an even larger share of world GDP, their military expenditures in proportion to GDP were below the world average, 3.7 percent of GDP during 1987-89, the base years for the simulation analysis herein (see Table 1). 1/ Military expenditures in Eastern Europe and the U.S.S.R. were a much larger share of their GDP, 14.4 percent. They accounted for about 30 percent of world military expenditures. Developing countries accounted for about 15 percent of world military expenditures. As a group, they spent an estimated US$135 billion on the military during 1987-89. This was 4.5 percent of their combined GDP, virtually equivalent to the world average, but considerably above expenditures of the industrialized countries. However, net debtor developing countries had military expenditures of 3.7 percent of their GDP, virtually equivalent to that of industrialized countries.

According to U.S. government estimates (ACDA), total world arms imports and exports averaged over $50 billion during 1987-89. Military trade accounted for about 2 percent of total trade, while military spending was over 4 percent of world GDP. Thus, the military can be characterized as a relatively domestically orientated economic activity. The two major blocks--industrial countries, and Eastern Europe and the U.S.S.R.--each accounted for about 45 percent of total military exports and the remaining 10 percent of military exports originated in the developing countries. In contrast, nearly 3/4 of arms exports were sent to developing countries. For the industrialized countries, arms exports were only 1.2 percent of their total exports. Military exports of Eastern Europe and the U.S.S.R. were 9.8 percent of total exports during 1987-98. 2/ Arms exports were only 0.6 percent of the exports of developing countries.

1/ The data on military expenditures used in this study is based on Stockholm International Peace Research Institute (SIPRI) estimates, which are generally believed to be the most accurate available. Trade data were taken from the U.S. Arms Control and Disarmament Agency (ACDA), which is widely regarded as the best available source for this data. SIPRI does not provide estimate for the U.S.S.R. and China; estimates in Steinberg (1992) and ACDA were used instead.

2/ The value figures for Eastern Europe and the U.S.S.R. must be treated with caution. All the arms transfer figures represent U.S. government estimates of values. However, for the most part the arms of this group are not freely traded on open markets. Instead their market value is estimated on the basis of hypothetical U.S. production costs for weapons of similar capabilities and therefore are probably an over-estimates.

Table 1
Military Expenditure, Arms Exports, and Arms Imports, 1987–89 Average

	Military Expenditures	Arms Exports	Arms Imports	Military Expenditures	Arms Exports	Arms Imports	Arms Exports	Arms Imports
	(In percent of GDP)			(In billions U.S. dollars)			(In percent of country's total)	
Developing Countries	4.46	0.15	1.10	134.77	4.50	32.82	0.64	4.78
Oil Exporters 1/	10.29	0.02	3.23	36.30	0.07	11.45	0.06	11.51
Africa 2/	3.42	0.02	1.42	11.43	0.06	4.72	0.09	7.52
Western Hemisphere 3/	1.89	0.31	0.39	16.04	2.59	3.27	2.44	3.53
Other Developing	4.20	0.10	0.96	49.27	1.14	11.12	0.30	2.34
Asian 4/	3.61	0.02	0.55	33.47	0.22	5.03	0.11	2.30
Other 5/	6.44	0.37	2.50	15.81	0.92	6.09	0.53	2.37
NIES 6/	4.74	0.04	0.59	15.17	0.13	1.77	0.09	1.27
Industrial Countries 7/	3.68	0.17	0.07	503.00	22.70	8.10	1.18	0.42
of which								
United States	6.07	0.28	0.04	296.10	13.40	2.10	4.29	0.57
Japan	1.00	0.00	0.04	26.80	0.10	1.20	0.04	0.52
Germany	2.96	0.11	0.07	34.30	1.30	0.90	0.41	0.29
Eastern Europe & USSR 8/	14.35	1.31	0.22	269.00	24.30	3.90	9.80	1.60

Sources: ACDA, SIPRI, IFS, Steinberg.

1/ Iran, Kuwait, Libya, Oman, Qatar, Saudi Arabia and the UAE.
2/ Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo,Cote d'Ivoire, Ethiopia, Gabon, Gambia, Ghana, Guinea–Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zaire, Zambia, Zimbabwe.
3/ Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uraguay, Venezuela.
4/ Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, People's Republic of China, Fiji, French Polynesia, Guam, India, Indonesia, Lao, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Phillipines, Singapore, Sri Lanka, Thailand, Tonga, Viet Nam.
5/ Cyprus, Turkey, Yugoslavia, Egypt, Iraq, Israel, Jordan, Lebanon, Syrian Arab Rep., Yemen Arab Republic, and Yemen, P.D. Rep.
6/ Korea, Singapore, Taiwan
7/ United States, Canada, Australia, Japan, New Zealand, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.
8/ Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania, U.S.S.R., Yugoslavia.

The arms imports of developing countries averaged $33 billion annually during 1987-89, about 5 percent of their total imports. 1/ This was a far greater proportion than industrial countries, whose arms imports were only 0.5 percent of total imports. For Eastern Europe and the U.S.S.R. arms imports were 1.6 percent of total imports. There is of course a great deal of variation in the pattern of military expenditures and trade observed in different regions and economic groups of the developing world. For instance, military expenditures of the oil exporting countries were considerably higher than the average, over 10 percent of GDP. Their annual arms imports of $11.5 billion were 11.5 percent of their total imports and, in contrast to most other developing countries, they generally paid for their arms imports without relying extensive on credit or grants from the supplying countries.

Arms imports of the net debtor developing countries, at $20 billion per year during 1987-89, represented 4.4 percent of their total imports. Western Hemisphere countries military spending was considerably below average at 1.9 percent of GDP with arms imports 3.5 percent of total imports. This is the only region among developing countries where arms exports were significant at 2.4 percent of their total exports. Military expenditures in Africa were 3.4 percent of GDP with arms imports well above average at 7.5 percent of their total imports. Military expenditures among other developing countries stood at 4.2 percent of GDP with arms imports 2.3 percent of their total imports. Military spending in the newly industrialized economies (NIEs) was 4.7 percent of GDP and their arms imports of $1.8 billion annually were 1.3 percent of their total imports.

A steep drop in trade of military goods has occurred in recent years, on the order of 50 percent. Deliveries of military goods to developing countries (which would approximately correspond to imports) are estimated to have fallen from about $36 billion in 1985 (1991 constant prices) to $18 billion in 1991, Grimmett (1992). 2/ The peak year was 1987 with deliveries to developing countries estimated at $41 billion. A more forward view is provided by arms transfers agreements, which by necessity precede deliveries. These peaked in 1985 at $64 billion (1991 constant prices) and fell to $25 billion in 1991, just 40 percent of the 1985 level.

2. The modified MULTIMOD simulation model

The simulations below use MULTIMOD, a multi-region econometric model designed to analyze the economic interactions among industrial and

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1/ It is uncertain the extent to which the arms imports are included in the military expenditure data or are in addition to the recorded level of military spending. Military expenditures are supposed to include all military activities other than domestic police. The treatment of arms imports is somewhat uncertain, see Hewitt (1992) for further discussion.

2/ This data is also based on U.S. government sources, however, the results are summary rather than by individual countries as in ACDA.

developing countries. The main linkages among the regions are through trade, exchange rates, and interest rates. Imports of the industrial and capital-exporting developing countries are functions of relative prices and aggregate demand, while imports by other developing countries depend upon the amount of available foreign exchange. Short-term interest rates depend on monetary policy through the money demand equations, while long-term interest rates are a moving average of current and expected future short term rates. Nominal exchange rates are determined by relative interest rates. 1/

For the purposes of this paper three features of the model are particularly important. It is a rational expectations model, which means, for example, consumption and investment depend on expectations about future income; and the movement of future prices, interest rates, and exchange rates affect their contemporaneous values. It has a well defined supply side based on a production function, so that changes in investment feed through into higher potential output in the future. Finally, the trade equations take account of the geographic distribution of trade across different economies.

In the existing version of MULTIMOD, domestic aggregate demand in developing countries is modeled in a relatively simple manner. Non-oil developing countries are assumed to face a constraint on borrowing from abroad. This constraint depends upon their ability to service loans in the future, becoming less severe as interest rates decline or exports increase. Behavioral equations determine the level of exports and total consumption (the sum of government consumption and private consumption). The level of imports and of investment are then calculated as residuals given the behavioral equations for external finance and for internal supply of goods, respectively. The net creditor countries (hereafter simply oil exporters) 2/ have a similar underlying domestic framework. As the residual supplier of oil, exports are given by the balance of demand and supply in the oil market, and imports reflect the difference between absorption and the aggregate supply of goods for the home market. In both developing country regions output is assumed to equal underlying supply, which in turn depended upon factors such as export performance.

MULTIMOD was modified for this paper in several important respects in order to provide a more in-depth analysis of developing country economies. 3/ Developing countries are divided into four economic/ geographical regions--Net debtor Western Hemisphere, Africa, the Newly Industrialized Economies (NIEs) and other developing countries (mostly non-

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1/ Masson, Symansky and Meredith (1990) provide a detailed description of the model.

2/ Comprising Iran, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Taiwan, Province of China, and the UAE.

3/ See Bayoumi, Hewitt, and Symansky (1993) for a more detailed discussion on these changes.

oil exporting Middle-Eastern and other Asian countries). The model for oil exporting countries is largely unchanged. The NIEs are modeled in the same manner as industrial countries and accordingly are treated as industrialized countries throughout. Extensive changes were made to the other three developing country groups. New equations were estimated for private consumption and investment, which were made dependent on forward looking wealth, and for exports and imports of manufactured goods. Government non-military consumption is exogenous and the domestic capital market is assumed to be underdeveloped so that all changes in government spending have to be paid for by changes in taxes. All the equations are estimated in U.S. dollar equivalents and therefore little attention is paid to domestic inflation.

The result is a version of MULTIMOD in which developing country groups are fully modeled in a forward looking manner, with consumption and investment reacting to anticipated changes in economic welfare. The major difference between the developing countries and the industrial countries is the flexible external financing constraint. In other respects, the empirically determined parameters indicate that developing countries behave in a manner similar to industrial countries.

3. Measuring the welfare effects of reduce military spending

One important issue that arises is how to measure the welfare impact from changing levels of military expenditures. Normally, the economics profession monitors welfare changes through changes in the GDP (or GNP). Such an approach implicitly assumes that a decrease in military expenditures of a specified amount by a nation leads to lower security and consequently lowers welfare by an amount equal to the decrease in spending. Thus a decrease in military spending that is exactly offset by a rise in civilian economic activity would be judged to be welfare neutral.

While the primary impact of military expenditures is on security rather than on the economy, no attempt is made to measure the impact on security of lowering military expenditures. While economic theory provides a rationale for government provision of security, since security displays the classic features of a public good, from an international perspective military expenditures by one nation impose a negative externality on other nations that feel threatened. 1/ The security impact of a coordinated decrease in military expenditures is quite different from a unilateral reduction by one nation. While a unilateral decrease in military expenditures almost certainly decreases national security, a coordinated decrease in military spending of the type considered in this paper has an uncertain impact on security since the reductions in security caused by domestic military cuts are counter balanced by the greater security provided by lower military spending in rival countries.

1/ Alternatively, higher military expenditures of an alliance will have a negative impact on the security of rival alliances.

Economic tools are well suited to measuring the economic gains derived from the resources freed when military spending is cut. Since in the present framework, the freed resource are used for nongovernmental activity, benefits can be measured merely by monitoring the change in the level of civilian economic activity. In order to illustrate that civilian economic activity rather than GDP should be followed when measuring the benefits from a coordinated decrease in military spending, consider a simple example. Suppose a tank factory is converted into a bicycle factory and that all the associated macroeconomic variables are unaffected so that the factory continues to sell all its output domestically with employment, wages, and international trade remaining unchanged. It is obvious that there would be no change in GDP. However, an important welfare change would have occurred. Instead of tanks, the society will have more bicycles and consequently higher civilian economic activity.

There would of course be a cost to society, the country would have fewer tanks to provide protection and would consequently suffer a loss in security, certeris paribus. However, since the analysis herein assumes that all neighboring countries simultaneously reduce their tanks arsenal by the same percentage, the impact on a particular country's security from reducing its tanks is uncertain. It could rise, fall, or remain unchanged, depending on the welfare measure and spillover effects of security. In any case, changes in GDP associated with changes in military spending do not provide a suitable estimate of these gains or losses. 1/

For these reasons, this study concentrates on measuring the civilian economic benefits derived from reducing military expenditures. Details of these calculations are given in Appendix 1. The basic approach is to estimate the present discounted value of the rise in civilian consumption over time. Over the period to 2002, this is calculated directly from the simulation. After 2002, it is calculated using the assumption that private consumption and investment continue to register the gains calculated in that year into the future. To calculate the present value a 4 percent real discount rate was used.

This indicates the potential gain to society from diverting resources from the military to civilian economic activities. These benefits must be discounted to the extent that there is a loss of security associated with the shift. Furthermore, the authors recognize that there are many who believe that military expenditures provide indirect (microeconomic) positive economic benefits to society which are not explicitly incorporated into the

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1/ Of course, in some cases decreasing military expenditures could be much more disruptive to the economy. There will be serious redistributional consequences with those formerly dependent on the military or military related activities suffering job losses or at least a fall in income. However, distributional changes are also ignored in measurement of GDP.

main simulations. 1/ Regardless of the merits of this argument for industrial market economies, there is very little basis to suggest that significant positive economic externalities exist for developing countries who import most of their military goods. 2/ Nevertheless, in order to take account of the possibility that military spending provides indirect positive economic benefits, a direct impact on investment is incorporated into the simulations in one of the variants in Section 5.

III. The Simulation Results

1. The "Main Case" simulation

The main case simulation investigates the economic impact when all countries simultaneously reduce their military expenditures 20 percent phased in five equal annual increments which represents a total drop in government spending of 0.7 percent of GDP for industrial countries and 0.6 percent of GDP for non-oil exporting developing countries, based on expenditure patterns in 1987-89. Each nation also lowers its military exports and military imports, by 20 percent, similarly phased in over five years.

The MULTIMOD simulations incorporates the decrease in military spending as a fall in government consumption accompanied by lower business and consumer taxes (or increase government transfers, which are equivalent to negative taxes in the model), keeping the fiscal deficit unchanged. 3/ The monetary authorities in most industrial countries are assumed to follow a target path for the money supply. 4/ In addition, it was assumed that 40 percent of the decline in military imports were associated with a decline in assistance from the exporting country, with half coming in the form of loans and half in the form of grants. The level of external assistance associated with arms imports has almost certainly fallen significantly over the last few years due to the end of the cold war. Since information limitations make it impossible to be precise about the exact ratios involved, for comparative purposes the results from a simulation in which 80 percent of military imports are associated with foreign financing from

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1/ The analysis does explicitly take account of the indirect macroeconomic and trade impact of lowering military expenditures which are in fact a large part of the argument put forward by those who claim that military spending is "good for the economy."

2/ Indeed, analysis coming out of the former Soviet Union indicates very limited positive externalities for civilian goods production from their relatively sophisticated military industries.

3/ The residuals on the trade equations were adjusted so that the *ex ante* effects on trade corresponded to the data on military trade.

4/ However France, Italy, the United Kingdom, and the smaller industrial countries are assumed to keep their exchange rates pegged to the deutsche mark.

the exporting country are reported as a variant of the main case. Such a ratio is probably more in line with the state of affairs prior to the collapse of the U.S.S.R.

a. Aggregate results for developing countries

A summary table of the simulation results for the main case and one special variant related to developing countries are shown in Table 2. The results of several other variations which allow for alternative assumptions related to the speed; financing, and type of cuts, are shown in Table 3. More detailed tables of all the results are in Appendix Table A1. In the main case, developing countries are found to have a small increase in GDP in the first year. 1/ There is no short term economic downturn because the permanent decrease in taxes, increase in wealth, and other factors induce an immediate rise in private consumption (0.1 percent) and investment (0.4 percent) which together exceed the drop in military expenditures, leading to a net increase in GDP. 2/ Furthermore, the initial increase in private demand strengthens over time as military spending is reduced further so that after five years the increase in consumption and investment is more than five times the first year increase. The gains continue after military expenditures in proportion to GDP stabilize, so that after 10 years consumption is 0.8 percent higher, investment 2.1 percent higher, and overall GDP is 0.2 percent higher. However, this optimistic outcome is by no means general to all country groups or simulations. In many of the alternative simulations a net downturn in GDP is recorded in the first year, followed by increases in GDP thereafter.

The causes for the significant rise in civilian economic activity in developing nations from a coordinated decrease in world military spending come from both domestic and foreign economic events. Domestically, the savings from military expenditures are used to lower individual and business taxes, which provides a direct stimulus. Additionally, lower government spending tends to lower domestic real interest rates, which improves business prospects and increases household wealth. However, the consumption and investment which is induced tends to hurt the estimated current account position of the country. In order to rectify this, the real exchange rate tends to depreciate, leading to higher net exports.

The foreign stimulus stems from two sources. First, since all nations experience a fall in domestic interest rates due to their lower military spending, there is a fall in world interest rates. This tends to reduce interest payments on foreign debt and loosen the external financing

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1/ In each case, the figures represent the deviation from the baseline. MULTIMOD provides a baseline projection for each variable over the course of the simulations. The results reported in the tables indicate how the projections change when military expenditures are altered.

2/ If the entire cut in military spending occurs immediately, as is done in variant 2, output does fall in the short-run.

Table 2
Sample Simulation Results: Main Case
(In percent deviation from Baseline)

	Government Consumption	Private Consumption	Private Investment	Total Demand	GDP	Real Exchange Rate	Exports	Imports
Developing Countries								
Year 1	−1.1	0.1	0.4	0.0	0.0	−0.1	0.1	0.1
Year 5	−5.5	0.5	1.7	0.0	0.1	−0.3	0.5	0.2
Year 10	−5.5	0.8	2.1	0.3	0.2	0.4	0.3	0.8
Western Hemisphere								
Year 1	−0.7	0.1	0.5	0.1	−0.0	0.3	−0.2	0.4
Year 5	−3.4	0.5	1.7	0.3	0.1	0.2	−0.2	0.6
Year 10	−3.4	0.7	1.9	0.5	0.3	1.0	−0.3	1.3
Africa								
Year 1	−0.8	0.1	0.6	0.0	0.0	−0.0	0.0	0.1
Year 5	−4.2	0.6	2.1	0.1	−0.1	−0.1	0.4	0.2
Year 10	−4.2	0.9	2.4	0.4	0.3	0.7	0.2	0.8
Other Developing Countries								
Year 1	−1.4	0.1	0.3	−0.0	0.0	−0.3	0.2	−0.1
Year 5	−7.1	0.5	1.6	−0.1	0.1	−0.7	0.8	0.0
Year 10	−7.1	0.9	2.2	0.2	0.2	0.0	0.6	0.5
Industrialized Countries								
Year 1	−0.7	0.0	0.5	0.0	0.0	−0.1	0.1	0.2
Year 5	−3.9	0.8	1.6	0.1	0.0	−0.1	0.7	0.8
Year 10	−3.9	1.0	1.8	0.3	0.3	−0.2	0.6	0.6
United States								
Year 1	−1.3	0.0	0.4	−0.2	0.0	−1.0	0.5	−0.5
Year 5	−7.1	0.9	1.7	−0.3	0.0	−1.4	1.3	−0.8
Year 10	−7.1	1.2	2.0	−0.1	0.3	−1.6	1.5	−0.9
Japan								
Year 1	−0.2	0.1	0.5	0.1	0.0	1.3	−0.3	1.0
Year 5	−1.3	0.5	1.1	0.4	0.1	1.9	−0.3	2.0
Year 10	−1.3	0.6	1.3	0.5	0.2	1.9	−0.5	1.7
Newly Industrialized Economies								
Year 1	−2.0	0.0	0.2	−0.1	−0.1	0.1	0.1	0.1
Year 5	−9.8	0.7	1.2	−0.1	0.0	0.1	0.8	0.6
Year 10	−9.8	0.8	1.4	0.0	0.1	0.3	0.7	0.5
Only Developing Countries Cut Their Military Spending								
Developing Countries								
Year 1	−1.1	0.1	0.3	0.0	0.1	−0.4	0.2	−0.2
Year 5	−5.5	0.3	1.1	−0.3	−0.1	−0.6	0.2	−0.6
Year 10	−5.5	0.5	1.4	0.0	0.1	−0.6	0.3	−0.6
Western Hemisphere								
Year 1	−1.1	0.0	0.2	0.0	0.0	−0.5	0.1	−0.3
Year 5	−5.5	0.1	0.7	−0.2	−0.1	−0.6	−0.2	−0.8
Year 10	−5.5	0.3	0.9	0.0	0.1	−0.7	−0.1	−0.8
Africa								
Year 1	−0.8	0.1	0.5	0.0	0.1	−0.4	0.2	−0.2
Year 5	−4.2	0.4	1.3	−0.2	−0.1	−0.2	0.1	−0.5
Year 10	−4.2	0.6	1.7	0.0	0.2	−0.3	0.2	−0.5
Other Developing Countries								
Year 1	−1.4	0.1	0.4	0.0	0.1	−0.4	0.4	−0.2
Year 5	−7.1	0.3	1.2	−0.3	−0.1	−0.7	0.4	−0.4
Year 10	−7.1	0.6	1.7	−0.1	0.2	−0.9	0.6	−0.4

Table 3
Sample Simulation Results: Variants
(In percent deviation from Baseline)

	Government Consumption	Main Case		More Military Aid		Faster Cuts		Cuts Not Anticiapted		Part Investment	
		Demand	Investment	Demand	Investment	Demand	Investment	Demand	Investment	Demand	Investment
Developing Countries											
Year 1	−1.1	0.0	0.4	−0.0	0.4	−0.3	0.9	−0.1	0.2	0.0	0.3
Year 5	−5.5	0.0	1.7	−0.0	1.6	0.4	2.3	0.2	2.1	0.0	1.1
Year 10	−5.5	0.3	2.1	0.3	2.0	0.4	2.0	0.3	2.2	0.2	1.4
Western Hemisphere											
Year 1	−0.7	0.1	0.5	0.1	0.5	−0.1	1.0	0.0	0.2	0.1	0.4
Year 5	−3.4	0.3	1.7	0.3	1.7	0.6	2.3	0.4	2.2	0.2	1.3
Year 10	−3.4	0.5	1.9	0.5	1.9	0.5	1.8	0.5	2.0	0.4	1.3
Africa											
Year 1	−0.8	0.0	0.6	0.0	0.5	−0.3	1.2	−0.1	0.3	0.1	0.5
Year 5	−4.2	0.1	2.1	0.0	1.8	0.5	2.9	0.3	2.6	0.1	1.4
Year 10	−4.2	0.4	2.4	0.3	2.1	0.5	2.4	0.4	2.5	0.3	1.6
Other Developing Countries											
Year 1	−1.4	−0.0	0.3	−0.1	0.3	−0.5	0.8	−0.1	0.2	0.0	0.2
Year 5	−7.1	−0.1	1.6	−0.2	1.5	0.2	2.2	0.0	2.0	−0.1	1.0
Year 10	−7.1	0.2	2.2	0.1	2.0	0.3	2.1	0.2	2.2	0.1	1.4
Industrialized Countries											
Year 1	−0.7	0.0	0.5	0.0	0.5	−0.4	0.9	−0.1	0.2	0.1	0.9
Year 5	−3.9	0.1	1.6	0.1	1.6	0.3	1.9	0.1	1.9	0.0	1.0
Year 10	−3.9	0.3	1.8	0.3	1.8	0.3	1.8	0.3	1.9	0.2	1.2
United States											
Year 1	−1.3	−0.2	0.4	−0.2	0.5	−0.9	1.1	−0.2	0.3	−0.1	0.3
Year 5	−7.1	−0.3	1.7	−0.3	1.7	0.0	2.2	−0.3	2.1	−0.3	0.7
Year 10	−7.1	−0.1	2.0	0.0	2.0	0.0	2.1	0.0	2.2	−0.1	0.7
Japan											
Year 1	−0.2	0.1	0.5	0.1	0.5	0.0	0.7	0.0	0.1	0.1	0.4
Year 5	−1.3	0.4	1.1	0.4	1.2	0.4	1.2	0.4	1.3	0.3	0.9
Year 10	−1.3	0.5	1.3	0.5	1.3	0.5	1.4	0.5	1.4	0.3	0.9
Newly Industrialized Economies											
Year 1	−2.0	−0.1	0.2	−0.1	0.2	−0.6	0.5	−0.1	0.1	−0.1	0.1
Year 5	−9.8	−0.1	1.2	−0.1	1.2	0.1	1.4	−0.1	1.4	−0.1	0.8
Year 10	−9.8	0.0	1.4	0.0	1.4	0.0	1.5	0.0	1.5	−0.1	0.8

constraint on developing nations, which further stimulates private consumption and investment. Second, as discussed in Section 2, the military sector can be thought of as a relatively domestically oriented activity for the industrialized nations. On average, civilian consumption and investment are more import intensive than military expenditures. Therefore, a decrease in military spending by the industrial countries stimulates their demand for imports from developed countries. For these reasons, decreasing military spending by one country has a positive economic externality on the country's trading partners, and indeed on all (net debtor) countries through downward pressure on world interest rates. These effects tend to improve the external position of a country, which allows the exchange rate to appreciate, boosting domestic expenditures as real imports rise by more than real exports.

Since coordinated reductions produce cuts in both domestic and foreign military spending, the overall effect on the external position depends upon the relative importance of the domestic and foreign cuts. In the main case simulation, the overall effect is slightly negative and results in a depreciation of the real exchange rate for developing countries. Because of this depreciation, real exports rise by more than real imports over the medium-term as total absorption rises by less than output. In the long-run, lower world interest rates ease the external constraint, allowing the real exchange rate to appreciate, imports to increase, and absorption to rise by more than output.

The differential impact of domestic and foreign military spending cuts is further illustrated in the bottom part of Table 2, which report the results of a simulation in which only the net debtor developing country regions (Western Hemisphere, Africa and Other Developing countries) cut their military spending. As expected, developing countries experience a depreciation in their currency that is larger than in the main case, reflecting the negative impact of domestic military spending cuts on the external constraint. Higher investment means that real GDP rises in the long-run, however, much of this higher output goes into exports and the rise in domestic absorption is smaller than the rise in GDP for every region. However, there is still a gain in regional economic welfare from the rise in private sector consumption and investment.

Calculations of the economic benefits of the military spending cuts for the main case scenario and for the variants are reported in Table 4. In present value terms, developing countries (excluding NIEs) gain almost $1.45 trillion, 46 percent of their 1992 GDP or 40 percent greater than the present value of the decrease in military expenditures. 1/ This is a very similar ratio of output to the gain experienced by industrial countries,

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1/ Ratios to 1992 GDP represent a method of comparing results across regions with different economic sizes. It should be noted, however, that the economic welfare gains represent a summation over the whole of the future, whereas 1992 GDP simply measures income at one particular moment. Hence, the gains represent a stock construct while GDP is a flow variable.

Table 4
Present Value of Costs and Benefits of Reducing Military Spending

	1993 to 2002	Beyond 2002	Total Gain	1993 to 2002	Beyond 2002	Total Gain
	(In billion 1992 U.S. dollars)			(In Percent of 1992 GDP)		
Developing Countries						
Military Spending	−158.6	−883.9	−1042.5	−5.0	−28.1	−33.2
Benefits						
Main Case	100.0	1351.5	1451.5	3.2	43.0	46.2
Developing Countries Only	56.1	866.0	922.1	1.8	27.6	29.4
Larger Cut in Aid	93.8	1254.3	1348.1	3.0	39.9	42.9
Cuts Occur in the First Year	142.5	1462.8	1605.3	4.5	46.6	51.1
Lack of Credibility	103.4	1401.3	1613.5	3.3	44.6	51.4
Part of Cuts are Investment	89.0	1028.1	1117.1	2.8	32.7	35.6
Western Hemisphere						
Military Spending	−27.6	−152.7	−180.3	−2.8	−15.7	−18.6
Benefits						
Main Case	28.5	362.0	390.4	2.9	37.3	40.2
Developing Countries Only	9.6	156.9	166.5	1.0	16.2	17.2
Larger Cut in Aid	28.4	360.3	388.7	2.9	37.1	40.1
Cuts Occur in the First Year	40.6	388.4	429.0	4.2	40.0	44.2
Lack of Credibility	29.9	377.7	407.6	3.1	38.9	42.0
Part of Cuts are Investment	24.8	277.3	302.1	2.6	28.6	31.1
Africa						
Military Spending	−22.4	−124.5	−147.0	−5.1	−28.2	−33.3
Benefits						
Main Case	15.6	204.0	219.6	3.5	46.2	49.7
Developing Countries Only	8.9	133.5	142.4	2.0	30.3	32.3
Larger Cut in Aid	13.7	176.0	189.7	3.1	39.9	43.0
Cuts Occur in the First Year	21.4	221.2	242.7	4.9	50.1	55.0
Lack of Credibility	15.9	211.5	227.4	3.6	47.9	51.5
Part of Cuts are Investment	14.0	156.5	170.5	3.2	35.5	38.6
Other Developing Countries						
Military Spending	−108.6	−606.7	−715.2	−6.3	−35.1	−41.3
Benefits						
Main Case	56.0	785.5	841.5	3.2	45.4	48.6
Developing Countries Only	37.7	575.6	613.2	2.2	33.3	35.4
Larger Cut in Aid	51.7	717.9	769.6	3.0	41.5	44.5
Cuts Occur in the First Year	80.5	853.2	933.7	4.7	49.3	54.0
Lack of Credibility	57.7	812.1	869.7	3.3	46.9	50.3
Part of Cuts are Investment	50.2	594.3	644.5	2.9	34.3	37.3

Table 4 (Continued)
Present Value of Costs and Benefits of Reducing Military Spending

	1993 to 2002	Beyond 2002	Total Gain	1993 to 2002	Beyond 2002	Total Gain
	(In billion 1992 U.S. dollars)			(In Percent of 1992 GDP)		
Industrial Countries						
Military Spending	−982.3	−5512.8	−6495.1	−5.4	−30.5	−36.0
Benefits						
Main Case	701.2	7355.0	8056.2	3.9	40.7	44.6
Developing Countries Only	5.0	101.3	106.3	0.0	0.6	0.6
Larger Cut in Aid	710.7	7454.6	8165.4	3.9	41.3	45.2
Cuts Occur in the First Year	862.7	7719.1	8581.8	4.8	42.8	47.5
Lack of Credibility	620.8	7637.7	8258.5	3.4	42.3	45.8
Part of Cuts are Investment	608.9	5817.6	6426.5	3.4	32.2	35.6
United States						
Military Spending	−572.9	−3210.1	−3783.1	−9.1	−51.2	−60.4
Benefits						
Main Case	322.6	3063.2	3385.7	5.1	48.9	54.0
Developing Countries Only	3.8	42.1	45.9	0.1	0.7	0.7
Larger Cut in Aid	326.3	3095.2	3421.5	5.2	49.4	54.6
Cuts Occur in the First Year	414.1	3249.4	3663.5	6.6	51.8	58.4
Lack of Credibility	297.0	3151.4	3448.4	4.7	50.3	55.0
Part of Cuts are Investment	295.4	2203.0	2498.5	4.7	35.1	39.9
Japan						
Military Spending	−58.2	−333.1	−391.3	−1.5	−8.9	−10.4
Benefits						
Main Case	90.6	1079.1	1169.7	2.4	28.7	31.1
Developing Countries Only	0.8	15.8	16.7	0.0	0.4	0.4
Larger Cut in Aid	92.3	1099.3	1191.5	2.5	29.3	31.7
Cuts Occur in the First Year	102.4	1148.1	1250.5	2.7	30.6	33.3
Lack of Credibility	72.7	1107.2	1274.8	1.9	29.5	33.9
Part of Cuts are Investment	75.5	810.2	885.7	2.0	21.6	23.6
Newly Industrializing Countries						
Military Spending	−36.3	−204.9	−241.2	−7.0	−39.5	−46.5
Benefits						
Main Case	15.7	198.5	214.2	3.0	38.3	41.3
Developing Countries Only	0.9	12.3	13.2	0.2	2.4	2.5
Larger Cut in Aid	15.9	201.6	217.5	3.1	38.9	41.9
Cuts Occur in the First Year	18.9	218.4	237.4	3.6	42.1	45.8
Lack of Credibility	14.1	207.5	221.7	2.7	40.0	42.7
Part of Cuts are Investment	14.7	141.9	156.6	2.8	27.4	30.2

Notes. The main case simulation measures the impact of a 20 percent cut in military spending over 5 years.
The developing countries only simulation looks at the impact when military spending is cut only in developing countries.
In the larger cut in aid simulation the percentage of military imports financed by aid is increased from 40 to 80 percent.
In the Cuts Occur in the First Year simulation all of the military spending cuts are carried out in the first year.
In the lack of credibility simulation future military spending cuts are not fully anticipated by individuals.
In the part of cuts are investment simulation 10/20 percent of developing/industrial country military spending is investmen

despite the fact that the underlying military spending cuts are somewhat smaller. However, when only developing countries reduce their expenditures, the gain is equivalent to 29 percent of 1993 GDP. Thus, the gains associated with domestic cuts make up around 2/3rds of the overall gains experienced by developing countries.

b. Developing country regions

The results for individual developing country regions illustrate the effect of the size of the relative cuts and the impact of trade patterns on the level and pattern of benefits from decreasing military expenditures. The western hemisphere region experiences the smallest cut in military spending, and hence a relatively small negative shock to its external position from domestic spending cuts. At the same time, its trade is dominated by the United States, which implements the largest cut in military spending among the industrial countries, and hence experiences the largest increase in demand for imports. The *ex ante* improvement in the external position of the Western Hemisphere translates into an appreciation of the real exchange rate and higher real imports, consumption, investment and absorption. The exchange rate appreciation lowers real exports, which in turn causes a small short-term fall in output. The beneficial long-term effects of lower interest rates on the external constraint can be seen in the substantial appreciation of the exchange rate between the 5th and 10th years of the simulation.

The relatively large external benefits for the western hemisphere countries is reflected in the welfare gains. Their cuts in military expenditures have a total present value of 19 percent of 1992 GDP. However, their welfare gains are estimated at 40 percent of 1992 GDP. More than half of this gain is due to externally generated benefits; when only developing countries cut their military spending, the welfare gain is 17 percent of 1992 GDP.

The cuts in military spending in Africa are larger than those in the western hemisphere, but smaller than in the other developing country region. The negative effect of these domestic military cuts on the external constraint, however, is reduced by the relatively high import content of military spending in this region. Since trade is heavily orientated towards Europe, an area of the world whose military spending as a ratio to output is lower than the United States, and hence the boost to exports from cuts in foreign military spending is smaller than for the western hemisphere region. Overall, there is a small depreciation of the real exchange rate and real exports rise by slightly more than imports. As in the other regions, the benefits of the fall in interest rates are reflected in a long-term appreciation of the real exchange rate.

Africa is the region which experiences the highest welfare gains, 50 percent of 1992 GDP compared to present value of military expenditure cuts of 33 percent of 1992 GDP. This largely reflects the relatively high propensity to import military goods in Africa. In the scenario where only

developing countries cut their military expenditures, the welfare gain is 32 percent of 1992 GDP. Therefore, the positive externality from industrial nations' cuts in military expenditures accounts for about 1/3 of the total gain.

Despite implementing larger cuts in military spending, the increases in consumption and investment in the other developing countries region are slightly smaller than those in the African region. Output is deflected abroad as pressures on their external balance cause a depreciation in their exchange rate and a deterioration in real net trade. As well as the size of their domestic spending cuts, the exchange rate depreciation reflects the regional pattern of trade. Unlike the other two developing country regions, who export and import to different areas of the world in roughly equal proportions, other developing countries are net importers from Japan and net exporters to the United States. As discussed below, the military spending cuts in the industrial countries lead to a depreciation in the real exchange rate in those countries with large amounts of military spending as a ratio to GDP, principally the United States, and an appreciation in the real exchange rates of those countries with small levels of military spending, most notably Japan. This loss in the terms of trade increases pressure on the external constraint, which in turn leads to a diversion of domestic output into exports.

The economic welfare gains to the other developing countries are estimated at 49 percent of 1992 GDP compared to the present value of in military expenditures cuts of 41 percent of 1992 GDP. The simulations indicate that about one fourth of the benefits are attributable to external benefits from military expenditure cuts by the industrialized nations.

c. Industrial countries

The results from the main case simulation for the industrial countries are similar to those reported in Bayoumi, Hewitt and Schiff (1993), and hence are summarize briefly. Industrial countries as a whole experience little change in output in the short-run as the fall in government consumption is largely offset by rises in investment consumption and net trade. In the long-run private consumption and investment rise by 1.0 percent and 1.8 percent, respectively, with the countries that implement the largest cuts having the largest longer term gains in consumption and investment. The long-run differences in performance are smaller than the differences in military spending, reflecting a positive international externality coming from lower world real interest rates and higher world trade. This externality is transmitted through changes in the international terms of trade, with those countries that implement the largest cuts in their military budgets experiencing a depreciation in their real exchange rate, and those countries with the smallest cuts experiencing an appreciation.

The newly industrialized economies which have military spending of 4.7 percent of GDP, are somewhere between the polar extremes of the United

States (6.1 percent) and Japan (1.0 percent). Both exports and imports rise, illustrating the beneficial effect of lower military spending on trade as a whole. One interesting feature of these results, not reported in Table 2, is that their current account does considerably worse than might be expected. Like the other developing countries region, their trade involves net imports from Japan and net exports to the United States, so they experience a negative terms of trade shock. However, since they do not face a constraint on external finance, the shock is partly reflected in a deterioration of the current account.

Within the industrial countries, the U.S. gains the most and Japan the least when the welfare gains are measured as a ratio to GDP, but this ordering is reversed when the gains are measured in comparison to the underlying spending cuts. The newly industrializing region does relatively badly on both measures. Despite experiencing relatively large cuts in spending (47 percent of GDP in 1992 present value terms) the economic welfare gains are quite modest (42 percent of 1992 GDP). This reflects the adverse terms of trade shock caused by their trading patterns.

Comparing the overall results for industrial countries with those for developing countries, the most striking characteristic is that developing countries do somewhat better. Developing countries welfare rises 46 percent of 1992 GDP based on decreases in military spending equivalent to 33 percent of 1992 GDP. Industrial countries in the main case have a welfare increase equivalent to 44 percent of 1992 GDP based on military cuts equivalent to 36 percent of 1992 GDP. Thus, the relative gains to developing countries are 75 percent higher than for industrial countries. The cuts have more impact on imports and investment in developing countries and slightly less impact on output and consumption.

Because most of the present value of the military expenditure cuts occurs in the long term, most of the welfare gains also accrue in the long term. Regardless, the relative ordering of benefits discussed above holds even in the short term. This reflects the phased introduction of the package, the slow response of private consumption to the fall in government spending, and, perhaps most importantly, the large increase in investment brought about by the fall in military spending. Investment has as lagged impact on welfare (only increases in consumption are included in the welfare calculations), however it has a large long-term impact through its effect on potential output and hence the level of consumption that can be achieved in the future.

2. Individual country results

The developing country regions which have been analyzed above are aggregates of large numbers of countries. While these results are valuable for looking at the overall regional effect of military spending cuts, it is also interesting to look at the behavior of individual countries within these groups. Accordingly, country-specific variants of the basic developing country model were produced for the main case scenario. The

basic developing country framework was combined with the appropriate country-specific national accounts and direction of trade data. The individual country models were then simulated on their own, using the results from the main case scenario as the input for foreign variables. 1/ Table 5 reports results from simulations for two countries with relatively high military spending: Pakistan and Egypt; and for three countries with relatively low military spending: Mexico, Ghana, and Cameroon. 2/

At around 7 percent of GDP during 1987-89, Pakistan spends significantly more than the average for the other developing region as a whole. This spending is predominantly domestic, with military imports estimated to be less than 15 percent of total military expenditures. Exports and imports are both dominated by manufactured goods, and it has a relatively low level of international debt. The large cuts in military spending free a substantial amount of domestic resources for private sector uses. However, pressure is put on the external position as the military spending is replaced by private sector demand with a higher propensity to import. Given the external financing constraint, the real exchange rate depreciates so as to close the incipient current account deficit. As a result, real exports rise by more than real imports throughout the simulation, as some of the output gains are averted abroad. These effects increase over the first five years of the simulation, reflecting the graduated nature of the military spending cuts. Despite this, the size of the cuts in military spending allow for a relatively large increase in private consumption and investment in both the short- and long-run, and economic welfare increases by 113 percent of 1992 GDP, compared with military spending cuts equivalent to 93 percent of 1992 GDP. 3/

Egypt is another country with relatively high military spending; however, in this case military imports are relatively important, making-up an estimated 30 percent of total military spending. Its main trading likes are with 11 European countries. It has a very high level of foreign debt, and a large current account deficit. The depreciation of the dollar caused by the relatively large military spending cuts in the United States puts additional pressure on the current account, which is brought back into balance by a depreciation in the Egyptian real exchange rate, again

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1/ There is a potential inconsistency in this approach. If all the countries were simulated separately, there is no mechanism to ensure that these results would sum to the regional aggregate.

2/ The 20 percent decline in government expenditure was applied to each of the developing countries in this section but is not necessarily indicative of actual or announced changes in military expenditures for any particular country. However, recent estimates and official budget projections for Pakistan, for example, indicate that changes of at least this magnitude are likely to be achieved. For more detailed information on military expenditures for individual countries, see Hewitt (1993).

3/ For the sake of brevity we did not include a table for the calculation of individual country economic welfare.

Table 5
Sample Simulation Results: Individual Countries
(In percent deviation from Baseline)

	Government Consumption	Private Consumption	Private Investment	Total Demand	GDP	Real Exchange Rate	Exports	Imports
Pakistan								
Year 1	−1.6	0.1	0.6	−0.1	0.1	−0.7	0.6	−0.2
Year 5	−7.0	0.9	2.8	−0.2	−0.1	−0.9	1.2	0.1
Year 10	−7.0	1.7	4.4	0.2	0.5	−0.9	1.5	0.7
Egypt								
Year 1	−0.9	0.1	0.3	−0.1	0.1	−0.6	0.5	−0.4
Year 5	−5.2	0.5	1.8	−0.3	0.1	−1.2	1.4	−0.3
Year 10	−5.2	0.9	2.7	0.0	0.2	−0.5	1.1	0.4
Mexico								
Year 1	−0.2	0.0	0.1	0.1	0.0	−0.1	0.0	0.2
Year 5	−1.2	0.3	0.9	0.4	0.2	0.0	0.4	1.1
Year 10	−1.4	0.6	1.4	0.7	0.2	0.9	0.2	2.1
Ghana								
Year 1	−0.2	0.0	0.0	0.0	0.0	0.0	0.0	−0.3
Year 5	−1.3	0.3	0.8	0.2	0.2	0.3	0.1	0.4
Year 10	−1.2	0.5	1.2	0.4	0.2	1.1	0.1	1.0
Cameroon								
Year 1	−0.6	0.0	0.5	0.0	0.0	0.2	−0.1	−0.1
Year 5	−3.6	0.4	2.3	0.2	0.2	0.1	0.2	0.5
Year 10	−3.6	0.6	2.0	0.4	0.2	1.2	0.1	1.2

diverting some of the gains in output overseas. Some of this depreciation is eroded in the long run, ass lower world interest rates improve the debt position. The rise in economic welfare from cutting military spending is a rather large percentage of 1992 GDP than the value for Africa as a whole, reflecting large military spending cuts.

At only 0.4 percent of GDP, Mexico has very low spending on the military, even within the Western Hemisphere region. It has a relatively high level of international debt, and, although it is also an oil exporter, the majority of its exports are manufactured goods. The main impact from the cuts in military spending come in an indirect fashion, through their impact on the United States, its biggest trading partner. The devaluation of the U.S. currency against those of other industrial countries caused by the cut in military spending (discussed above) also produces a significant appreciation of the peso against the dollar. This results in a favorable terms of trade effect, which in turn boosts both imports and demand; after five years real imports are 1.1 percent above baseline, while real exports have only risen by 0.2 percent. These beneficial effects are further amplified in the longer-term by the fall in interest rates. Despite the small cut in military spending, economic welfare rises by almost 50 percent of 1992 GDP, higher than the average for the region as a whole and reflecting the importance of the United States in Mexican trade. Since the present value of the military spending cuts represent only 5 percent of 1992 GDP, most of these benefits are positive externalities caused by lower military expenditures of Mexico's trading partners.

At 0.6 and 1.8 percent of GDP, respectively, Ghana and Cameroon also have low levels of military spending. Exports are dominated by non-oil commodities in the case of Ghana, while in Cameroon both oil and non-oil commodities are important; both have significant levels of external debt. The short-term impact on both economies is negligible. In the medium term the rise in demand for imports caused by the replacement of military spending by private consumption and investment leads to a rise in the price of commodities. This in turn allows an appreciation in the exchange rate, and higher real imports and total demand. As in the case of Mexico, this medium-term gain is also supplemented by lower interest rates in the longer-run. The rise in economic welfare is 31 percent of 1992 GDP for Ghana and 35 percent for Cameroon. These are somewhat lower than the gains for the region as a whole, but are still large compared to the present value of military spending cuts of 8 and 18 percent of 1992 GDP for Ghana and Cameroon, respectively.

3. Variations on the main case

To this point the analysis has focused on the main case (and a special simulation where only the developing countries cut military spending). This section reports the outcomes from four variants of the main case, which are used to test the sensitivity of the results to alternating underlying assumptions. The first scenario analyzes the effect of an alternative financing assumption. The next two scenarios look at how the phasing of the

military spending cuts affects the results. The last alternative scenario assumes that part of the reduction in military spending comprises productive investment, and hence cuts in military spending have a direct negative impact on the capital stock and hence on underlying output.

The results from these scenarios are summarized in Table 3 and shown in more detail in Appendix Table A1. The first column of Table 3 shows the cuts in government consumption in the main case, which are same as those in most of the alternative scenarios. The next two columns show the response of total demand (which includes government consumption) and investment in the main case scenario. These two variables are then reported for each of the variants to the main case in turn.

The "Alternative Finance" scenario is indicative of the sensitivity of the results to the assumption about foreign financing, when the level of foreign financing associated with military imports is 80 percent instead of 40 percent as assumed in the main case, the economic welfare gains to developing countries are about 7 percent lower. Thus, the extent to which military imports are foreign financed or paid for directly by the importer has a noticeable, but modest impact on the results. This is because the trade component of military expenditures is somewhat modest, even for the developing countries. The economic welfare gains come mostly from the lower domestic consumer and business taxes, lower domestic and world interest rates, and the increased demand for exports from industrial countries.

The "Faster Cuts" variant shows the results when the full 20 percent military spending cuts occur immediately, rather than being phased in steadily over five years. This provides insight into the importance of the assumption that the spending cuts are phased in over time. This simulation produces a significantly larger initial decline in real absorption (and output) than in the main case scenario reflecting the larger reduction of demand in the first year of the simulation. This is most striking in the case of the United States, which implements the largest cuts in both absolute terms and as a ratio to GDP, and where absorption and GDP fall by 0.9 percent and 0.8 percent in the first year, respectively.

However, these negative effects are relatively short-lived, and GDP recovers rapidly, as can be seen in the more detailed results in Appendix Table A1. The speedy recovery reflects the response of investment and private consumption. Larger short-term reductions in military spending free more resources for the private sector, and both private consumption and investment rise by more than in the main case scenario. These benefits continue into the medium term, and both absorption and investment are considerably higher than in the main case both initially and after five years, particularly in the developing country regions. The results after ten years indicate very little long-term impact from changing the speed of the military spending cuts. As might be expected, the differences in behavior are particularly important in those regions where the military spending cuts are the largest, such as Africa, other developing countries, the United States, and the NIEs. Welfare in developing countries rises by

10 percent more than in the main case (Table 4), while the corresponding figure for industrial countries is 5 percent.

The "Lack of Credibility" variant shows the results when the future military spending cuts are not anticipated by individuals. The main case scenario assumes that individuals correctly anticipate the path of military spending cuts. Since consumers and investors are forward looking, in the main case they anticipate the beneficial effects of future cuts in military spending, which causes an immediate rise in both consumption and investment. By contrast, in this variant consumers assume that current levels of military spending will be maintained in the future. Hence, in the first year they assume that military spending will be cut by only 4 percent, with no anticipated future reductions. In the second year the new spending cuts cause them to project the new 8 percent reduction into the future. The third, fourth, and fifth years see further reductions in the anticipated levels of military spending of 4 percent each year hence, while the actual path of military spending is identical to that in the main case, the anticipated paths of military spending are different.

There are larger short-term losses in absorption and output than the main case, as the failure to anticipate future spending cuts causes smaller increases in private consumption and investment. However, these short-term losses are balanced by medium term-gains, as consumers and investors react to unexpected additional military spending cuts. The failure to anticipate the future reductions in military spending reallocates some of the benefits to private consumption and investment from the short- to the medium-term, however, as can be seen from the calculations of overall benefits reported in Table 3, the impact on long-term welfare is negligible.

In the "Part Investment" simulation, part of the spending cut on military goods is in the form of a decline in productive investment. It is now well established that certain types of government expenditures can promote productivity. A question that has been hotly debated is the extent to which military activities enhance productivity. The question raised here is the extent to which the military has a direct positive effect on civilian productivity. 1/ This simulation assumes that one-fifth of the reduction in military spending in the industrial countries constitutes a cut in productive investment, together with one-tenth of the cuts in developing countries. Thus, four-fifths (nine-tenths) of the spending cuts were assumed to be from government consumption and one-fifth (tenth) from productive government investment.

1/ This could come from military related research that has civilian applications, training given to demobilized military personnel, or possibly from infrastructure constructed by the military that is used by civilian producers. The scope for these is obviously more limited in the developing countries which import more of their military equipment.

The main effect of the simulation is to reduce the long-run welfare gains from cutting military spending, as part of the increase in civilian investment brought about by lower taxes and interest rates is offset. The short-run path of output is very similar to the main case, particularly after the first year; however, the longer-term gains are smaller. By the year 2002, investment in developing countries has increased by 1.4 percent, compared to 2.1 percent under the main case scenario. Hence, while the short-term impact of the spending cuts are similar, the long-term benefits are lower. The present value calculation indicates that the economic welfare of developing countries rises by 36 percent of 1993 GDP, about 25 percent lower than in the main case. A similar effect occurs in the industrial countries.

IV. Conclusions

Overall, there are substantial long-term economic gains to developing countries from cutting military spending, and an immediate boost to civilian economic activity commensurate with the size of the military expenditure cuts. However, the short-run effect on total output, which includes military expenditures, is ambiguous, depending to a large extent upon the underlying level of military spending as well as other assumptions. Cutting military spending by 20 percent worldwide could produce a long run increase in private consumption 0.8 percent in developing countries of and 2.1 percent in private investment. These gains in turn produce a rise in economic welfare, which is estimated to be $1.45 trillion in 1993 prices, 46 percent of 1992 GDP.

The welfare gains across individual developing countries are affected by a number of factors. Larger gains in welfare are associated with larger cuts in military spending, larger cuts in military imports, higher ratios of commodities exports, and close bilateral trade links with the U.S. On the other hand, triangular patterns of trade in which countries import from Japan and export to the United States are associated with lower welfare benefits, due to an unfavorable terms of trade effect. Overall, the developing country region of the world which benefits the most from military spending cuts is Africa.

These results are relatively insensitive to the timing of the military spending cuts or expectations about the future, although these factors do have an impact on the size of the short-term losses in output. If the 20 percent cut in military spending is collapsed into one year or if the initial decrease is perceived to be a one-shot event, the short term decrease in GDP is much larger. Thus, it is clearly possible that decreasing military expenditures can have significant short term negative effects on GDP growth, depending on the exact circumstances. Regardless, cutting military expenditures leads to an immediate short run boost in civilian economic activity in all scenarios.

When 10 percent of developing country and 20 percent of industrial country cuts in military spending are assumed to represent a fall in productive investment, the estimated gains in economic welfare fell by around a quarter. Thus the extent to which military expenditures has productive side effects determines the level of long term gains, but not the general direction.

Calculation of Present Value of Long Term Welfare Gains

The benefits obtained in any country from reducing military expenditure are equivalent to the increase in private consumption realized in current and future years. The cost to the country of this policy is the decrease in security due to lower military expenditures. If a coordinated decrease in military spending occurs, the decrease in the level of military spending by a given country will not necessarily be reflected in a fall in security. Each country will benefit from the decreased military expenditures by neighboring countries and others, to the extent that they feel threatened. Theoretically, many countries could experience an increase in security with a coordinated decrease in military expenditures as the capability of all countries to wage an attack would be diminished.

Calculating the present value of the consumption flows consists of a number of different steps. The underlying macroeconomic assumptions behind the calculations are that the baseline real rate of interest is 4 percent and that the world level of economic growth is 2 percent per annum. The short and medium term costs and benefits can be calculated directly from the simulation results using the discount rate of 4 percent. For instance, for net debtor developing countries in the main case simulation, the increase in consumption from 1993-2002 is estimated to be $100 billion while military expenditures fall by $159 billion.

The long term gains in consumption consist of two parts. First, there is a higher level of consumption relative to the base case in the year 2002. This will continue to increase as the economy grows. Therefore, in order to calculate the present value of these future increases in consumption, the discount factor is the real interest rate less the rate of growth or 2 percent. For net debtor developing countries this is estimated to be $750 billion. The same discount factor should be applied to military expenditures because if the same share of GDP were allocated to the military in the future, these expenditures would have also grown automatically with increases in the GDP. The present value of future military expenditures in the net debtor developing countries is therefore estimated at $1,040 billion.

The increased level of investment from the year 2002 onward will also result in consumption gains. In a well functioning market economy in equilibrium, the present value of future consumption from each project should be equal to the cost of capital investment (with distortions, the present value of future consumption associated with investment projects may differ from unity). Therefore, the consumption value of investment was calculated at the level of investment expenditures in the year 2002 discounted at the real rate of interest less the growth rate. For the net debtor developing countries this level is estimated at $600 billion. The total benefits are $1,450 billion. In the case of the net debtor developing countries, the future consumption increase is considerably above the decrease in military spending. This is due in part to the international

economic externality. For instance, when only developing countries lower their military spending, the gains are estimated to be $922 billion, somewhat lower than the reduction in military spending.

Appendix Table A1
Alternative Scenarios: Detailed Results
Changes in Billion 1992 Dollars

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Developing Countries											
Main Case											
Government Spending	−4.2	−8.8	−13.5	−18.4	−23.6	−24.2	−24.9	−25.5	−26.1	−26.8	−27.2
GDP	0.6	0.6	1.5	2.4	3.7	6.9	8.1	8.4	8.6	9.7	11.9
Consumption	1.7	3.5	5.9	8.7	11.9	15.2	17.7	19.4	20.7	21.8	23.0
Investment	2.8	4.9	7.2	9.7	13.0	15.8	17.4	17.9	17.8	17.9	18.6
Alternative Finance Arrangements											
GDP	0.6	0.7	1.9	3.0	4.3	7.2	8.1	8.1	8.1	9.1	11.0
Consumption	1.5	3.2	5.4	8.1	11.2	14.3	16.7	18.3	19.4	20.4	21.6
Investment	2.5	4.4	6.5	8.9	12.0	14.7	16.1	16.5	16.4	16.4	17.0
Cuts Occur in the First Year											
GDP	−5.1	7.2	9.3	8.6	7.1	6.0	6.9	9.1	12.1	14.7	16.7
Consumption	4.6	10.5	15.0	18.0	19.3	19.8	20.2	21.0	22.3	24.1	26.0
Investment	6.3	14.4	17.5	18.5	17.4	15.8	14.8	14.8	15.9	17.4	19.0
Lack of Credibility											
GDP	−0.8	0.5	2.3	3.9	5.2	8.8	7.9	8.4	9.0	10.7	13.5
Consumption	0.8	2.8	5.8	9.4	13.3	16.6	18.7	20.1	21.2	22.3	23.8
Investment	1.4	4.5	8.3	12.3	16.0	18.8	18.7	18.6	18.2	18.4	19.4
Part of Cuts are Investment											
GDP	−0.5	0.4	0.5	2.9	3.6	6.4	6.5	5.3	4.7	5.1	6.9
Consumption	1.8	3.5	4.2	6.9	10.1	13.6	16.4	18.0	18.8	19.2	19.8
Investment	2.1	4.0	3.9	6.1	8.3	11.3	12.9	12.9	12.3	11.7	11.8
Western Hemisphere											
Main Case											
Government Spending	−0.7	−1.5	−2.4	−3.2	−4.1	−4.2	−4.3	−4.5	−4.6	−4.7	−4.7
GDP	−0.1	0.1	0.6	1.1	1.5	2.1	2.3	2.4	2.7	3.2	3.9
Consumption	0.6	1.1	1.6	2.4	3.3	4.3	5.1	5.6	5.9	6.1	6.4
Investment	0.9	1.4	2.0	2.7	3.6	4.4	4.8	4.8	4.7	4.6	4.7
Alternative Finance Arrangements											
GDP	−0.0	0.2	0.6	1.1	1.5	2.1	2.3	2.4	2.7	3.2	3.9
Consumption	0.6	1.0	1.6	2.4	3.3	4.3	5.1	5.6	5.8	6.1	6.4
Investment	0.9	1.4	2.0	2.7	3.6	4.4	4.8	4.8	4.7	4.6	4.7
Cuts Occur in the First Year											
GDP	−0.3	2.5	2.6	2.1	1.6	1.6	2.1	3.0	3.9	4.6	5.2
Consumption	1.2	3.0	4.4	5.3	5.6	5.7	5.7	5.8	6.2	6.7	7.2
Investment	1.8	4.2	5.2	5.4	4.9	4.3	3.8	3.7	3.9	4.3	4.7
Lack of Credibility											
GDP	−0.0	0.5	1.0	1.3	1.6	2.3	2.2	2.4	2.9	3.6	4.5
Consumption	0.2	0.8	1.7	2.8	3.9	4.9	5.4	5.8	6.0	6.3	6.7
Investment	0.4	1.4	2.5	3.6	4.6	5.3	5.2	5.0	4.8	4.8	4.9
Part of Cuts are Investment											
GDP	−0.5	−0.2	0.3	1.2	1.6	2.1	2.0	1.7	1.7	2.1	2.7
Consumption	0.7	1.1	1.1	1.8	2.7	3.8	4.6	5.0	5.2	5.3	5.4
Investment	0.7	1.3	1.3	1.9	2.6	3.4	3.9	3.8	3.5	3.2	3.1

Appendix Table A1 (Continued)
Alternative Scenarios: Detailed Results
Changes in Billion 1992 Dollars

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Africa											
Main Case											
Government Spending	−0.6	−1.2	−1.9	−2.6	−3.3	−3.5	−3.5	−3.6	−3.7	−3.8	−3.8
GDP	0.1	0.2	0.4	0.6	0.8	1.3	1.4	1.4	1.4	1.6	2.0
Consumption	0.3	0.6	1.0	1.4	1.9	2.4	2.7	3.0	3.1	3.2	3.4
Investment	0.5	0.8	1.2	1.6	2.1	2.5	2.7	2.8	2.8	2.8	2.9
Alternative Finance Arrangements											
GDP	0.1	0.2	0.5	0.7	1.0	1.3	1.4	1.3	1.3	1.4	1.7
Consumption	0.2	0.5	0.8	1.2	1.7	2.1	2.4	2.6	2.7	2.8	3.0
Investment	0.4	0.7	1.0	1.3	1.8	2.2	2.3	2.4	2.4	2.4	2.5
Cuts Occur in the First Year											
GDP	−0.4	1.6	1.8	1.5	1.1	0.9	1.0	1.3	1.8	2.3	2.7
Consumption	0.8	1.7	2.4	2.8	2.9	2.9	2.9	3.0	3.2	3.5	3.8
Investment	1.1	2.4	2.9	3.0	2.8	2.5	2.3	2.3	2.5	2.8	3.1
Lack of Credibility											
GDP	−0.1	0.2	0.6	0.9	1.1	1.5	1.4	1.4	1.5	1.7	2.2
Consumption	0.1	0.5	0.9	1.5	2.1	2.6	2.9	3.0	3.1	3.3	3.4
Investment	0.2	0.8	1.4	2.0	2.5	2.9	2.9	2.9	2.9	2.9	3.1
Part of Cuts are Investment											
GDP	0.0	0.2	0.2	0.6	0.8	1.2	1.2	1.0	0.9	0.9	1.2
Consumption	0.3	0.6	0.7	1.1	1.6	2.1	2.6	2.8	2.9	2.9	2.9
Investment	0.4	0.7	0.6	1.0	1.3	1.8	2.0	2.0	2.0	1.9	1.9
Other Developing Countries											
Main Case											
Government Spending	−2.8	−6.1	−9.3	−12.6	−16.2	−16.6	−17.1	−17.4	−17.8	−18.3	−18.7
GDP	0.6	0.3	0.5	0.8	1.4	3.5	4.4	4.5	4.5	4.9	6.0
Consumption	0.8	1.9	3.2	4.8	6.7	8.5	9.9	10.9	11.7	12.4	13.2
Investment	1.4	2.6	4.0	5.5	7.4	9.0	9.9	10.3	10.3	10.5	10.9
Alternative Finance Arrangements											
GDP	0.6	0.4	0.8	1.1	1.9	3.7	4.4	4.4	4.2	4.5	5.4
Consumption	0.7	1.7	2.9	4.4	6.2	7.9	9.2	10.2	10.9	11.5	12.2
Investment	1.2	2.3	3.6	4.9	6.7	8.2	9.0	9.3	9.3	9.5	9.9
Cuts Occur in the First Year											
GDP	−4.4	3.2	4.8	5.0	4.3	3.5	3.7	4.8	6.3	7.7	8.8
Consumption	2.6	5.8	8.2	9.9	10.7	11.2	11.6	12.1	13.0	14.0	15.1
Investment	3.4	7.8	9.5	10.2	9.8	9.1	8.7	8.8	9.4	10.3	11.2
Lack of Credibility											
GDP	−0.8	−0.2	0.7	1.7	2.5	4.9	4.4	4.6	4.6	5.4	6.8
Consumption	0.4	1.5	3.1	5.2	7.3	9.2	10.4	11.3	12.0	12.8	13.7
Investment	0.8	2.4	4.5	6.7	8.9	10.5	10.5	10.7	10.5	10.7	11.3
Part of Cuts are Investment											
GDP	−0.0	0.4	0.0	1.2	1.2	3.1	3.3	2.6	2.1	2.1	3.0
Consumption	0.8	1.8	2.4	4.0	5.8	7.7	9.2	10.2	10.7	11.1	11.5
Investment	0.9	2.0	2.0	3.2	4.3	6.1	7.0	7.1	6.9	6.6	6.8

Appendix Table A1 (Continued)
Alternative Scenarios: Detailed Results
Changes in Billion 1992 Dollars

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Industrial Countries											
Main Case											
Government Spending	−26.5	−54.3	−83.7	−114.6	−146.6	−150.0	−154.2	−157.7	−161.4	−165.3	−169.7
GDP	−6.2	6.4	6.7	8.3	9.2	34.8	51.3	58.5	59.4	58.6	59.6
Consumption	3.7	27.8	48.6	70.0	90.8	109.1	122.9	131.9	137.1	140.6	143.9
Investment	17.2	34.8	44.5	55.9	67.7	76.6	80.8	81.3	80.3	80.3	82.6
Alternative Finance Arrangements											
GDP	−6.3	6.7	7.1	8.8	9.6	35.6	52.3	59.4	60.3	59.5	60.5
Consumption	3.8	28.2	49.4	71.0	92.2	110.6	124.6	133.6	138.8	142.3	145.6
Investment	17.6	35.6	45.5	57.1	69.1	78.0	82.2	82.6	81.6	81.6	83.9
Cuts Occur in the First Year											
GDP	−83.9	−14.7	27.9	52.8	60.0	57.5	51.9	49.6	52.7	59.9	68.9
Consumption	18.4	57.2	86.4	107.6	119.9	126.9	130.6	134.0	138.3	143.8	149.6
Investment	32.4	67.6	80.6	84.3	81.7	76.2	72.3	72.4	76.2	81.9	88.1
Lack of Credibility											
GDP	−16.5	−19.9	−14.0	−2.7	9.9	41.3	56.9	62.1	63.2	64.1	67.6
Consumption	3.7	13.6	30.2	51.8	76.6	99.6	115.6	126.2	133.5	139.3	145.0
Investment	6.9	22.2	41.0	60.7	79.8	90.3	91.6	89.6	87.6	87.5	90.2
Part of Cuts are Investment											
GDP	17.3	37.6	6.4	−1.2	−7.3	19.1	43.0	53.7	54.5	50.9	47.4
Consumption	8.1	29.8	38.8	54.9	72.3	90.3	106.4	117.0	122.9	126.2	128.5
Investment	30.0	52.5	38.5	40.5	41.5	49.5	56.6	57.2	54.6	51.7	50.6
United States											
Main Case											
Government Spending	−15.3	−31.5	−48.7	−66.8	−85.6	−87.7	−89.8	−92.0	−94.3	−96.5	−98.8
GDP	−3.1	2.2	−0.5	−2.2	−3.4	9.6	18.0	21.5	21.9	21.7	22.5
Consumption	0.7	12.4	21.9	31.8	41.8	50.4	57.0	61.3	63.8	65.4	67.0
Investment	4.2	8.4	11.2	15.2	19.7	23.4	25.4	25.9	25.9	26.2	27.3
Alternative Finance Arrangements											
GDP	−3.1	2.3	−0.4	−2.1	−3.2	9.9	18.3	21.8	22.2	21.9	22.8
Consumption	0.7	12.6	22.3	32.2	42.3	51.0	57.7	62.0	64.4	66.0	67.6
Investment	4.3	8.6	11.5	15.5	20.1	23.8	25.8	26.3	26.2	26.5	27.7
Cuts Occur in the First Year											
GDP	−48.0	−9.3	11.3	22.2	24.4	21.4	18.2	17.7	20.1	24.3	28.7
Consumption	8.3	28.8	43.1	53.0	58.2	60.5	61.6	63.0	65.0	67.7	70.5
Investment	10.7	22.1	26.3	27.2	25.8	23.7	22.6	23.0	24.8	27.2	29.6
Lack of Credibility											
GDP	−9.0	−11.0	−9.0	−4.8	0.3	15.4	21.8	23.6	23.5	23.9	25.8
Consumption	1.8	6.9	15.1	25.5	37.4	48.2	55.1	59.6	62.6	65.1	67.7
Investment	2.6	7.5	13.0	18.8	24.7	27.9	28.3	27.8	27.5	27.9	29.4
Part of Cuts are Investment											
GDP	−0.5	4.3	−2.4	−5.3	−7.2	5.2	12.7	14.3	12.2	9.5	8.3
Consumption	1.3	11.7	19.4	28.7	38.5	47.0	53.2	56.5	57.7	57.9	58.2
Investment	2.9	5.4	5.1	6.2	7.8	11.4	12.6	12.0	10.6	9.6	9.7

Appendix Table A1 (Continued)
Alternative Scenarios: Detailed Results
Changes in Billion 1992 Dollars

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan											
Main Case											
Government Spending	−1.7	−3.4	−5.1	−6.8	−8.5	−8.5	−9.4	−9.4	−9.4	−9.4	−10.3
GDP	−0.4	3.5	4.4	5.1	5.3	7.2	8.5	9.2	9.9	10.6	11.5
Consumption	1.2	4.6	7.2	9.6	11.7	13.6	15.0	16.0	16.8	17.5	18.3
Investment	4.5	8.7	10.2	11.5	12.6	13.3	13.7	13.8	14.0	14.4	15.0
Alternative Finance Arrangements											
GDP	−0.4	3.6	4.5	5.2	5.5	7.3	8.6	9.4	10.1	10.8	11.8
Consumption	1.2	4.7	7.3	9.8	12.0	13.8	15.3	16.3	17.1	17.8	18.6
Investment	4.6	8.9	10.4	11.7	12.9	13.6	14.0	14.1	14.3	14.6	15.3
Cuts Occur in the First Year											
GDP	−4.5	3.1	6.5	8.0	7.9	7.8	8.1	9.0	10.5	12.0	13.1
Consumption	2.5	7.0	10.1	12.2	13.4	14.3	15.1	16.1	17.3	18.4	19.3
Investment	6.2	12.4	14.0	14.1	13.6	12.9	12.9	13.4	14.4	15.3	16.0
Lack of Credibility											
GDP	−0.8	−0.2	1.3	3.1	4.9	7.8	8.8	9.2	9.8	10.8	12.2
Consumption	0.5	1.7	3.7	6.3	9.1	11.6	13.2	14.4	15.4	16.4	17.6
Investment	1.2	4.1	7.5	11.2	14.6	16.2	16.1	15.7	15.5	15.8	16.5
Part of Cuts are Investment											
GDP	0.3	3.4	3.1	3.5	3.9	5.9	7.1	7.4	7.5	7.7	8.3
Consumption	1.0	3.7	5.7	7.9	9.9	11.6	12.8	13.5	13.9	14.3	14.8
Investment	3.4	6.6	7.5	8.6	9.7	10.5	10.5	10.1	9.8	9.8	10.2
Newly Industrializing Countries											
Main Case											
Government Spending	−1.0	−2.0	−3.1	−4.2	−5.4	−5.6	−5.7	−5.8	−5.9	−6.2	−6.3
GDP	−0.4	−0.3	0.0	0.1	0.1	0.8	1.1	1.1	1.0	0.8	0.8
Consumption	0.0	0.6	1.1	1.7	2.2	2.6	2.8	2.9	2.9	2.8	2.9
Investment	0.4	1.1	1.5	2.1	2.7	3.1	3.2	3.2	3.1	3.1	3.2
Alternative Finance Arrangements											
GDP	−0.3	−0.3	0.0	0.1	0.1	0.8	1.2	1.1	1.0	0.8	0.9
Consumption	0.0	0.6	1.1	1.7	2.2	2.6	2.9	2.9	2.9	2.9	2.9
Investment	0.5	1.1	1.6	2.1	2.7	3.1	3.3	3.2	3.1	3.2	3.3
Cuts Occur in the First Year											
GDP	−3.0	−0.9	0.7	1.6	1.5	1.0	0.6	0.5	0.7	1.0	1.4
Consumption	0.5	1.5	2.2	2.6	2.7	2.7	2.6	2.6	2.7	2.9	3.1
Investment	1.1	2.4	3.0	3.2	3.0	2.8	2.7	2.8	3.1	3.4	3.6
Lack of Credibility											
GDP	−0.5	−0.8	−0.6	−0.3	−0.0	1.0	1.2	1.2	1.0	0.9	1.0
Consumption	0.1	0.4	0.8	1.3	1.9	2.4	2.6	2.7	2.7	2.8	2.9
Investment	0.2	0.8	1.5	2.3	3.1	3.5	3.5	3.4	3.3	3.4	3.5
Part of Cuts are Investment											
GDP	−0.1	0.2	−0.2	−0.2	−0.2	0.6	1.1	1.1	0.8	0.5	0.3
Consumption	0.0	0.5	1.0	1.5	2.0	2.5	2.8	2.8	2.7	2.6	2.6
Investment	0.3	0.6	0.8	1.3	1.8	2.3	2.4	2.2	1.9	1.8	1.8

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