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**PUBLIC SPENDING IN DEVELOPING COUNTRIES:
TRENDS, DETERMINATION, AND IMPACT**

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ABSTRACT

The objective of this paper is to review trends in government expenditures in the developing world, to analyze the causes of change, and to develop an analytical framework for determining the differential impacts of various government expenditures on economic growth.

Contrary to common belief, it is found that structural adjustment programs increased the size of government spending, but not all sectors received equal treatment. As a share of total government spending, expenditures on agriculture, education, and infrastructure in Africa; on agricultural and health in Asia; and on education and infrastructure in Latin America, all declined as a result of the structural adjustment programs.

The impact of various types of government spending on economic growth is mixed. In Africa, government spending on agriculture and health was particularly strong in promoting economic growth. Asia's investments in agriculture, education, and defense had positive growth-promoting effects. However, all types of government spending except health were statistically insignificant in Latin America. Structural adjustment programs promoted growth in Asia and Latin America, but not in Africa.

Growth in agricultural production is most crucial for poverty alleviation in rural areas. Agricultural spending, irrigation, education, and roads all contributed strongly to this growth. Disaggregating total agricultural expenditures into research and non-research spending reveals that research had a much larger impact on productivity than non-research spending.

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PUBLIC SPENDING IN DEVELOPING COUNTRIES: TRENDS, DETERMINATION, AND IMPACT¹

Shenggen Fan and Neetha Rao²

1. INTRODUCTION

Many developing countries are currently undergoing substantial macroeconomic adjustments. It is not clear how such programs are affecting government expenditure and hence longer-term economic growth and poverty reduction. Thus, it is important to monitor trends in the levels and composition of government expenditures, and to assess the causes of change over time. It is even more important to analyze the relative contribution of various expenditures to production growth and poverty reduction, as this will provide important information for more efficient targeting of these limited and often declining financial resources in the future.

There have been numerous studies on the role of government spending in the long-term growth of national economies (Aschauer 1989; Barro 1990; Tazi and Zee 1997). These studies found conflicting results about the effects of government spending on economic growth. Barro was among the first to formally endogenize government spending in a growth model and to analyze the relationship between size of government and rates of growth and saving. He concluded that an increase in resources devoted to non-productive (but possibly utility-enhancing) government services is associated with lower per capita growth. Tazi and Zee also found no relationship between government size and economic growth. On the other hand, Aschauer's empirical results indicate that non-military public capital stock is substantially more

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important in determining productivity than is the flow of non-military or military spending, that military capital bears little relation to productivity, and that the basic stock of infrastructure of streets, highways, airports, mass transit, sewers, and water systems has most explanatory power for productivity. Many studies also attempted to link government spending to agricultural growth and poverty reduction (Elias 1985; Fan, Hazell, and Thorat 2000; Fan, Zhang, and Zhang 2000; and Fan and Pardey 1998). Most of these studies found that government spending contributed to agricultural production growth and poverty reduction.

The purpose of this study is to review and analyze the trends and causes of change in government expenditures and their compositions in the developing world, and to develop an analytical framework for determining differential impacts of various government expenditures on economic growth. We first review trends in and the composition of government expenditures across developing regions of Africa, Asia, and Latin America. We then model determinants of composition of government expenditures. Next, we model effects of government expenditures on gross domestic product (GDP) growth by estimating a GDP function and estimate the impact of various public capitals on agricultural GDP growth. We conclude with the study's major findings and recommendations.

2. GOVERNMENT SPENDING: TRENDS, SIZE, AND COMPOSITION

For the purpose of cross-country comparisons, we converted all government expenditures into 1995 constant international dollars. We collected data from 1980 to 1998 for 43 developing countries across Asia, Africa, and Latin America.³

TOTAL GOVERNMENT SPENDING AND COMPOSITION

Over the past two decades, government expenditures in 43 developing countries considered in this study experienced an erratic pattern. During the 1980s, expenditures increased from \$776 billion in 1980 to \$1,148 billion in 1990, with an annual growth rate of 4 percent (Table 1). In the 1990s, governments increased their spending power. By 1998, total expenditures reached \$1,790 billion, with an annual increase of 5.7 percent. There appears to be no obvious adverse impact of macroeconomic adjustments on government spending for these developing countries as a whole.

³ For detailed explanation of data sources and country coverage, please refer to Appendix 1.

Table 1—Government expenditures

	1995 international dollars, billions			Percentage of GDP		
	1980	1990	1998	1980	1990	1998
AFRICA	108.30	138.38	190.01	28.46	26.25	27.64
Botswana	0.78	2.32	3.49	29.82	33.80	35.94
Burkina Faso	0.61	1.03	2.19	12.20	14.98	22.89
Cameroon	2.33	4.34	3.50	15.74	21.17	16.18
Cote d'Ivoire	5.42	4.50	5.71	31.68	24.48	23.99
Egypt	41.78	39.36	58.9	50.28	27.81	30.12
Ethiopia	4.50	7.50	9.10	18.75	27.17	25.20
Ghana	2.05	3.09	6.36	10.89	13.25	19.40
Kenya	4.25	6.89	8.23	25.26	27.46	28.03
Malawi	1.16	1.11	1.29	34.59	26.55	22.90
Mali	1.01	1.38	1.69	19.44	25.00	22.72
Morocco	17.43	22.16	29.45	33.09	28.82	31.31
Nigeria	9.43	20.05	20.16	12.80	24.49	19.79
Togo	1.55	0.93	1.33	30.80	16.70	21.05
Tunisia	8.02	12.48	16.29	31.56	34.60	31.51
Uganda	0.90	2.11	3.70	9.47	15.60	16.15
Zambia	2.22	1.81	1.96	37.05	27.26	27.51
Zimbabwe	4.85	7.30	16.67	27.92	27.32	52.23
ASIA	454.70	789.30	1273.3	19.06	16.82	15.23
Bangladesh	5.63	13.37	24.02	7.41	11.06	13.77
China	196.65	289.63	538.01	27.20	16.63	13.60
India	93.45	215.02	299.43	12.25	15.96	14.37
Indonesia	45.55	70.12	97.55	22.13	18.36	17.88
Korea, Rep. of	30.80	68.80	129.81	17.28	16.22	20.24
Malaysia	17.73	33.41	39.53	28.49	30.12	21.76
Myanmar	5.97	6.86	5.34	15.85	16.03	7.71
Nepal	1.68	3.20	4.75	14.30	17.22	17.52
Philippines	25.10	43.54	55.81	13.36	19.60	20.38
Sri Lanka	10.50	10.84	14.36	41.36	28.37	25.02
Thailand	21.63	34.49	64.68	18.80	14.08	18.55
LAC	212.57	219.97	326.55	16.84	15.47	16.60
Argentina	57.78	28.77	68.29	18.23	10.57	15.41
Belize	0.12	0.24	0.32	22.87	28.40	28.50
Bolivia	2.11	2.17	4.05	16.09	16.38	21.90
Chile	13.68	14.41	27.63	28.01	20.38	21.57
Colombia	15.64	18.90	40.05	11.48	9.94	16.00
Costa Rica	3.12	4.05	6.30	25.04	25.61	29.06
Dominican Rep.	3.35	2.97	6.34	16.92	11.66	16.29
Ecuador	3.54	4.44	8.69	14.22	14.50	22.62
El Salvador	3.02	1.85	2.30	17.14	10.90	9.18
Guatemala	3.65	2.79	4.75	14.32	10.04	12.24
Mexico	78.67	106.82	112.81	15.75	17.88	14.88
Panama	2.73	2.43	4.27	30.53	23.70	28.51

Table 1—Government expenditures (continued)

	1995 international dollars, billions			Percentage of GDP		
	1980	1990	1998	1980	1990	1998
Paraguay	1.42	1.78	3.89	9.85	9.40	16.96
Uruguay	4.63	5.45	9.69	21.84	25.95	33.31
Venezuela	19.10	22.92	27.17	18.74	20.73	19.76
TOTAL	775.56	1,147.65	1,789.86	19.25	17.28	16.25

Source: Calculated using data from International Monetary Fund's (IMF) *Government Financial Statistics Yearbook* (various issues).

Regional deviations from these averages among developing countries were quite marked.

Across all regions, Asia experienced the most rapid growth, while Africa and Latin America increased at a much slower pace. In fact, most of the increase in total government expenditures came from Asia, accounting for 71 percent of total expenditures in 1998, up from 59 percent in 1980. This is due to the fact that most Asian countries experienced rapid growth in per capita GDP. With the exception of Sri Lanka and Myanmar, all countries in the region at least doubled their total expenditures for the period 1980–98. Republic of Korea and Bangladesh had the most rapid growth over 1980–98, followed by India and Thailand. Myanmar is the only Asian country to reduce its total government expenditures (by 11 percent) for the same period.

For African countries, expenditures grew at 3.26 percent over 1980–98. Growth was much slower in the 1980s, at 2.74 percent per annum. In fact, there was a brief contraction after 1982, and it was not until 1986 that total government expenditures recovered to 1982 levels, when many African countries implemented macroeconomic structural adjustments. However, during the 1990s African countries gained momentum in expanding government expenditures, growing at 4.3 percent per annum. Botswana had the most rapid growth, mainly due to the

outstanding performance of its national economy: more than 10 percent growth per annum during 1980–98.

Latin American countries had the slowest growth in spending between 1980 and 1998. There was virtually no growth in the 1980s, and rapid growth in the 1990s was primarily due to recovery from the decline in the 1980s. There were two contractions over the whole period. The first occurred between 1982 and 1984, with 18 percent reduction in spending. The second contraction was between 1987 and the early 1990s. Most of growth in the region in the 1990s was due to recovery from these two contractions.

Total government expenditure as a percentage of GDP measures the amount a country spends relative to the size of its economy. For countries in this study, the percentage declined from 19 percent in 1980 to 16 percent in 1998. On average, developing countries spend much less than developed countries. For example, total government outlays as a percentage of GDP in Organisation for Economic Cooperation and Development (OECD) countries range from 27 percent in 1960 to 48 percent in 1996 (Gwartney, Holcombe, and Lawson 1998), compared to 13–35 percent in most developing countries.

For Asia, the percentage declined from 19 percent in 1980 to 15 percent in 1998. There is a strong correlation between the level of economic development and government spending power in this region, with the exception of Sri Lanka. In 1998, Myanmar spent the least, only 8 percent of its GDP, while the rest of the Asian countries spent 13–25 percent of their GDP. The two largest economies in the region, China and India, spent the same amount relative to their GDP, about 13–14 percent.

Surprisingly, among the three regions, Africa spends the most as a percentage of GDP. Government spending as a percentage of GDP has been around 26–28 percent over the last two

decades, almost 10 percentage points higher than Asia and Latin America. Among all countries in the region, Botswana, Egypt, Tunisia, Morocco, Kenya, and Zimbabwe are among the largest spenders, often spending more than 30 percent of their GDP. Uganda and Cameroon spend only half as much, about 15–20 percent, the least among African countries in our study.

Latin America experienced an even more erratic spending pattern. The percentage increased at a rate of 2–3 percent per year until 1986, then declined thereafter at a rate of 1–2 percent per year from 1987 to 1991. After 1992, the percentage began another upward trend. For the region, the percentage averaged 16.6 percent in 1998, slightly higher than Asian countries. Costa Rica and Panama spend almost 30 percent, while El Salvador and Guatemala spend only 12 percent of their respective GDPs.

Equally important is the composition of government expenditures, which reflects government spending priorities. The composition across regions reveals many differences (Table 2).⁴

⁴ Comparison is made across six sectors, namely agriculture, education, health, defense, social security, and transportation and communication. Other sectors, such as mining, manufacturing and construction, fuel and energy, and general administration, are not included in our analysis and are collectively termed “other” expenditures.

Table 2—Composition of total expenditure, 1980 and 1998 (percent)

	Africa		Asia		Latin America	
	1980	1998	1980	1998	1980	1998
Total	100	100	100	100	100	100
Agriculture ^a	6.0	5.0	15.0	10.0	8.0	3.0
Education	12.0	16.0	14.0	20.0	16.0	19.0
Health	3.0	5.0	5.0	4.0	4.0	7.0
T & C	6.0	4.0	12.0	5.0	11.0	6.0
Social Security	5.0	3.0	4.0	3.0	19.0	26.0
Defense	12.0	10.0	18.0	11.0	7.0	7.0
Other ^b	55.0	57.0	33.0	47.0	35.0	32.0

Notes: T & C stands for transportation and communication.

^a Includes agriculture, forestry, fishing, and hunting.

^b Includes fuel and energy; mining, manufacturing, and construction; general administration.

Sources: Calculated using data from International Monetary Fund's *Government Finance Statistics* (various issues).

The top three expenditures for Africa in 1998 are education, defense, and health.

Although education expenditure is the largest (15.9 percent), the percentage is smaller than in Asia and Latin America. Defense accounts for 10 percent of total government expenditures in the region, similar to Asia but more than Latin America in 1998. On average, African countries spend only 5 percent of total government expenditures on health. This is particularly disturbing considering that HIV/AIDS is widespread among its general population. Another discouraging trend is that African countries spend very little on transportation and telecommunication compared to other regions, and their share in total government expenditures declined over time from 5.9 percent in 1980 to 3.9 percent in 1998.

Education spending is the largest among all government expenditures in Asia, accounting for 20 percent. It is not surprising that Asia has the highest quality of human capital among regions. Defense and agriculture spending rank second and third, accounting for 10 percent and 11 percent, respectively, of total government expenditures in 1998, reduced from 17 percent and 15 percent, respectively, in 1980. This indicates that as the economy continues to recover from the 1997 Asian Crisis, governments in the region may be spending less on health and social security, which are much needed to protect disadvantaged groups. Although defense spending declined from 17 percent in 1980 to 11 percent in 1998, the percentage is still high compared to Latin America, which spends 7 percent on defense, and is substantially higher than the region's spending on infrastructure, social security, and health.

For Latin America, social security spending ranks at the top of all government expenditure items, indicating that higher income inequality among population groups in the region may call for government intervention. In addition, Latin America spent 15–18 percent of total expenditure on education between 1980 and 1998. This region also spends more on transportation and infrastructure than any other region, accounting for 6.3 percent of total government expenditures in 1998. Agricultural expenditure accounts for a small fraction of total government expenditures (3.3 percent), mainly due to the small share of agriculture in national GDP.

Other expenditures (which include government spending in fuel and energy, mining, manufacturing and construction, and general administration) account for more than 50 percent of total government spending in Africa over 1980–1998. For Asia, the share of this type of expenditures increased from 33 percent in 1980 to 47 percent in 1998. For Latin America, it also accounts for more than 30 percent of total government spending. Most of these are either

government subsidies or expenses relating to general administration. The large and increasing share of these expenditures may have competed with more productive spending items such as agriculture, education, and infrastructure.

AGRICULTURAL SPENDING

Agriculture is the largest sector in many developing countries. More importantly, the majority of the world's poor live in rural areas and are primarily engaged in agriculture. Therefore, agricultural expenditure is one of the most important government instruments for promoting economic growth and alleviating poverty in rural areas of developing countries. Agriculture expenditures increased at an annual growth rate of 3 percent between 1980 and 1998 (Table 3). During the same period of time, rural population grew at approximately 1 percent per year, and agricultural GDP by 4.2 percent. Therefore, these saw a slight increase in agricultural expenditures per capita of rural population, and a decrease of agricultural expenditures per unit of agricultural GDP.

Table 3—Agriculture expenditure

	1995 international dollars, billions			Percentage of agricultural GDP		
	1980	1990	1998	1980	1990	1998
AFRICA	6.79	7.52	9.27	7.51	5.65	6.00
Botswana	0.08	0.15	0.16	26.37	47.79	45.15
Burkina Faso	0.03	0.06	0.05	2.08	2.79	1.52
Cameroon	0.05	0.18	0.10	1.22	3.58	1.16
Cote d'Ivoire	0.18	0.13	0.07	4.17	2.24	1.19
Egypt	1.82	1.86	3.32	12.56	7.13	10.38
Ethiopia	0.30	0.52	1.16	2.25	4.05	6.96
Ghana	0.25	0.13	0.21	2.30	1.21	6.07
Kenya	0.36	0.42	0.33	7.65	6.64	4.94
Malawi	0.12	0.12	0.09	8.97	7.34	4.73
Mali	0.09	0.02	0.01	3.77	0.93	0.19
Morocco	1.13	1.10	0.94	11.59	8.11	6.02
Nigeria	0.26	0.58	0.25	1.80	2.20	0.79
Togo	0.11	0.35	1.08	7.87	18.56	40.91
Tunisia	1.16	1.00	1.25	32.42	17.61	19.38
Uganda	n.a.	0.03	0.02	n.a.	0.38	0.23
Zambia	0.51	0.05	0.02	59.89	4.36	1.42
Zimbabwe	0.34	0.82	0.22	13.01	20.60	4.13
ASIA	67.22	97.7	132.60	9.58	8.62	8.18
Bangladesh	0.73	1.60	2.87	2.53	4.67	7.41
China	24.00	28.91	57.53	11.03	6.14	7.91
India	26.01	44.51	43.52	9.95	11.94	7.81
Indonesia	4.91	5.82	6.98	9.94	7.85	6.55
Korea, Rep. of	1.72	6.51	10.57	6.70	18.05	33.59
Malaysia	1.55	2.25	1.33	11.38	10.81	5.56
Myanmar	1.41	0.64	0.77	8.02	2.34	2.70
Nepal	0.27	0.27	0.29	4.05	2.99	2.82
Philippines	1.52	2.95	3.22	3.22	6.07	6.96
Sri Lanka	3.00	0.62	0.69	45.82	6.87	6.33
Thailand	2.09	3.60	4.83	7.82	11.77	12.38
LAC	16.84	6.89	10.71	12.67	4.81	7.22
Argentina	4.54	0.23	0.64	22.54	1.04	2.69
Belize	0.02	0.03	0.02	12.98	19.96	10.58
Bolivia	0.72	0.05	0.08	29.59	2.35	2.86
Chile	0.24	0.29	0.80	6.87	4.97	8.37
Colombia	0.06	1.18	0.52	0.21	3.32	1.53
Costa Rica	0.11	0.17	0.15	4.77	6.60	4.49
Dominican Rep.	0.48	0.43	0.59	11.99	12.55	12.92
Ecuador	0.26	0.18	0.40	8.51	4.36	8.07
El Salvador	0.18	0.10	0.06	2.62	3.45	1.95

Table 3—Agriculture expenditure

	1995 international dollars, billions			Percentage of agricultural GDP		
	1980	1990	1998	1980	1990	1998
Guatemala	0.16	0.12	0.12	2.48	1.64	1.38
Mexico	9.13	3.26	6.11	22.01	7.59	16.29
Panama	0.14	0.06	0.09	18.56	6.29	8.18
Paraguay	0.05	0.02	0.21	1.20	0.44	3.67
Uruguay	0.06	0.08	0.12	2.20	3.50	4.83
Venezuela	0.71	0.69	0.82	14.48	11.6	12.01
TOTAL	90.85	112.1	152.59	9.82	7.95	7.93

N. a. means not available.

Source: Calculated using data from International Monetary Fund's *Government Financial Statistics Yearbook* (various issues).

In Africa, government expenditure on agriculture increased gradually at an annual rate of 3.5 percent. Agricultural expenditures in Asia more than doubled in the past two decades, with an annual growth rate of 3.8 percent, the highest growth among the three regions. Latin America is the only region that reduced its spending in agriculture, with an annual reduction of 8.4 percent, and eight out of 15 countries included in this study reduced their government expenditures in agriculture.

Agriculture expenditure as a percentage of agriculture GDP measures government spending on agriculture relative to the size of the sector. Compared to developed countries, agricultural spending as a percentage of agricultural GDP is extremely low in developing countries. The former usually have more than 20 percent, while the latter average less than 10 percent. In Africa, agriculture expenditure as a percentage of agricultural GDP remained at relatively similar levels (7–8 percent) throughout the study period. About two-thirds of African countries decreased agriculture expenditure relative to agricultural GDP. Asia's performance was similar to that of Africa, as its percentage remained constant at 7.5–9 percent. For Latin

America, agricultural spending as a percentage of agricultural GDP hovered around 4–13 percent during 1980–1998.

The share of total government expenditures on agriculture provides important information on whether the agriculture sector received biased treatment under macroeconomic adjustment programs. For all countries in the study, the share gradually declined from 12 percent in 1980 to 9 percent in 1998. The share has been constant for Africa, indicating no effects of macroeconomic adjustment programs on agricultural spending. In Asia, the share declined from 15 percent to 10 percent for the study period. Latin America experienced the most rapid decline in its share, from 8 percent to a mere 3 percent, during the same period.

Among all types of agricultural expenditures, agricultural research and development is the most crucial to growth in agricultural and food production. Pardey and Beintema (2001) show that agricultural research and development (R&D) expenditures as a percentage of agricultural GDP saw a relatively stable increase in the last three decades. For example, in 1995, the share of agricultural R&D expenditure in agricultural GDP in Africa and Asia was between 0.53–0.85 percent, and Latin America's share was 0.98 percent. These rates are relatively low compared to 2–3 percent in developed countries.

3. DETERMINATION OF GOVERNMENT EXPENDITURES

In this section, we attempt to gain insights about government spending behavior with the aid of a model. Determination of total government spending and its patterns is complex and may include many factors, such as fiscal conditions and political, cultural and economic factors. In recent years, macroeconomic structural adjustment programs heavily influenced spending in many developing countries.

TOTAL GOVERNMENT SPENDING

How much a government can spend depends on its revenues and its ability to borrow from international and domestic sources. For many small developing countries, international aid also has become a significant source of government expenditures. The relative importance of these factors changes over time. In particular, when a government introduces budget cuts under the aegis of macroeconomic reforms and adjustments, spending patterns are likely to be affected. We use the following specification to model changes in government expenditures.

$$GEPGDP_t = f(RGDP_{t-1}, SA_t, X_t) \quad (1)$$

where $GEPGDP_t$ is government expenditure as a percentage of GDP at year t and $RGDP_{t-1}$ is government revenue⁵ as a percentage of GDP at year $t-1$. The one-year lag of the government revenue variable reflects the fact that in many developing countries, the amount the government can spend depends on revenues generated from the previous year. The variable SA_t is a dummy variable that is equal to 1 when macroeconomic adjustments are implemented and equal to 0 otherwise.⁶ Apart from revenue and structural adjustment variables, X_t captures the effect of other factors on government spending. Since it is difficult to quantify them, we use both year and country dummies to proxy these factors. To avoid the potential endogeneity of the independent variables of government revenue and structural adjustment programs, these two variables are also estimated as dependent variables in a system equation. The one-year lag of $GEPGDP_t$ and the two-year lag of $RGDP_t$ are used as independent variables in these two equations.

Regression results are presented in Table 4. We have four different specifications.

Regression 1 includes only revenue and structural adjustment program variables. In regression 2, we added GDP per capita ($GDPP_t$), and urbanization ($URBANP_t$) variables. These two variables

⁵ Government revenue includes current (tax and non-tax revenue), capital revenue, and grants, including foreign aid.

⁶ For the initiation years of structural programs by country, refer to Appendix 2.

illustrate how economic development levels affect government spending. Regressions 3 and 4 are results from variable coefficient models in which all parameters in the regressions vary by region. This is because determination of government expenditures may differ by region even after controlling for all variables in the equations.

Table 4—Determinants of total government expenditures

	R_1	R_2	R_3	R_4
$RGDP_{t-1}$	0.185 (8.530)*	0.179 (8.050)*		
Africa			0.331 (5.830)*	3.760 (3.880)*
Asia			0.150 (5.500)*	0.152 (6.790)*
Latin America			0.604 (6.420)*	0.589 (6.070)*
$GDPP_{t-1}$		-0.032 (-0.490)		
Africa				0.343 (2.700)*
Asia				-0.800 (-9.010)*
Latin America				-0.169 (-0.800)
$URBANP_{t-1}$		-0.406 (-1.840)*		
Africa				-1.403 (-6.470)*
Asia				2.970 (6.980)*
Latin America				-0.104 (-0.130)
SA_t	0.419 (4.500)*	0.452 (4.650)*		
Africa			0.370 (3.250)*	0.669 (3.880)*
Asia			0.150 (0.880)	0.281 (2.120)*
Latin America			0.539 (4.280)*	0.552 (4.280)*
R^2	0.713	0.710	0.720	0.870

Notes: The dependent variable is the percentage of government expenditures in total GDP. Figures in parentheses are t -values. Asterisk (*) indicates significance at the 10 percent level. All regressions included country dummies to capture country-fixed effects.

Results in regression 1 indicate that government expenditure is largely determined by revenue and structural adjustment. However, contrary to common belief, the latter was found to increase government expenditure (the coefficient of the structural adjustment variables is positive and statistically significant). Regression 2 shows that after controlling for GDP per capita and for urbanization, the structural adjustment program variable is still statistically significant and positive. When we break our analysis into regions, we find that for all regions, structural adjustments increased government spending. The only exception is Asia, when economic development variable is not controlled for.

COMPOSITION OF SPENDING

Some studies have analyzed the impact of composition of government spending on economic growth (Devarajan, Swaroop, and Zou 1996), but few have modeled the determination of composition. Understanding why certain countries spend more on one sector than others will help developing countries reallocate government resources to the most productive sector by focusing on major forces behind existing patterns. The composition of government spending is modeled in the following specification:

$$S_{i,t} = g(GEPGDP_{t-1}, GDPP_{t-1}, SA_t, Z_{i,t}) \quad (2)$$

where $S_{i,t}$ is the share of i^{th} sector⁷ in total government expenditure, $GEPGDP_{t-1}$ is a one-year lag of government expenditure as a percentage of GDP, $GDPP_{t-1}$ is a one-year lag of per capita GDP, and $Z_{i,t}$ comprises other factors that may affect government spending in the sector. Again, we use year and country dummies to proxy for Z and to control for other factors excluded from the equation. Similar to equation 1, we also endogenize the independent variables of

⁷ where S_1 = agriculture, S_2 = education, S_3 = health, S_4 = social security, S_5 = transportation and communication, and S_6 = defense.

$GEPGDP_{t-1}$, $GDPP_{t-1}$, SA_t as functions of lagged revenue and GDP variables. Regression results are presented in Table 5.

Table 5--Determinants of sector share in total government expenditures

	S_1	S_2	S_3	S_4	S_5	S_6
<i>GEPGDP_{t-1}</i>						
Africa	-0.098 (-3.750)*	-0.025 (-2.300)*	-0.003 (-0.450)	-0.020 (2.620)*	-0.028 (-0.680)	-0.003 (-0.230)
Asia	-0.004 (-0.300)	-0.021 (-2.700)*	-0.001 (-0.280)	1.104 (9.140)*	-0.098 (-0.980)	-0.023 (-1.430)
Latin America	0.042 (3.330)*	-0.001 (-0.060)	0.018 (1.860)*	-0.020 (-1.030)	-0.005 (-0.440)	-0.397 (-3.930)*
<i>GDPP_{t-1}</i>						
Africa		0.070 (3.940)*	0.003 (0.030)	-0.014 (-1.150)	0.074 (1.070)	-0.032 (-1.300)
Asia		0.021 (2.070)*	0.026 (3.450)*	0.365 (2.290)*	-0.013 (-7.290)*	-0.063 (-2.970)*
Latin America		-0.052 (-1.600)	0.027 (1.270)	-0.104 (-2.500)*	-0.014 (-0.550)	-0.280 (-1.560)
<i>SA_t</i>						
Africa	-0.028 (-1.790)*	-0.013 (-1.950)*	0.006 (1.300)	-0.005 (-1.050)	-0.076 (-2.870)*	-0.016 (-1.720)
Asia	-0.020 (-1.680)	-0.001 (-0.040)	-0.010 (-2.450)*	-0.031 (-0.360)	-0.008 (-0.800)	-0.010 (-0.830)
Latin America	0.003 (0.410)	-0.057 (-5.440)*	-0.010 (-1.700)	-0.020 (-1.600)	-0.029 (-3.870)*	-0.061 (-0.960)
<i>GDPSI_t</i>						
Africa	0.026 (1.170)					
Asia	-0.411 (-3.060)*					
Latin America	-0.004 (-0.340)					
R^2	0.570	0.720	0.840	0.520	0.530	0.220

Notes: S_1 = agriculture, S_2 = education, S_3 = health, S_4 = social security, S_5 = transportation and communication, and S_6 = defense. Figures in parentheses are t -values. Asterisk (*) indicates significance at the 10 percent level. All regressions include country dummies to capture country-fixed effects.

For all regressions, we disaggregated our analysis into regions. As total government expenditures increase, the share of agriculture expenditure (S_I) declines in Africa and increases in Latin America. For Asia, the relationship is statistically insignificant. The share of the agriculture sector in total GDP ($GDPS_I$) is not statistically correlated with government expenditure shares in agriculture in Africa and Latin America, but in Asia as the share of agriculture in total GDP declines, the share of expenditures on agriculture increases, implying that these countries may have started to protect their agriculture. The most important finding is that structural adjustments reduced government expenditure shares in the agriculture sector in Africa. But such a biased treatment from structural adjustment is not obvious in Asia and Latin America.

Results for S_2 (education sector) indicate that as a country becomes richer, the share of education expenditures becomes larger in Asia and Africa, evidenced by positive and statistically significant coefficients of $GDPP_{t-1}$ variables in the education shares equation. In Latin America, however, this relationship is not significant. Structural adjustments had no impact on education spending in Asia. However, education has suffered from structural adjustment programs in Africa and Latin America—the coefficient of the adjustment program variable is negative and statistically significant in these two regions.

The relationship of health expenditure share to government revenue and per capita GDP variables differs sharply among regions, as shown in regression S_3 of Table 5. In Africa and Asia, the relationship is negative and statistically insignificant. In Latin America, as the economy grows and revenues increase, governments increasingly spend more on health care. Structural adjustment programs had little impact on health shares in total expenditures in Africa and Latin

America. However, Asian governments reduced their spending shares on health as a result of structural adjustment programs.

Results from S_4 show that the shares of social security in total government expenditures in Africa and Latin America are generally negatively correlated with their economic development level (per capita GDP) or spending power (government expenditures as a percentage of GDP). By contrast, as economy and spending power expand, governments tend to spend more on social security in Asia. In all regions, the structural adjustment programs showed no impact on social security spending.

Structural adjustments had an adverse impact on government spending on infrastructure across all regions, although they are statistically insignificant in Asia (regression S_5 in Table 5). This implies that governments may have reduced infrastructure investment during macroeconomic structural adjustment programs, particularly in Africa and Latin America.

Defense expenditures as a share of total government expenditures had a negative relationship with the level of economic development in Asia and Latin America. In other words, poorer countries spent large shares of total government expenditures on military defense than less poor countries in the study. This inverse relationship is particularly strong for Asia. Structural adjustment programs reduced defense spending in all regions. However, this reduction is not statistically significant.

4. IMPACT OF GOVERNMENT SPENDING ON GROWTH

Many studies have analyzed how government expenditures contribute to economic growth (Barro 1990; Kelly 1997). However, they focused on the impact of total government expenditures and overall GDP growth. Very few studies attempted to link different types of

government spending to growth, and even fewer attempted to analyze the impact of government spending at the sector level. In this section, we first model the impact of different types of government spending on overall GDP growth, then analyze the effect of agricultural spending on agricultural GDP.

SPENDING AND OVERALL GDP GROWTH

We estimate a production function with national GDP as the dependent variable, and labor, capital investment, and various government expenditures as independent variables.

$$GDP_t = h(LABOR_t, K_t, KGE_{i,t}, SA_t, W_t) \quad (3)$$

where GDP_t is GDP at year t , $LABOR_t$ and K_t are labor and private capital inputs at year t , and $KGE_{i,t}$ is capital stock constructed from current and past government spending in the i^{th} sector with $KAGEXP_t$ representing government stock in the agricultural sector, $KEDEXP_t$ representing the education sector, $KHEXP_t$ representing the health sector, $KTCEXP_t$ representing the transportation and telecommunication sector, $KSSEXP_t$ representing the social security sector, and $KDEXP_t$ representing the defense sector. Usually this stock cannot be observed directly, so it serves more as a part of the conceptual apparatus than an empirical tool. To construct a capital stock series from data on capital formation, we used the following procedure:

$$K_t = I_t + (1 - \delta)K_{t-1} \quad (4)$$

where K_t is the capital stock in year t , I_t is gross capital formation in year t , and δ is the depreciation rate. Since the depreciate rate varies by country, we simply assume a 10 percent depreciation rate for all the countries. To obtain initial values for the capital stock, we used a similar procedure to Kohli (1982):

$$K_{1980} = \frac{I_{1980}}{(\delta + r)} \quad (5)$$

Equation 5 implies that the initial capital stock in 1980 (K_{1980}) is capital investment in 1980 (I_{1980}) divided by the sum of real interest rate (r) and depreciation rate.

Impact of structural adjustment programs on economic growth is captured by variable SA_t , and other factors not included in the equations are captured through the year and country dummies of W_t .

Results are shown in Table 6. Regression 1 (R_1) reports results by region when structural adjustment variables SA_t are excluded, while regression 2 (R_2) reports those with SA_t included. The labor and capital coefficients are positive and statistically significant for all regions. For government expenditures on agriculture, coefficients are positive and statistically significant in Africa and Asia. For Latin America, the coefficient is insignificant although positive. For education expenditure, the coefficients are positive and statistically significant only in Asia. This indicates that continued education investment in Asia will contribute greatly to GDP growth. Coefficients for Africa and Latin America are negative.

Table 6—Estimates of GDP function

	R_1	R_2
<i>LABOR_t</i>		
Africa	0.766 (15.790)*	0.812 (16.990)*
Asia	0.922 (6.210)*	0.871 (5.890)*
Latin America	1.092 (26.830)*	1.000 (17.260)*
<i>K_t</i>		
Africa	0.325 (10.190)*	0.312 (9.690)*
Asia	1.165 (11.230)*	1.171 (11.610)*
Latin America	0.784 (7.780)*	0.836 (8.190)*
<i>KAGEXP_t</i>		
Africa	0.052 (2.160)*	0.051 (2.150)*
Asia	0.076 (1.870)*	0.087 (2.160)*
Latin America	0.0198 (0.800)	0.007 (0.290)
<i>KEDEXP_t</i>		
Africa	-0.099 (-2.230)*	-0.107 (-2.420)*
Asia	0.283 (2.650)*	0.257 (2.410)*
Latin America	-0.083 (-1.800)*	-0.066 (-0.960)
<i>KHEXP_t</i>		
Africa	0.211 (6.170)*	0.219 (4.350)*
Asia	-0.081 (-1.390)	-0.089 (-1.530)
Latin America	0.176 (6.720)*	0.178 (6.900)*
<i>KTCEXP_t</i>		
Africa	0.021 (1.000)	0.021 (1.070)

Table 6—Estimates of GDP function (continued)

	R_1	R_2
Asia	-0.228 (-6.210)*	-0.225 (-6.180)*
Latin America	0.023 (0.930)	0.022 (1.070)
<i>KDEXP_t</i>		
Africa	-0.182 (-5.300)*	-0.173 (-5.070)*
Asia	0.122 (3.580)*	0.127 (3.790)*
Latin America	-0.085 (-3.810)*	-0.083 (-3.730)*
<i>KSSEXP_t</i>		
Africa	0.007 (0.300)	0.016 (0.620)
Asia	-0.017 (-0.990)	-0.016 (-0.920)
Latin America	-0.016 (-0.960)	-0.011 (-0.690)
<i>SA_t</i>		
Africa		-0.031 (-1.810)*
Asia		0.065 (2.990)*
Latin America		0.046 (2.370)*
R^2	0.997	0.998

Notes: The dependent variable is total GDP. Figures in parentheses are *t*-values.

Asterisk (*) indicates significance at the 10 percent level. All regressions included country and year dummies to capture country- and year-fixed effects.

The coefficient for health expenditures is positive and statistically significant in Africa and Latin America. In Asia, the coefficient is not statistically significant. The coefficient for social security spending in all regions is statistically insignificant. Similar to social security, transportation and communication expenditures did not have a positive and statistically

significant impact on economic growth. Defense expenditure had a very strong negative impact on economic growth in Africa and Latin America. Finally, structural adjustment programs increased GDP growth in Asia and Latin America but not in Africa.

AGRICULTURAL SPENDING AND GROWTH IN AGRICULTURE

Since agricultural growth has been one of the most effective ways for poverty reduction through the so-called “trickle-down” process, we estimate the determinants of agricultural growth in developing countries. We pay special attention to how government spending can promote growth in the agricultural sector. We include an explanatory variable in the agricultural production function that measures government expenditures on agriculture to identify output-enhancing effects of public expenditures. The production function to be estimated is specified as:

$$AGOUT_t = h(AGLAND_t, LABOR_t, FERT_t, TRACT_t, ANIMALS_t, IRRIP_t, ROADS_t, LITE_t, KAGEXP_t, SA_t, U_t) \quad (6)$$

where $AGOUT_t$ is agricultural output, the dependent variable; the independent variables are labor ($LABOR_t$), land ($AGLAND_t$), fertilizer ($FERT_t$), number of tractors ($TRACT_t$), number of draft animals ($ANIMALS_t$), and public input variables such as percentage of crop areas under irrigation ($IRRIP_t$), road density ($ROADS_t$), literacy rate ($LITE_t$), and an agricultural expenditure capital variable ($KAGEXP_t$). Impact of structural adjustment programs on economic growth is captured by variable SA_t . The variable U_t is used to capture the other factors not included in the equation, and is proxied by year and country dummies.

We further disaggregate government expenditures into research ($KAGREXP_t$) and non-research expenditure capitals ($NKAGREXP_t$) to capture separate effects of these two types of

expenditures. These capital variables are converted from government expenditures using procedures similar to those described in equations 4 and 5.

Output is measured as the agricultural output index reported by Food and Agriculture Organization (FAO), where agriculture is broadly defined to include crop, livestock, forestry, and fishery production. All these variables were incorporated into the estimating equation as indices and in logarithm forms to minimize bias that may arise from using different scales or units of input and output for each country.

Two different specifications were estimated, and the results are presented in Table 7. The first specification includes conventional inputs such as labor, land, fertilizer, machinery, and draft animals; physical public inputs such as irrigation, road density, and literacy rate; and a stock variable of total government expenditure on agriculture. The second specification disaggregates total agricultural expenditures into agricultural and non-agricultural research expenditures (total agricultural expenditures net of agricultural research expenditures). Due to the limited number of observations (21), we were unable to conduct this analysis at the regional level.

Table 7—Estimates of agriculture production function

	R_1	R_2
$KAGEXP_t$	0.0370 (3.1100)*	
$KAGREXP_t$		0.0430 (1.8700)*
$KNAGREXP_t$		0.0170 (1.0300)
$AGLAND_t$	0.4430 (3.1500)*	0.6480 (3.0500)*
$IRRIP_t$	0.2540 (7.1700)*	0.2450 (5.3300)*
$LABOR_t$	-0.0590 (-0.5400)	0.1660 (1.0400)
$FERT_t$	0.0560 (3.7000)*	0.0480 (1.4400)
$TRACTS_t$	0.0007 (0.0300)	0.0660 (1.7500)*
$ANIMALS_t$	0.1780 (3.0500)*	-0.0840 (-0.8900)
$ROADS_t$	0.1840 (3.0900)*	0.1770 (2.5600)*
$LITERACY_t$	0.0200 (8.1400)*	0.0170 (2.6300)*
R^2	0.9970	0.9980

Notes: The dependent variable is agricultural production index. Figures in parentheses are t -values. Asterisk (*) indicates significance at the 10 percent level. All regressions included country dummies to capture country-fixed effects.

Similar to the results in Table 6, total agricultural expenditures had a significant effect on agricultural GDP, as shown in the first regression of Table 7. The coefficients for all conventional inputs except labor and machinery are statistically significant. Insignificant coefficients of labor and machinery inputs imply that there may be a large surplus of labor in

rural areas. Physical public capital inputs, including roads, irrigation, and literacy rate, are all positive and statistically significant. This strongly suggests that broader rural investments in infrastructure and education contributed to agricultural production growth.

Disaggregating total agricultural expenditure into research and non-research expenditures reveals an interesting finding: although both their coefficients are positive, the coefficient for agricultural research is larger in magnitude and more significant in statistical level than non-research expenditures. This is *prima facie* evidence that productivity-enhancing expenditures, such as agricultural research investments have much larger output-promoting effects than other forms of public spending (including subsidies).

5. MAJOR FINDINGS AND RECOMMENDATIONS

In this study, we compiled government expenditures by types across 43 developing countries between 1980 and 1998. We then analyzed trends, determination, and impact of various forms of government spending. The following are the major findings of this study.

Total government expenditures for 43 countries included in the study increased over time. Macroeconomic adjustments do not seem to adversely affect total government spending. However, when we control for other variables and disaggregate the analysis into different regions, structural adjustment programs increased total government spending in almost all regions.

Structural adjustment programs had different consequences for different sectors. In Africa, governments reduced shares for agriculture, education, and infrastructure, while Asian governments reduced shares for agriculture and health. Education and infrastructure suffered from reduction in government expenditures in Latin America.

The performance of government spending in economic growth is mixed. In Africa, government spending in agriculture and health were particularly strong in promoting economic growth. Among all types of government expenditures, agriculture, education, and defense contributed positively to economic growth in Asia. In Latin America, health spending had a positive growth-promoting effect. Structural adjustment programs had a positive growth-promoting effect in Asia and Latin America, but not in Africa. In fact, structural adjustment programs hurt economic development in the region.

Agricultural spending, irrigation, education, and roads contributed strongly to growth. Disaggregating total agricultural expenditures into research and non-research spending reveals that research had a larger productivity enhancing impact than non-research spending.

Several lessons can be drawn from this study. First, various types of government spending have differential impacts on economic growth, implying greater potential to improve efficiency of government spending by reallocation among sectors. Second, governments should reduce their spending in unproductive sectors such as defense, and curtail excessive subsidies in fertilizer, irrigation, power, and pesticides. Third, all regions should increase spending in agriculture, particularly on production-enhancing investments such as agricultural R&D. This type of spending not only yields high returns to agricultural production, but also has a large impact on poverty reduction since most of the poor still reside in rural areas and their main source of livelihood is agriculture.

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APPENDIX 1: DATA SOURCES AND MEASUREMENT ISSUES

DEFINITION AND MEASUREMENT OF GOVERNMENT EXPENDITURES⁹

Total expenditure is broken down into various sectors following the International Monetary Fund's *Government Finance Statistics Yearbook* sectors. This study concentrates on six sectors, namely agriculture, defense, education, health, social security, and transportation and communication. Please see Appendix Table 1 for definitions.

To convert expenditures denominated in current local currencies into international dollar aggregates expressed in base year (1995), prices were first deflated from current local currency expenditures to a set of base year prices using each country's implicit GDP deflator. We then used 1995 exchange rates measured in 1995 purchasing power parity reported by the World Bank (2000) to convert local currency expenditures measured in terms of 1995 prices into a value aggregate expressed in terms of 1995 international dollars.

Data Sources

We included 43 developing countries from three regions in our analysis, partly reflecting availability of data and partly because these countries are important in their own right while representing broader rural development throughout all developing countries. The 17 countries included for Africa are Botswana, Burkina Faso, Cameroon, Côte D'Ivoire, Egypt, Ethiopia, Ghana, Kenya, Malawi, Mali, Morocco, Nigeria, Togo, Tunisia, Uganda, Zambia, and Zimbabwe. We included 11 countries from Asia: Bangladesh, China, India, Indonesia, Korea, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, and Thailand. For Latin America, we included 15 countries: Argentina, Belize, Bolivia, Chile, Colombia, Costa Rica, Dominican

Republic, Ecuador, El Salvador, Guatemala, Mexico, Panama, Paraguay, Uruguay, and Venezuela.

Total GDP, agricultural GDP, total population, agricultural population, employment and private investments by sector, road density, literacy rate, and information on structural change were taken from the World Bank database. Agricultural land, agricultural labor, irrigated areas, number of tractors, and number of draft animals were taken from the FAO database. The main sources for expenditure data reported here are International Monetary Fund's (IMF) *Government Financial Statistics Yearbook* (various issues), Asian Development Bank's (ADB) *Key Indicators of Developing Member Countries of ADB* (various issues), FAOStat Database (June 2000), the World Bank's *2000 World Development Indicators*, United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics for education data (<http://unescostat.unesco.org/>, December 1999), Inter-American Development Bank's (IDB) *Economic and Social Progress in Latin America* (various issues), and Asian Productivity Organization's *Public Expenditures on Agriculture in Asia* (1991). All data for agricultural research and development expenditures are taken from Pardey, Roseboom, and Beintema (1997).

For large countries such as India, Malaysia, Philippines, and Indonesia, both central and local government expenditures were reported by IMF sources. For many of the remaining countries, only central government expenditures were reported, either by IMF and other sources. This may not cause a serious problem for the broad, cross-country comparisons reported here because many of these countries have minimal local government expenditures or lack sub-national government entities. In addition, we estimated arithmetic averages and geometrically

extrapolated data for countries whose values were missing to ensure continuity of data. Please see Appendix Table 1 for a summary of these extrapolations by country.

Appendix Table 1—Data source and extrapolation

Countries	Expenditure data	Years extrapolated^a	SAP^b
AFRICA			
Botswana	<i>Data for all sectors and years available</i>		1991
Burkina Faso	Agriculture	1994–95	1989
Cameroon	Education	1998	1981
Cote d'Ivoire	Total expenditure	1981–83, 91–92	1991
	Agriculture	1981–84, 1986–98	
	Defense	1981–83, 1986–88	
	Education	1981–84, 1986–89	
	Social security, T&C	1981–83	
Egypt	Total revenue, total expenditure, Capital expenditure, agriculture, health, social security	1998	1993
Ethiopia	<i>Data for all sectors and years available</i>		1987
Ghana	<i>Data for all sectors and years available</i>		1980
Kenya	<i>Data for all sectors and years available</i>		1981
Malawi	Defense	1990–95	1990
Mali	Agriculture	1989–98	1988
	Defense	1989–90	
Morocco	Total revenue	1997–98	1986
	Transportation	1988–90	
Nigeria	Total revenue	1988–91	1983
	Total expenditure	1980–83	
Togo	T&C	1988–91	1988
Tunisia	<i>Data for all sectors and years available</i>		1987
Uganda	Total revenue	1987–88	1985
	T&C	1987–90	
Zambia	Defense	1984–88	1992
Zimbabwe	Agriculture, T&C	1990–92, 1998	1984
	Education, social security	1990–92	
	Health	1998	
ASIA			
Bangladesh	Total revenue	1990–92	1983
	Health	1986–88	
	T&C	1998	
China	Health	1998	1991
India	Social security	1998	1998
Indonesia	Social security	<i>1980–1993 n. a.</i>	1981
Korea, Rep. of	Agriculture	1998	
Malaysia	<i>Data for all sectors and years available</i>		

Appendix Table 1—Data source and extrapolation (continued)

Countries	Expenditure data	Years extrapolated^a	SAP^b
Myanmar	<i>Data for all sectors and years available</i>		
Nepal	<i>Data for all sectors and years available</i>		
Philippines	<i>Data for all sectors and years available</i>		
Sri Lanka	<i>Data for all sectors and years available</i>		
Thailand	<i>Data for all sectors and years available</i>		
LATIN AMERICA			
Argentina	Education	1986–88	1980
	Health	1980–88	
	Social security	1982–87	
Belize	Revenue, expenditure, agriculture, capital	1986–87	1985
	Agriculture, T&C	1998	
Bolivia	Agriculture, T&C	1985–86	1985
Chile	Agriculture	1989–90	
Colombia	Agriculture, T&C	1985–89	1985
	Defense, health, social security	1985–88	
Costa Rica	<i>Data for all sectors and years available</i>		1994
Dominican Rep.	T&C	1998	1991
Ecuador	Agriculture	1991–98	
El Salvador	<i>Data for all sectors and years available</i>		1982
Guatemala	<i>Data for all sectors and years available</i>		1983
Mexico	Agriculture, T&C, health, education, social security	1998	1987
Panama	<i>Data for all sectors and years available</i>		1989
Paraguay	<i>Data for all sectors and years available</i>		
Uruguay	Education	1982–85	
Venezuela	Education	1995–98	

Sources: IMF's *Government Finance Statistics Yearbook* (various issues) unless otherwise noted.

Data for China are taken from the *Chinese Statistical Yearbook* (various years). N.a. means not available.

Note: T&C is transportation and communication.

^aData were extrapolated using a five-year period.

^bYear of first structural adjustment program.

Appendix Table 2—Definitions of government and sectoral expenditures

Type of expenditure	Includes
Government revenue	Current revenue (tax and nontax revenue), capital revenue, and grants
Government expenditure	Central government (government departments, offices, establishments, and other bodies that are agencies or instruments); state, provincial, or regional government; local government; supranational authorities
Defense	Administration, supervision, and operation of military defense affairs and forces: land, sea, air, and space defense forces; administration, operation, and support of civil defense forces; administration of military aid; research and experimental development of defense
Education	Pre-primary and primary education affairs and services: administration, management, inspection, operation, and support of schools and other institutions providing training at these levels; administration of secondary education affairs and services: general programs and vocational and technical; administration of tertiary education affairs and services: university and other institutions providing tertiary education services; subsidiary services to education (other services for students regardless of level of education)
Health	Administration of general hospital affairs and services: management, operation, inspection, or support for hospitals that do not limit their services to a particular medical specialty; specialized hospital services (for a particular condition or disease); medical and maternity center services; nursing and convalescent homes; clinics, medical, dental, and paramedical practitioners; public health affairs and services (such as blood bank operations, disease detention centers, prevention services, and population control services); applied research and experimental development related to health and medical delivery system
Social security and welfare	Transfer payments, including payments in kind (to compensate for reduction/loss of income or inadequate earning capacity); administration, management, or operation of social security affairs involving chiefly provision of benefits for loss due to sickness, childbirth, or temporary disability resulting from industrial and other accidents—includes maternity benefits; administration, management, or operation of retirement, pensions, or disability plans for government employees, both civil and military and their survivors; administration, operation, and support of old age, disability, or survivor's benefits; unemployment compensation benefits; family and child allowances; welfare affairs and services (children's and old age residential institutions, handicapped persons, and other residential institutions)

Appendix Table 2—Definitions of government and sectoral expenditures (continued)

Type of expenditure	Includes
Agriculture, forestry, fishing and hunting	Administration of agricultural land conservation affairs and services, including: land reclamation and land expansion, land clearance, installation of drainage systems, provision of irrigation systems, reduction of salinity, outlays for construction of dams, dikes and irrigation canals, installation of equipment, management and operation of all physical works (as mentioned above), research and development; administration of agrarian reform and land settlement affairs and services: design, field management, operation, and evaluation of land reform and resettlement activities, extension of credit in connection with such activities, outlays to landowners whose title to the land was changed, research of land reform and resettlement; administration of affairs and services designed to stabilize or improve farm prices and farmers' incomes: subsidies or other forms of payments, research into design and efficacy of price support schemes; public information and statistics collected, administration of agricultural extension affairs and services, administration of veterinary affairs and services including research, administration of pest control affairs and other services; administration of forestry affairs and services including regulation of government forest operations and the issuance of tree-felling licenses; outlays in the form of loans, transfers, and subsidies; research into all aspects of forest management and exploitation; administration of commercial or sport fishing and hunting affairs and services; support for fish hatcheries or game preserves
Transportation and communication	Road transport affairs and services includes highway construction affairs and services (including loans, transfers, and subsidies; research into road design and construction methods); road system operation affairs and services (other than construction); water transport affairs and services includes: water transport facility construction affairs and services (including loans, transfers, and subsidies; research into water transport design and construction methods); water transport operation affairs and services (other than construction); railway affairs and services includes: railway facility construction affairs and services (including loans, transfers, and subsidies; research into railway transport design and construction methods); railway transport operation affairs and services (other than construction); air transport affairs and services includes: air transport facility construction affairs and services (including loans, transfers, and subsidies; research into air transport design and construction methods); air transport operation affairs and services (other than construction); pipeline

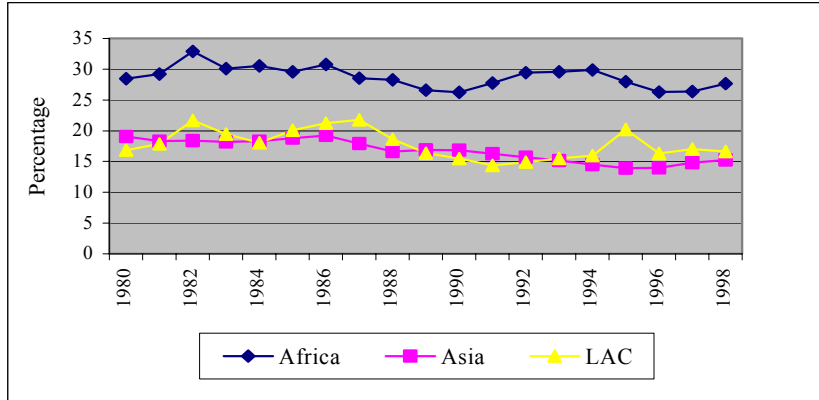
Appendix Table 2—Definitions of government and sectoral expenditures (continued)

Type of expenditure	Includes
	transport and other transport affairs and services (such as cable railways, aerial cables, funiculars, etc.); pipeline transport facility construction affairs and services (including loans, transfers, and subsidies; research into
	air transport design and construction methods); pipeline transport operation affairs and services (other than construction); administration of communication affairs and services (including loans, transfers, and subsidies; research into communication design and construction methods)

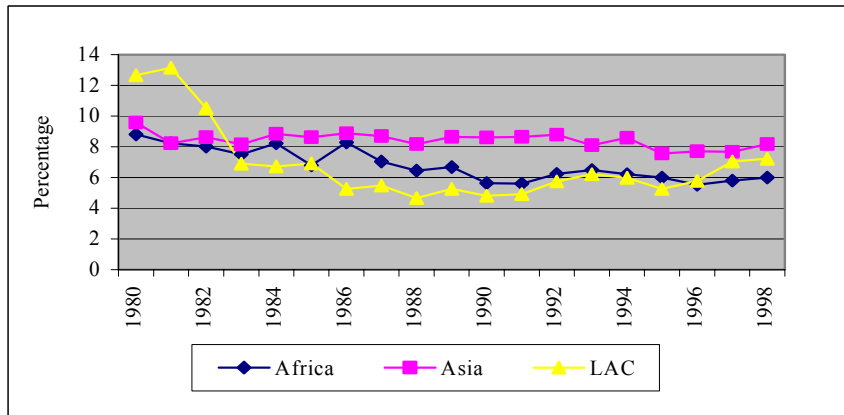
Source: *A Manual on Government Finance Statistics*, International Monetary Fund, 1986.

Appendix Figure 1—Government spending intensities

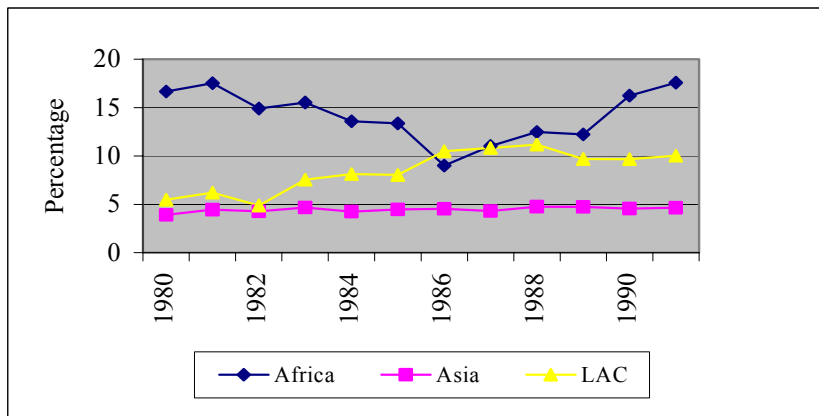
Percentage of government expenditure in GDP



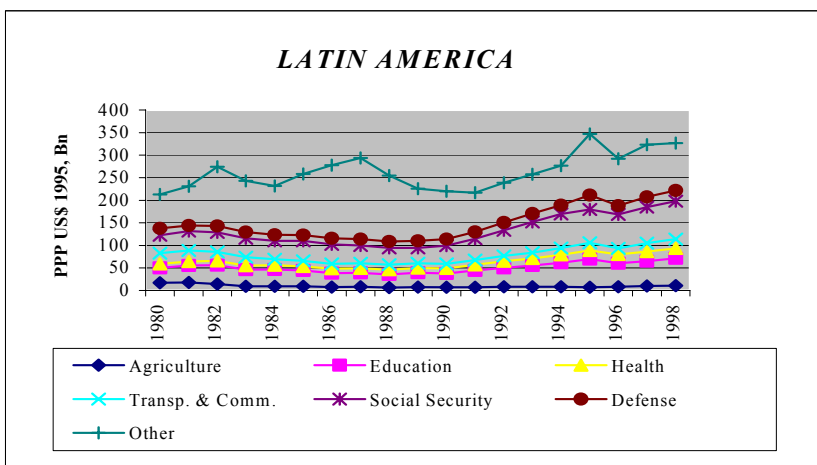
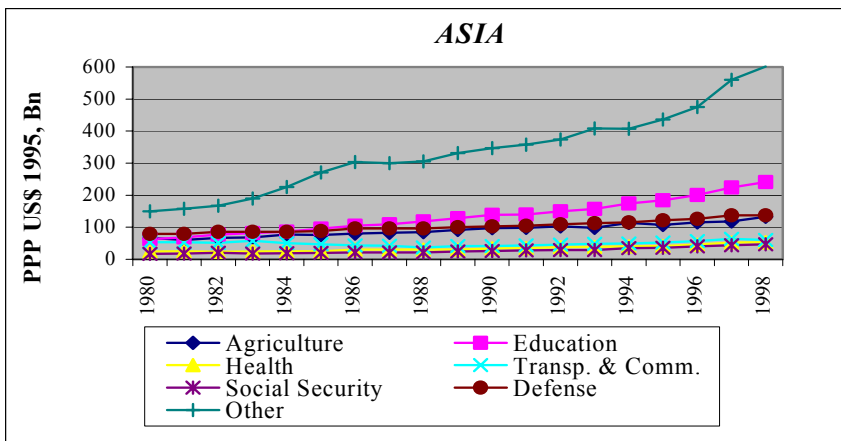
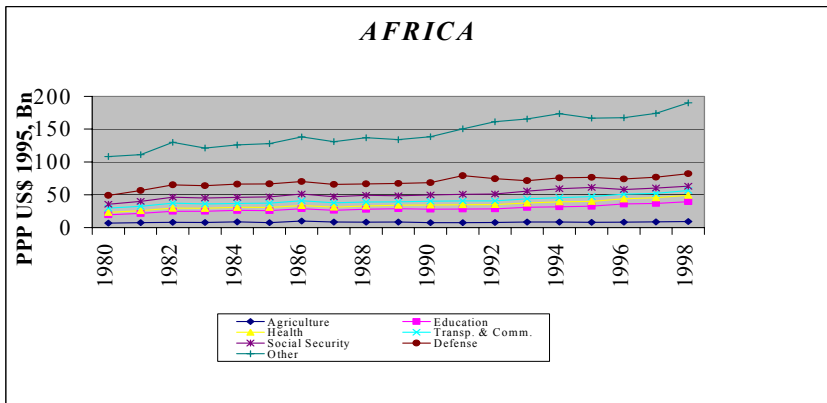
Percentage of agriculture expenditure in total AgGDP



Share of agricultural research expenditure in agriculture expenditure



Appendix Figure 2—Composition of expenditures by region, 1980–1998



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