CERAF

Center For Economic Research on Africa
School of Business
Montclair State University

Economic Analysis
of
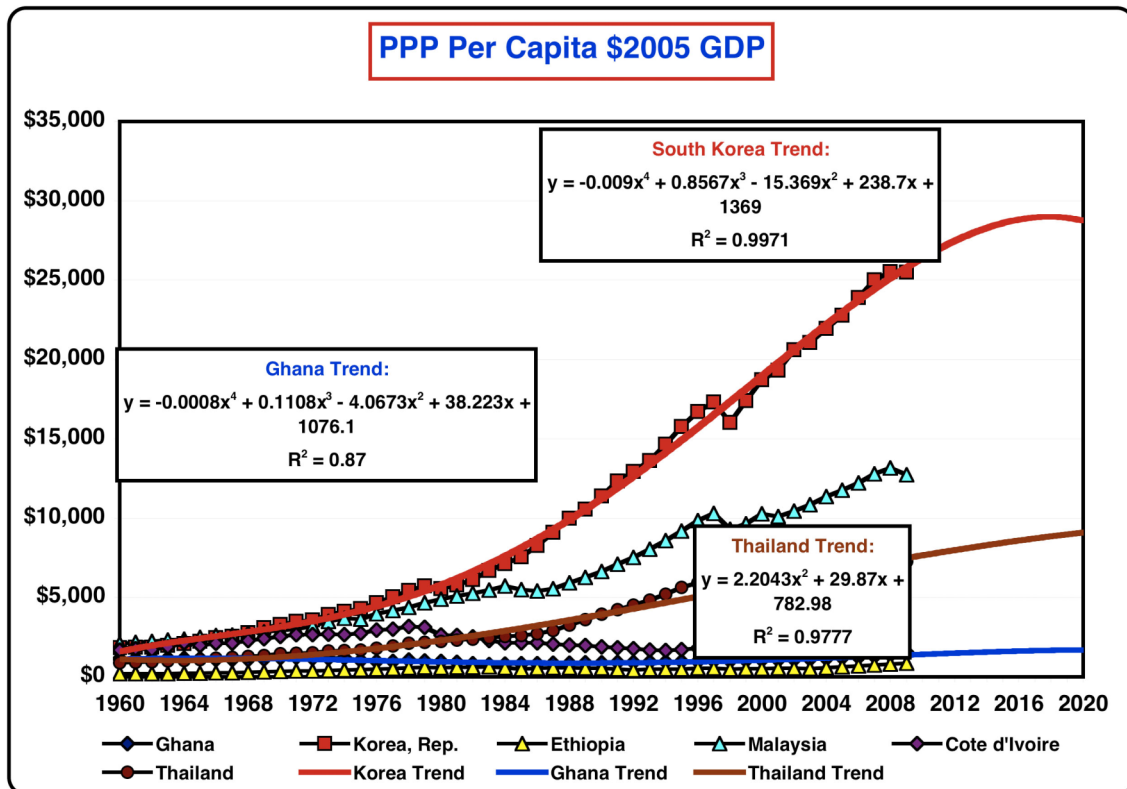# Development Projects

2011

Phillip LeBel, Ph.D., Director
Center for Economic Research on Africa
Montclair State University
(translated and updated from the French original version, ©1999)
e-mail: lebelp@mail.montclair.edu
internet: http://msuweb.montclair.edu/~lebelp/

The Economic Environment of Development Projects

1. Introduction

In developing countries, how investment projects perform is a critical factor in achieving economic growth. Properly conceived projects are crucial to success, but they also require a fully specified and coherent set of goals and means, as well as their placement within a suitable institutional framework if they are to succeed. The economic environment of development projects embraces the quantity and quality of available resources, how they are organized and deployed, and whether a country's national economic policies are designed to reward economic efficiency as a priority objective. To better understand the economic environment of development projects, we will examine the institutional framework of national economic policies in developing countries in general and in Africa in particular. As various concepts are introduced, we will link the macroeconomic environment to the microeconomic environment of development projects through use of a simple quantitative forecasting model.

Figure 1

PPP Per Capita $2005 GDP

South Korea Trend:
$y = -0.009x^4 + 0.8567x^3 - 15.369x^2 + 238.7x + 1369$
$R^2 = 0.9971$

Ghana Trend:
$y = -0.0008x^4 + 0.1108x^3 - 4.0673x^2 + 38.223x + 1076.1$
$R^2 = 0.87$

Thailand Trend:
$y = 2.2043x^2 + 29.87x + 782.98$
$R^2 = 0.9777$

Legend: Ghana; Korea, Rep.; Ethiopia; Malaysia; Cote d'Ivoire; Thailand; Korea Trend; Ghana Trend; Thailand Trend

Source: The World Bank, *World Development Indicators*

It is useful at the outset to ask whether development policies matter. Figure 1 provides one way of understanding the significance of development policies. In 1960, Ghana had a higher per capita GDP than Thailand. Moreoever, Ghana's per capita GDP was almost eighty percent of the level of per capita GDP in South Korea. By the end of the first decade of the twenty first century, differences across these countries became substantial. In 2009, while Ghana's per capita GDP in real purchasing power terms had increased by just under 23 percent, while Thailand's grew eight-fold, from $897 to $7,260. And South Korea, whose per capita GDP stood at $1832 in 1960, reached $25,593 in 2009, an increase of 1,391 percent. That per capita achievement also meant that South Korea, which had barely overcome a civil war in the 1950's had become one of the ten largest economies in the world in the space of 50 years. In short, development policies matter.

Development projects, particularly those in Africa during the course of the past thirty years since independence, have had a mixed record of performance. Informal estimates by the World Bank suggest that as many as half of all development projects do not achieve their objectives, with corresponding losses in terms of un-recovered funds. For well over a decade, the World Bank, working with other multilateral organizations of the United Nations such as UNDP, FAO, UNESCO, UNIDO, and WHO, with Africa-based organizations such as the African Development Bank, and with bilateral donor organizations such as U.S. AID, CCCE of France, and GTZ of Germany, have developed a framework of structural adjustment for overall lending operations in developing countries in general, and for African countries in particular.

The purpose of structural adjustment is to redefine the range and scope of public and private sector roles in the allocation of resources in such a way as to restore fiscal health to the public sector, and to enable African countries in particular to enjoy higher and more sustainable rates of economic growth than they have experienced in the past. As anyone familiar with structural adjustment programs can attest, reforms include a more restrained use of monetary expansion to reign in inflationary pressures, increases in depository interest rates to foster domestic savings, currency devaluations to stem import dependence and stimulate export expansion, increases in producer prices to stimulate domestic production, deregulation of price controls at the producer and consumer level, reductions in public subsidies for non-performing enterprises, privatization of state and para-statal enterprises, to name but a few examples. In virtually all cases, increased emphasis is given to market-based price incentives for economic efficiency, bringing government budgets into fiscal equilibrium, paring external public debt through decreased borrowing

by the public sector, and in general fostering indigenous institutional innovation to mobilize and channel domestic savings into the most productive investment sectors.

Despite the sometimes uneven pace of structural adjustment, the substantial changes that it can have on local formal sector employment, the effects on the mix of goods and services produced, and on the distribution of income, there is substantial evidence that countries which undergo structural adjustment programs are growing faster than those that have not done so. At the same time, while structural adjustment has its critics, because of the potential shift in international investment and aid from traditional developing countries to the newly evolving post-communist regimes in central and eastern Europe, there is a real risk that unless African countries can make structural adjustment a success, the loss of income and markets may slow down development in the region for several years ahead. Thus, how structural adjustment takes place in Africa, and how it shapes the relationship between the public and private sectors in participating countries, is central to the economic environment of development projects in the region.

2. Measuring Economic Development

At the most abstract level, one might ask the following question: "Regardless of the level of economic development of a country, what is the optimal mix of public and private sector roles in the economy?" To answer this question, one needs to ask what kinds of economic functions have governments been called upon to perform and do they generate outcomes that are consistent with sustainable economic growth. At the most basic level, one can begin by looking at the most common indicator of economic development, a country's Gross National Product (GNP), or what is more commonly used, its Gross Domestic Product (GDP). While there are broader measures, such as the human development index as developed recently by the United Nations Development Program and as published in its annual Human Development Report, a country's GNP or its GDP continues to serve as the most widely used measure of economic development.

Figure 2

The Circular Flow of the Economy
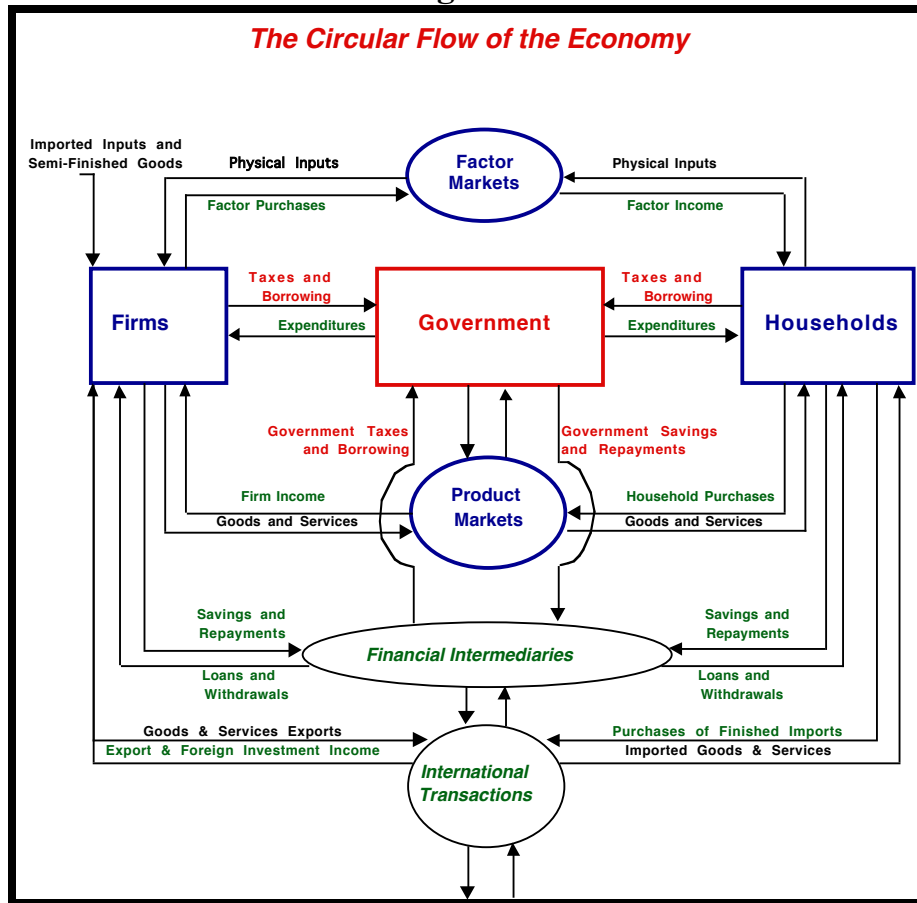
The reference for all national income and product accounting is the circular flow of goods and services. Figure 2 shows how the various sectors of the economy are linked through the national income and product accounts. The national income and product account measures of particular interest for our purposes are the Gross National Product, Net National Product, National Income, Personal Income, Disposable Income, and Gross Domestic Product.

2.a Standard National Income and Product Accounts: GNP, NNP, NI, PI, DI, and GDP

The Gross National Product is an estimate of the market value of all newly produced finished goods and services at current prices and exchange rates. It includes all income produced within its national borders as well as net factor income derived from abroad. The Gross Domestic Product measures the market value of all newly produced finished goods and services within a country's national borders. It does not include net factor income from abroad. In both cases, the market value of production includes the value of all exported goods and services minus the level of imported goods and services.

In terms of national income accounting, the Gross National Product can be defined as:

1. **GNP** = C + I + G + X - M, where:

    C = Personal Consumption Expenditures
    I = Gross Private Domestic Investment
    G = Government Expenditures on Goods and Services
    X = Exports of Goods and Services
    M = Imports of Goods and Services

The guiding principle of all national income accounting is to provide a consistent measure of the market value of goods and services and to do so without double counting any transaction. Personal consumption expenditures thus refer to finished goods and services purchases by the household sector of the economy.

At the firm level, since personal consumption of goods and services has already been taken into consideration, the residual amount of spending by firms is for plant and equipment investment, and is referred to as Gross Private Domestic Investment. Government expenditures on goods and services refers to purchases by all units of government, from the national to the local level, net of any transfer payments within the government sector and net of any transfer payments to the business and household sectors of the economy. Double accounting is avoided by concentrating only on purchases by government of goods and services net of these transfer payments.

A closely related measure to the Gross National Product is the Net National Product (NNP). It is the Gross National Product minus depreciation, sometimes referred to as the Capital Consumption Allowance, or:

2. **NNP** = (C + I + G + X - M) - D, where:

    D = Depreciation (or Capital Consumption Allowance).

A country's national income, or NI, is defined as its NNP minus indirect business taxes and non-tax liability, minus business transfer payments (as in dividends to shareholders), plus or minus any statistical discrepancy, plus government subsidies less the current surplus of government enterprises. Algebraically,

3.   **NI** = NNP - IBT - BTP +/- SD + GS +/- GEP, where:

NNP =	Net National Product
IBT =	Indirect Business Taxes
BTP =	Business Transfer Payments
SD =	Statistical Discrepancy
GS =	Government Subsidies
GEP =	Public enterprise profits (-) or losses (+)

In turn, a country's personal income, or PI, is defined as national income minus corporate profits with inventory and capital consumption adjustments, minus net interest, minus social security contributions (taxes), minus wage accruals less disbursements, plus personal interest income, plus personal dividend income, plus government transfer payments to persons, plus business transfer payments to persons. Algebraically, personal income is defined as:

4.   **PI** = NI - CP - Ni - SST - NWD + Pii + PDi + GTP + BTP, where:

CP =	Corporate Profits with inventory and capital consumption adjustments
Ni =	Net Interest Payments
SST =	Social Security Taxes
NWD =	Net Wage Disbursements
Pii =	Personal Interest Income
PDi =	Personal Dividend Income
GTP =	Government Transfer Payments to persons
BTP =	Business Transfer Payments to persons.

The final macroeconomic yardstick is disposable personal income, which is simply personal income minus personal taxes. Algebraically, disposable income is defined as:

5.   **DI** = PI - PT, where:
PT =   Personal Taxes

Conversion of a country's GNP to its GDP is straightforward. GDP is defined as a country's GNP minus receipts of factor income received from abroad plus payments of income made to the rest of the world. In short, it refers to the value of goods and services produced by residents within a country's national

boundaries, whereas GNP reflects the market value of a country's production of goods and services, whether produced within its borders or produced abroad. There has been an increasing use of GDP over GNP in recent years, largely because it correlates more closely to other measures of macroeconomic activity such as inflation and unemployment rates of the economy. Algebraically, GDP is defined as:

5. **GDP** = GNP + FPA - FRA, where:
   FPA = Factor payments to the rest of the world,
   FRA = Factor receipts from the rest of the world.

As the circular flow diagram of Figure 1 shows, a country's national income account, be it GNP, NNP, NI, PI, DI, or GDP, is based on the consistent aggregation of income and product flows by type of economic agent. National Income can be calculated in one of two ways, either by the market value of finished goods and services, or by the payment of income to all factors of production, which is its equivalent. Thus National Income can be defined as a country's GNP minus depreciation minus indirect business taxes, or it can be defined as the sum of factor payments to land, labor, capital, and entrepreneurship.

2.b Purchasing Power Parity (PPP) Measures of National Income and Product Accounts

In terms of comparative economic performance among individual countries, since economies differ by both geographic, industrial, and demographic size and scope, one common way of standardizing such comparisons is to derive a country's per capita GNP, its per capita NNP, its per capita NI, or its per capita PI or DI by dividing each of the national income aggregates by the corresponding level of population. Of course, such measures do not reflect differences in the composition of goods and services produced, nor do they reflect differences in living standards among countries. It is why economists in general, and the World Bank in particular, have modified estimates of per capita GNP and per capita GDP on a purchasing power parity (PPP) basis to derive more comparable units of measurement.

Constructing a Purchasing Power Parity Index of Economic Development involves a two-step process. Traditional comparisons of per capita GNP or GDP use only the market value of a country's goods and services, based on the existing functional expenditure relationships already defined, and converted into a common currency at existing market exchange rates. The difficulty in drawing comparisons, even when standardized on a per capita basis, is that the

composition of goods and services in any two countries is not likely to be the same.

To account for these differences, economists first construct a representative basket of goods and services for each country and then compare the cost of that basket in the home country with the country with which the comparison is being made. If it costs more in the home country to purchase the same basket of goods as it does in the comparison country, the nominal estimate of a country's GNP or GDP is lowered by the relative difference between the two countries. However, for this to be complete, a similar comparison is undertaken for the comparison country as well, using its representative basket of goods and services. Net differences in these relative comparisons then provide the basis for an adjusted measure of GNP or GDP, and which is denoted by a PPP prefix, as is shown in Table 2 below.

2.c The Human Development Index

Beyond the purchasing power parity measure of per capita GNP and per capita GDP, a number of economists have also decried the absence of any consideration of allied measures of human and social development. In response, the United Nations Development Program, through its annual Human Development Report, which it began publishing in 1991, has compiled an index of human development among countries. The Human Development Index, or HDI, uses a weighted grouping of several indicators to measure a country's level of well being. The HDI is based on a country's life expectancy at birth, its knowledge base as reflected in the level of adult literacy and the mean number of years of schooling achieved by the population, and a utility function measure of per capita income that incorporates a country's prevailing level of income inequality. Table 1 provides some international comparisons of all of these yardsticks as reported in the UNDP Human Development Report, while Table 2 provides a cross sectional profile of African countries.

Table 1
Global Regional Profiles of Human Development

	GDP PPP $Current billions, 2009	GDP $Current Distribution	GDP PPP $2005 billions, 2009	GDP $2005 Distribution	Population, 2009	Population Distribution, 2009	PPP Per Capita GDP in $2005	Life Expectancy at Birth, in years	Adult Literacy Rate, ages >= 15 years
East Asia & Pacific (all income levels)	$19,525	26.97%	$17,761	27.55%	2,183,049,317	32.22%	$8,136	73.42	90.68
Europe & Central Asia (all income levels)	$21,139	29.20%	$17,947	27.84%	887,905,757	13.11%	$20,213	75.38	93.11
High income: OECD	$37,787	52.19%	$33,792	52.41%	1,024,918,221	15.13%	$32,971	80.03	98.85
Latin America & Caribbean (all income levels)	$6,251	8.63%	$5,620	8.72%	578,877,469	8.54%	$9,708	73.59	69.78
Middle East & North Africa (all income levels)	$3,772	5.21%	$3,427	5.32%	376,579,930	5.56%	$9,102	71.44	67.74
South Asia	$4,658	6.43%	$4,230	6.56%	1,567,720,214	23.14%	$2,698	64.43	61.10
Sub-Saharan Africa (all income levels)	$1,817	2.51%	$1,650	2.56%	840,291,755	12.40%	$1,963	52.51	63.51
World	$72,398	100.00%	$64,475	100.00%	6,775,235,741	100.00%	$9,516	69.18	83.68

Source: The World Bank, *World Development Indicators*.

The significance of these development indicators is that they provide a rough yardstick in terms of international patterns of development at a given moment in time. Time series data for any one or group of indicators for a country or region provides a benchmark against which to assess both past and current policies, as well as to devise new ones for the future. Major international policy initiatives, such as the Economic Commission for Africa's Lagos Plan of Action statement of 1979, the World Bank's 1981 report, Accelerated Development of Sub-Saharan Africa, the United Nations Programme of Action for African Economic Recovery and Development (UNPAAERD, 1986-1990), the United Nations New Agenda for the Development of Africa in the 1990's (UN-NADAF, 1992), the New Economic Program for African Development (NEPAD), as well as similar bilateral initiatives all take as a starting point some combination of these development indicators as a measure of the magnitude of Africa's development challenge, the scope of strategic measures needed to respond, and of the resources needed to meet that challenge.

Table 2
Africa Development Indicators

	Population in 2009	Annual Growth Rate, 1960-2009	Projected Population in 2020	PPP $2005 PC GDP, 2009	PPP $2005 PC Growth Rate, 1980-2009	Projected PPP $2005 PC GDP, 2020	Life Expectancy at Birth, 2009	Annual Rate of Change, 1980-2009	Projected Life Expectancy, 2020	Improved Water Access Rate, 2008	Improved Sanitation Facilities Rate, 2008
Mauritius	1,275,323	1.35%	1,478,482	$11,658	4.01%	$17,964	72.64	0.33%	75.34	99.00	91.00
South Africa	49,320,150	2.15%	62,319,342	$9,333	0.22%	$9,559	51.62	-0.33%	49.78	91.00	77.00
Gabon	1,474,586	2.29%	1,892,106	$13,094	-0.90%	$11,850	60.87	0.39%	63.52	87.00	33.00
Botswana	1,949,780	2.72%	2,618,868	$12,154	4.41%	$19,542	54.95	-0.32%	53.05	95.00	60.00
Lesotho	2,066,919	1.83%	2,522,251	$1,333	1.68%	$1,600	45.35	-0.58%	42.56	85.00	29.00
Zimbabwe	12,522,784	2.49%	16,414,332				45.44	-0.89%	41.17	82.00	44.00
Congo, Rep.	3,683,182	2.67%	4,923,015	$3,848	0.95%	$4,271	53.71	-0.36%	51.64	71.00	30.00
Kenya	39,802,015	3.30%	56,894,562	$1,428	0.13%	$1,448	54.89	-0.17%	53.86	59.00	31.00
Madagascar	19,625,030	2.79%	26,554,432	$912	-1.19%	$799	60.79	0.80%	66.38	41.00	11.00
Zambia	12,935,368	3.00%	17,898,845	$1,299	-0.56%	$1,221	46.33	-0.39%	44.38	60.00	49.00
Cameroon	19,521,645	2.65%	26,041,445	$2,002	-0.02%	$1,998	51.36	0.02%	51.47	74.00	47.00
Ghana	23,837,261	2.60%	31,601,564	$1,410	1.25%	$1,616	56.82	0.23%	58.30	82.00	13.00
Namibia	2,171,137	2.65%	2,895,205	$5,821	0.58%	$6,201	61.58	0.22%	63.07	92.00	33.00
Cote d'Ivoire	21,075,010	3.77%	31,648,529	$1,545	-1.84%	$1,260	57.95	0.13%	58.78	80.00	23.00
Tanzania	43,739,051	3.04%	60,817,707	$1,237	0.11%	$1,252	56.29	0.40%	58.80	54.00	24.00
Congo, Dem. Rep.	66,020,365	3.02%	91,555,707	$290	-3.33%	$200	47.77	0.10%	48.29	46.00	23.00
Nigeria	154,728,892	2.55%	204,013,252	$2,001	0.63%	$2,144	48.14	0.25%	49.49	58.00	32.00
Liberia	3,954,979	2.73%	5,316,194	$360	-5.34%	$197	58.67	0.72%	63.51	68.00	17.00
Togo	6,618,613	2.98%	9,146,766	$772	-1.16%	$679	62.87	0.47%	66.23	60.00	12.00
Uganda	32,709,865	3.26%	46,558,657	$1,105	2.03%	$1,379	53.41	0.23%	54.75	67.00	48.00
Rwanda	9,997,614	2.57%	13,212,461	$1,032	0.83%	$1,129	50.59	0.34%	52.53	65.00	54.00
Senegal	12,534,228	2.90%	17,174,023	$1,650	0.40%	$1,723	55.89	0.57%	59.49	69.00	51.00
Ethiopia	82,824,732	2.69%	110,917,052	$848	1.27%	$975	55.66	0.82%	60.91	38.00	12.00
Eritrea	5,073,279	2.63%	6,748,152	$527	-1.10%	$467	59.85	1.06%	67.21	61.00	14.00
Angola	18,497,632	2.70%	24,798,962	$5,278	1.27%	$6,067	47.55	0.55%	50.52	50.00	57.00
Malawi	15,263,417	3.03%	21,204,598	$721	0.15%	$733	53.81	0.64%	57.70	80.00	56.00
Burundi	8,303,330	2.14%	10,482,366	$356	-0.65%	$331	50.87	0.30%	52.56	72.00	46.00
Central African Republic	4,422,397	2.23%	5,634,540	$688	-1.13%	$607	47.30	-0.08%	46.89	67.00	34.00
Sudan	42,272,435	2.66%	56,420,049	$2,007	2.40%	$2,606	58.48	0.58%	62.31	57.00	34.00
Mozambique	22,894,294	2.26%	29,285,251	$804	2.10%	$1,010	48.08	0.40%	50.26	47.00	17.00
Mauritania	3,290,630	2.78%	4,448,218	$1,751	0.06%	$1,763	56.97	0.27%	58.69	49.00	26.00
Benin	8,934,985	2.84%	12,153,908	$1,369	0.60%	$1,463	61.81	0.70%	66.75	75.00	12.00
Chad	11,206,152	2.75%	15,101,642	$1,181	2.12%	$1,487	48.93	0.05%	49.19	50.00	9.00
Somalia	9,133,124	2.43%	11,891,286				50.07	0.53%	53.08	30.00	23.00
Mali	13,010,209	1.95%	16,082,712	$1,077	1.22%	$1,231	48.81	0.69%	52.62	56.00	36.00
Niger	15,290,102	3.22%	21,658,989	$626	-1.36%	$539	51.95	0.96%	57.69	48.00	9.00
Burkina Faso	15,756,927	2.49%	20,653,069	$1,078	1.74%	$1,303	53.31	0.59%	56.88	76.00	11.00
Sierra Leone	5,696,471	1.91%	7,014,800	$734	-0.24%	$714	47.92	0.48%	50.49	49.00	13.00
Guinea	10,068,724	2.42%	13,095,315	$951	0.45%	$999	58.34	1.02%	65.20	71.00	19.00
Gambia, The	1,705,212	3.49%	2,486,305	$1,285	0.34%	$1,333	56.24	0.66%	60.46	92.00	67.00
East Asia & Pacific (all income levels)	2,183,049,317	1.51%	2,573,311,163	$8,136	4.10%	$12,664	73.42	0.42%	76.87	89.02	62.96
Europe & Central Asia (all income levels)	887,905,757	0.58%	946,514,251	$20,213	1.45%	$23,682	75.38	0.24%	77.39	98.01	94.11
High income: OECD	1,024,918,221	0.75%	1,112,140,990	$32,971	1.84%	$40,284	80.03	0.29%	82.65	99.59	99.55
Latin America & Caribbean (all income levels)	578,877,469	2.01%	720,740,889	$9,708	0.83%	$10,637	73.59	0.46%	77.36	93.37	79.36
Middle East & North Africa (all income levels)	376,579,930	2.64%	501,450,974	$9,102	0.88%	$10,028	71.44	0.66%	76.84	88.07	85.17
Sub-Saharan Africa (all income levels)	840,291,755	2.69%	1,125,526,045	$1,963	0.32%	$2,035	52.51	0.30%	54.26	59.74	31.31
World	6,775,235,741	1.65%	8,115,666,040	$9,516	1.66%	$11,408	69.18	0.35%	71.88	86.79	60.59

In terms of Africa's development progress, it stands as one of the poorest regions of the globe, with one of the lowest levels of life expectancy, the lowest level of educational achievement, the lowest level of literacy, and with

one of the lowest levels of human development, based on the UNDP's Human Development Index. That Africa's record of development has been so weak comes out of an environment where it has received some of the highest levels of international aid per capita, and with seemingly so little to show for either that international aid, or the domestic policies and resource decisions of the countries in the region. In terms of future policy choices, then, one needs to look not only at these comparative development indicators, but also at the range of these indicators within African countries, and to how variations in these indicators influence a country's level of development, be that in terms of its purchasing power parity measure of per capita GDP or its Human Development Index, or some combination thereof.

2.d Calculating the Level of Development

Based on the concepts thus far illustrated, let us now consider how we may compare the level of development of two countries, Esperie and Martou. Based on the information given below, derive the corresponding levels of GNP, NNP, NI, PI, and DI on a per capita basis for each.

Problem 1
(in billions of $U.S.)

	Esperie	Martou
Personal Taxes	200	450
Gross Private Domestic Investment	400	750
Net Government Personal Transfer Payments	100	25
Exports of Goods and Services	650	350
Depreciation	75	35
Social Security Taxes	130	220
Personal Consumption Expenditures	1200	2300
Imports of Goods and Services	300	550
Indirect Business Taxes	260	325
Government Purchases of Goods and Services	240	700
Government Subsidies	20	300
Public Enterprise Gains(+)/Losses(-)	15	175
Statistical Discrepancy	30	73
Personal Interest Income	120	20
Business Transfers to Individuals	300	15
Net Interest Payments	35	15
Personal Dividend Income	136	24
Factor Payments to Rest of World	30	20
Factor Receipts from Rest of World	45	15
Net Wage Disbursements	18	33
Population (in millions)	4.5	3.25
Literacy rate index	0.75	0.55
Life Expectancy index	0.54	0.63
Income Distribution Coefficient	0.54	0.33

Standard Estimates of National Income

	Esperie		Martou	
	Total	Per Capita	Total	Per Capita
1. GNP =				
2. GDP =				
3. NNP =				
4. NI =				
5. PI =				
6. DI =				

Consider now the following comparison. Based on purchasing power parity estimates, Esperie's purchasing power parity adjusted figures are 160 percent of their nominal levels, while Martou's are 65 percent. Recalculate in the space below the purchasing power parity estimates of the corresponding national income accounts in the space below

Problem 2
Purchasing Power Parity (PPP) Estimates

	Esperie		Martou	
	Total	Per Capita	Total	Per Capita
1. GNP =				
2. GDP =				
3. NNP =				
4. NI =				
5. PI =				
6. DI =				

As a third estimate, consider an index of human development, based on each country's literacy rate index, its life expectancy index, and its income distribution coefficient. Consider first the estimate of human development based on the simple mean of the three indices for each country and enter the corresponding values in the table below. Then, if a higher value of the inequality index is considered undesirable (its range being interpreted as 0 representing absolute equality and 1 representing absolute inequality), using the complement of the inequality index (i.e., 1 minus the inequality index), calculate the corresponding index based on the simple mean. Third, if the respective weights for each component of the human development index are 10, 70, and 20 percent, derive the corresponding human development index for each country in the space below.

Problem 3
Human Development Indices

	Esperie Total	Martou Total
Simple Mean HDI		
Inequality Adjusted Simple Mean HDI		
Weighted Inequality Adjusted Mean HDI		

The final adjustment we want to consider is how to make comparisons of a country's development performance over time. Economic growth is measured as changes in a country's GDP (or GNP). A country's annual growth rate is the absolute change in GDP from one year to the next divided by the base year and multiplied by 100. Thus, if GDP in year zero is 105 and is 115 in year one, the annual rate of growth is $((115-105)/(105)) \times 100$, or 9.52 percent. A short-cut is to derive the compound rate of growth by taking the ratio of 115 to 105, which yields 1.0952.

Calculating a country's rate of growth over time requires application of a compound rate of growth formula. To derive the value of GDP in year n, one uses the following:

$$GDP_n = GDP_0(1+r)^n, \text{ where:}$$

$$GDP_0 = \text{GDP in period 0,}$$
$$GDP_n = \text{GDP in period n,}$$
$$r = \text{the corresponding rate of growth.}$$

As an example, if a country's GDP in year zero is 200 and is growing at 5 percent a year, at the end of 10 years, GDP will be 325.78.

As a variant of the above formula, suppose one is interested in deriving the underlying rate of interest, or growth rate, when the beginning and endpoints of a country's GDP are known. By taking the ratio of GDP in period n to GDP in period 0 one has the compound growth rate expression on the right hand side. Next, taking the natural logarithm of the ratio of the respective GDP's leaves the right hand side as $n(1+r)$. Then, dividing the logarithm of the ratio of the respective GDP's by n leaves the corresponding natural logarithm of $(1+r)$. Taking antilogarithm of this value yields the compound growth rate of GDP for the given time span. The corresponding summary equation is:

$(1+r) =$ $\exp(\ln(Pt/Po)/n)$.

Problem 4

If Esperie's GDP in period 0 is 300 and is 700 ten years later, what is the annual rate of growth in GDP over the given time period?

Even with calculation of a country's GDP growth rate for any given set of time periods, we also need to take into account the distorting consequences of inflation, or a change in the general level of prices. There are several methods for tracking the impact of inflation, and which can then be used to derive a country's real level of GDP, to distinguish it from the country's current price, or nominal GDP. The most common one is through use of a price index, and the most widely used price index is referred to as a Laspeyres index. A Laspeyres index takes a fixed basket of goods and services in a base year, and then calculates the cost of this basket over time. With the base year cost set at 100, future year costs as a percentage of base year costs are multiplied by 100 to derive the price index for the corresponding year.

As an example, consider the following prices and quantities for two different periods, and the corresponding Laspeyres price index values.

Category	Quantity	Base Period Price	End Period Price
Food	20	30	65
Clothing	13	20	25
Housing	40	40	30
Health care	17	20	85
Transportation	8	12	16
Education	5	15	36
Recreation	2	20	30

Base period total expenditures are 3011, and end-period expenditures are 4638. If base year expenditures are set at 100, if we take the ratio of end-period to base period expenditures, we have 1.5404. Multiplying this ratio by 100 yields 154.04. This means that it now costs 54.04 percent more to buy a fixed basket of goods and services at the end period in comparison to the base period.

If we have a price index, or price deflator for a country's GDP over time, we can now derive the corresponding real, or constant purchasing power equivalent, level over time, and derive the corresponding real rate of growth in

GDP. Let us return to Esperie's nominal GDP values of 300 and 700 ten years later. If the corresponding GDP price deflator is 110 in the base period (the price index being based on prices in a prior time period different from the base year for GDP) and is 180 in the terminal time period, real GDP for the two different periods is calculated as nominal GDP divided by the corresponding price deflator, and the quotient is multiplied by 100. Thus,

$$(300/110) \times 100 = \ 272.72 = \text{real GDP in the base period}$$
$$(700/180) \times 100 = \ 288.89 = \text{real GDP in the end period.}$$

If we now recalculate the annual rate of growth in real GDP, it is now estimated to grow at only 3.61 percent, the difference between this value and the nominal rate calculated in problem 4 representing the distorting effect of inflation.

As one further adjustment, policymakers may be interested in deriving real rates of growth based on estimates of GDP expressed in dollars of the terminal time period. Two methods may be used. One is to reconstruct a price index based on today's purchasing profile and re-calculate that basket for all prior time periods. The resulting index is known as a Paasche index. Since policymakers typically do not generate Paasche indices, a short-hand approximation can be derived by calculating the ratio of the prior Laspeyres index to the end value of the Laspeyres index and to multiply each corresponding quotient by 100. As an example,

Original Laspeyres Index	Modified Laspeyres Index
120	$(120/220) \times 100 = 54.55$
130	$(130/220) \times 100 = 59.09$
150	$(150/220) \times 100 = 68.18$
170	$(170/220) \times 100 = 77.27$
190	$(190/220) \times 100 = 86.36$
220	$(220/220) \times 100 = 100.00$

When the modified Laspeyres index is used to adjust nominal GDP, the corresponding real GDP values are expressed in the most recent year's currency value.

Problem 5

Calculate the annual rate of growth of real GDP based on the modified Laspeyres index using the following information:

Year	Nominal GDP	Mod. Laspeyres	Real GDP
0	275	20	_____
10	800	180	_____

Annual Rate of Growth in Real GDP   _____

3. Defining the Optimal Mix of Public and Private Sector Institutions

As already noted, structural adjustment programs in general, and in Africa in particular, have been driven by an increased emphasis on market incentives to enhance economic efficiency. A popular strategy in many African countries in the 30 years since independence has been to rely on extensive use of public sector intervention to accelerate both the transformation of economic production as well as to pursue economic growth. By and large, such extensive public sector intervention has worked poorly at best. Precisely because it has worked so poorly, structural adjustment has placed a major emphasis on enhancing the role of the private sector in the economy, ranging from broad scale deregulation of producer and consumer prices, to market determined rates of interest, market determined exchange rates, and with a strong emphasis on privatization of public sector enterprises.

While Africa's private sector does have a positive and important role to play in the development process, what remains to be answered is what should be the optimal mix of the public and private sectors within the context of structural adjustment. To provide some perspective to this issue, let us consider five economic functions which governments in all economies have been called upon to perform. In looking at these functions, we will see that the extent to which these functions should be pared or sustained turns largely on how efficient markets are in absorbing critical information to the allocation of resources. In addition, we also will see that where public sector intervention may have been appropriate in some historical circumstances, changes in the level and distribution of information, as well as in the quality of information technology, suggest that markets are far more efficient in handling many complex issues of resource allocation than at first it may appear. What this will leave, then, is a core set of functions appropriate to public sector support, and which is common to both developed and developing countries alike.

The five economic functions, which the public sector has been called upon to perform, have varied in level and scope among countries throughout time. Rather than look at the individual historical experience of any one country, we will look at the economic rationale for these functions in terms of some common examples, as well as draw conclusions as to what they portend for the future. The five economic functions, which are listed below in essentially historical sequence, are as follows:

    a. Create and establish economic institutions and rules to strengthen a market-based allocation of resources;

    b. Promote socio-economic justice;

    c. Provide for a market competitive-equivalent structure for product and factor markets;

    d. Provide for an optimal composition in the allocation of resources;

    e. Promote economic stabilization and growth.

To the extent that each of these functions can be justified in economic terms, they imply that markets are inadequate to meet these goals. Where markets appear inadequate in meeting such goals, one has an a priori case of "market failure" in the sense that market signals provide for a misallocation of resources. The other side of this proposition is that while markets may be inadequate in solving fundamental problems of economic scarcity, government intervention does no better, and may in fact leave society worse off. To the extent that this is true, one has a case of "government failure" to meet a broad set of social objectives as embodied in the above listed functions.

3.a Government as Arbiter of a Market-Based System
Let us consider briefly the nature of each function. The first refers to government as an umpire or referee in the marketplace. It does not imply an activist role for government, but rather one in which the setting of clearly defined rules can foster a more efficient allocation of resources. Two examples underscore this function. One is the determination of various types of business organization, notably, corporations, partnerships, and proprietorships. Corporations, which date back to 17th century Dutch and English innovations, provide an efficient mechanism for raising capital. They do so by separating ownership from liability, and the fact that the Dutch and English pioneered in their development had much to do with the commercial

success of these two countries well before the industrial revolution of the 18th century.

As a simple contrast, when Columbus sought funding for his exploratory voyage to the new world toward the end of the fifteenth century, the corporate business structure had not yet been developed. Had it been available, Columbus might have made his voyage some 20 years earlier, to the evident benefit of investors. Instead, Columbus had to engage in a frustrating search for funding, turning only at last to the Spanish monarchy, which understood little of what we would today clearly call a case of venture capital. While governments have adopted statutes defining the rights and responsibilities of corporations, they have responded largely to pressures from the business community for such types of business organization, thus enhancing the efficiency of markets.

As a second example, in the early years of the 20th century, the Chicago meatpacking industry was wracked by scandal, by unsanitary working conditions, and by serious risks to worker health. Upton Sinclair published *The Jungle* in 1906, a journalistic exposé of these conditions, which led soon thereafter to the creation of the U.S. Food and Drug Administration in 1908. The FDA is charged with the responsibility of examining food and drug production standards, thereby providing protection to the consuming public for goods whose contents may be sealed, or whose direct and indirect effects may be unknown. When Sinclair published his book, the U.S. population had a low literacy rate, had no radio or television communication, and which thus seemed to justify such an oversight role by a public agency such as the FDA.

In contrast, two recent cases illustrate that an oversight function can be redundant in the presence of a high level of information available to all. The two cases involved Tylenol, a popular over the counter aspirin substitute, and Pepsi Cola, a popular soft drink. In the former case, a disgruntled employee tampered with a few packages of Tylenol and placed arsenic in them, thereby causing what seemed to be random fatalities to a few unsuspecting consumers. Within the space of a week, not only was this event broadcast on all major radio and television stations throughout the United States. The manufacturer also took out an expensive recall campaign in the media, asking consumers to return their supplies free of charge in exchange for either a cash exchange or a tamper-proof replacement that the company soon put on the market.

The second case involved the apparent discovery a syringes in Pepsi Cola cans, which again was broadcast on national radio and television within a

short space of time. The company undertook an investigation and discovered that a hoax had been perpetrated, after which the issue evaporated in a matter of days. In both instances, the reputations of major brand name producers were at stake, and consumers were informed rapidly of the threat to product integrity. Congress in general, and the FDA in particular, did not undertake any oversight measures in either instance, thus pointing up the importance of how improved information can enhance the role of markets in matching supply and demand. What these examples do not resolve is just what kinds of products are likely to function best within such market driven circumstances, especially in developing countries where the quality and quantity of information can be substantially different. As a counterexample, infant milk formula has been sold in many developing countries to mothers who for various reasons have not followed fully the prescribed dosage allowances, with the result that many children have been at greater risk of malnutrition than where infant formula has not been used.

Manufacturers such as Abbott Laboratories and Nestlé, both producers of infant formula products, have tried to combine commercial self interest with an evident need to provide more extensive consumer information and orientation than would be the case in developed countries. Having made this comparison, however, it does not follow that just because a commercial product is available on a local market, that extensive regulation by a public sector entity is warranted. Were Abbott and Nestlé to continue to experience malnourished children in the markets in which they sold their products, parents in general, and mothers in particular with either modify their use of infant formula to the prescribed directions on each can, or revert to nursing as a traditional method. For mothers with problems of lactation, and where wet nurses are not generally available, this leaves open the question of to what extent can commercial infant formula products satisfy both consumers and the producers of these products in a mutually satisfactory way.

What these examples illustrate is that where commercially available information exists, the need for public sector intervention is diminished. While it leaves open how such information is generated, how much it costs, and how it is distributed between producers and consumers, before one calls for public sector intervention, the relevant test should be to what extent is the equivalent amount of information essential to a prudent economic decision less costly when generated through market processes than when generated through public sector institutions.

3.b Promotion of Economic Justice

The second economic function is both well known and widespread. The underlying assumption here is that in an economy where economic agents do not all have the same information, skills, or talents, the underlying distribution of income and wealth generated by any production cycle will not necessarily provide for a socially just outcome. Defining economic justice is a complex task, requiring that one take into account both process and outcomes. Economists and economic philosophers have written much since the days of the ancients as to whether markets provide for economic justice. As long as markets are competitive in some generally defined sense, then the process of generating a particular distribution of income can be seen as fair, without calling on any particular need for corrective action. On the other hand, if the process is somehow not seen as fair, then the outcome is also considered unfair, in which case some form of public sector intervention is in order.

Economic policy in most countries does not always draw a clear distinction between process and outcomes, and leaves to the public sector some form of responsibility for implementing a vision of social justice. Governments do so in the form of progressive income and wealth taxes, and in the form of various transfer programs whose nominal beneficiaries are the designated poor. It should be noted that governments have not always been called upon to perform this function, even when markets may have been perceived as inequitable.

In the nineteenth century, while some governments moved to create poorhouse legislation on behalf of the indigent and homeless, providing for the poor was viewed largely, for better or worse, as a private sector responsibility, with religious institutions often filling the role in providing for clothing, shelter, and food. The novels of Charles Dickens and of Victor Hugo speak to the scope and consequences of these arrangements as they prevailed in the nineteenth century, while in the twentieth century, governments have embraced a broad variety of welfare state measures to address issues of poverty and income inequality.

What remains unanswered, and can not be readily answered within the framework of the tools of economic analysis, is what is the optimal distribution of income. All societies must grapple with the implicit tradeoff between overall mean levels of per capita income and the corresponding distribution of that income, both in and across time. To the extent that a society can achieve relative degrees of equality in the distribution of income

while at the same time enjoy rising standards of living is the implicit goal that shapes social welfare policy in most countries, even though the conditions essential to do so are neither obvious nor necessarily available. What is clear is that for many developing countries in Africa, engaging in broad-based policies of income redistribution is something which most governments have been equipped to perform, especially when considered against the other responsibilities and functions which these governments have been called upon to perform.

3.c Promoting Competition as a Path to Economic Efficiency
Economic theory tells us that the more competitive is an economy, the more efficient it will be. In the most general sense, a competitive economy translates into an efficient economy by providing the maximum level of output of goods and services at the lowest possible cost to society. This seemingly obvious statement has been interpreted quite differently in different contexts and at different points in time. Again, the issue of information pertaining to resource decisions is central to the notion of competition and economic efficiency, and how information is generated and distributed has much to do with whether markets can become efficient. At the most abstract level, economic theory posits a competitive market structure with an infinite number of buyers and sellers such that no single buyer or single seller has any significant influence over output or price.

Competition in this sense is atomistic, given the large numbers of agents. It also presumes perfect information among all agents, and *in extremis*, thus obviates the need for advertising, so perfectly endowed with all pertinent information is every buyer and seller. For developing countries in general, and for African countries in particular, perhaps the closest example one can cite in reference to this type of market is the traditional open air market where price setting is informal, is extensively negotiated between buyer and seller, and where advertising is indeed largely absent. Consumers acquire pertinent information from experience, from friends and colleagues, and with knowledge of specific products, are perfectly willing to negotiate extensively from several physically juxtaposed sellers to obtain the most favorable terms of a sale. Informal markets in Africa are also considered to be highly efficient, largely because they satisfy so many of the underlying axioms of a competitive market structure.

Beyond the informal market sector, however, formal markets often present a more complicated set of issues. In many instances, there are few sellers, transactions restrictions abound, advertising is widely used, and at first glance,

such markets often appear to be non-competitive, and thus inefficient. It is within this perceived framework that policymakers have devised various alternatives grounded in notions of competitive policies to promote economic efficiency. One can reduce most of them to five variations, each of which we will look at briefly.

The first option is to use regulation of a privately owned firm. In the United States, back in the mid-nineteenth century, one of the high tech industries at the time was the railroad. So efficient were railroads that they were able to drive most alternative forms of competition, namely, barge canals and horse driven transportation, nearly out of business. Concern rose that railroads represented an unfair form of competition, and that something had to be done to force them to respond to consumer interests. In 1887, Congress passed the Interstate Commerce Act, which created the Interstate Commerce Commission, whose primary responsibility was to oversee the setting of tariffs on interstate commerce of goods and passenger traffic. The reason for selecting this option was that there were economies of scale driven by the relatively capital intensive nature of the industry, i.e., high fixed costs of track and terminals, that could be realized only if the density of traffic were maximized. Creating several physically adjacent railroad lines would have been inefficient.

It is from the notion of pervasive economies of scale, and more recently, economies of scope, that many countries have opted for permitting monopolistic structures in many key industries, notably transportation and in telecommunications, and whose existence is closely monitored by a regulatory commission. It is a compromise option, and as numerous studies have suggested, quite capable of regulatory capture by the regulated industries themselves, the latter having the essential information needed by a regulatory commission to set the very rates on behalf of a largely atomistic group of unorganized consumers. Regulation also has the unwarranted side effect of limiting incentives by management to manage costs, and thus technical efficiency, to dynamically changing conditions. This can become especially pernicious in developing countries where regulation of key industries is coupled with extensive protection from international competition, and in which domestic consumers wind up paying enormous costs for largely non-competitive and inefficient services.

The second option is to use taxes and subsidies to promote a competitive market structure. In this case, a relatively monopolistic market can be subject to taxation on its excess, or economic, profits, which could then be turned

over to fledgling competitors, all with the goal of increasing the number of sellers in a market. It sounds plausible on paper. The United States adopted this position when it chose to deregulate the oil industry in 1980 with the passage of the Windfall Profits Tax Act. The deregulation of the industry was expected to create windfall profits in the industry, based on the chronic shortages in energy demand during the 1970's.

Instead of industry reaping the benefits of deregulation, an excise tax would be used to capture some of that gain and increase the number of competitors in alternative energy technologies. Few developing countries have opted for this approach, partly because the distorting effects of price controls have made it difficult to anticipate such an adjustment, partly because the institutional and economic environment for competing industries is so thin, and partly because governments have had so little experience with nurturing such alternatives. It is, however, a central element in the international debate over industrial policy, and matches some of the practices of MITI, Japan's Ministry of International Trade and Industry, which has tried to increase domestic market capacity in the face of international competitors. Such variations are also what clearly amount to mercantilism, and which is at odds with the underlying principle of economic efficiency based on increased market competition.

A third option is one well known in a number of developing countries, namely, nationalization of private enterprises as well as creation of a number of state-owned and parastatal enterprises. Many African countries opted for this approach in the early decades of the 1960's. African socialism, as espoused by Julius Nyerere, Leopold Senghor, and other African political leaders, was based on the notion that the colonial experience had retarded the growth and diversification of African economies, and that in the absence of a viable private sector, the only solution was for African governments to intervene directly in transforming existing industries while creating new ones in an effort to accelerate industrial development and economic growth of the continent. Because state-owned enterprises were supposed to be serving national goals and not narrow profit-maximizing ones on behalf of private shareholders, they would, as a matter of national pride, focus on achieving technical efficiency in operations, and in setting output and pricing patterns consistent with a competitive-equivalent market structure.

The difficulty with public enterprises is that many of them have never experienced any competitive pressures, domestic or foreign. They did not experience domestic competition because government policy was driven by the notion that a publicly owned local enterprise would function automatically

on behalf of the public interest, and that this would be sufficient. They did not experience much international competition because governments also tended to set automatically high tariff and import quota restrictions from abroad as a way of helping to ensure the success of local public enterprises. The result is that many such state-owned and parastatal enterprises never earned any profits, did little by way of product and market innovation, and became chronic drains on hard-pressed local government subsidies just to stay afloat.

Economists refer to this type of behavior as moral hazard in that firms adopt riskier choices under the umbrella of implicit or explicit government protection than they would if they faced fully exposed and purely competitive pressures. Because losses from these enterprises because so significant, they reduced funding opportunities for other priority public sector activities such as physical infrastructure, health, and education. It is partly from this context that structural adjustment programs, begun in the early 1980's, were born, and why privatization was given the emphasis that it has.

A fourth option is to use antitrust. This is a largely American policy creation, dating back to the end of the nineteenth century. "Trust" was the nineteenth century term for monopoly, and antitrust legislation was built around the notion that legislation would and should be used to break up these trusts to create more competitive market structures. Led by Congressional passage of the Sherman Act in 1890, and followed by such statutes as the Clayton Act of 1914, the Federal Trade Commission Act of 1914, the Robinson-Patman Act of 1936, and other laws, antitrust legislation was built around the notion of defining various forms of anticompetitive behavior, and then devising suitable sanctions ranging from simple fines to partial and total divestiture of firm assets.

The classic example was the Standard Oil decision of the U.S. Supreme Court, which found this firm, which had been established in 1870 by John D. Rockefeller, and had become by 1900 one of the first vertically integrated firms with assets then worth several billions of dollars, guilty of violating the Sherman Act. The result was that the Supreme Court ordered the divestiture of Standard Oil assets on a state-by-state pro rata basis, creating some 38 corporations in the process. The Standard Oil Company of New Jersey became Esso, and then in 1972, was renamed Exxon in the United States. The Standard Oil of Indiana became known as Amoco, the Standard Oil Company of Ohio became known as Sohio, and the Standard Oil Company of California became known as Chevron, to cite but a few examples.

For developing countries, even those engaged in or contemplating privatization, there has been no serious consideration given to antitrust, largely because of concerns that even a domestically privatized firm would still be small in comparison to the international firms in which it might find itself in competition. Still, the example is worth noting, particularly in that antitrust has far from disappeared from the policy landscape. As perhaps the most notable example, the U.S. Justice Department's prosecution of the American Telephone and Telegraph Company, or AT&T, resulted in 1984 of a court decision separating its long distance company from local companies, and in which seven regional local companies were created. This stands in strong contradistinction to the fostering of mergers as a form of competitive national strategy as practiced in Europe, and particularly so in Japan through its Ministry of International Trade and Industry, and no country in Africa has ever proposed such a course of action.

The last option is to do nothing, or what is equivalent, to deregulate a regulated industry that had been deemed monopolistic. This has been one of the most daunting of challenges, but which has been vigorously pursued in the United States airline industry during the 1980's, and which has affected local bus and train transportation. For developing countries, deregulation, primarily of prices, threatens in the short term to add to a local economy's inflation rate. At the same time, it also may make new forms of competition possible, either from domestic competitors or from abroad, and may provide suitable incentives for management to adhere more closely to questions such as technical efficiency in ways that they might not otherwise consider. It should be noted that structural adjustment programs, in addition to placing emphasis on privatization, have also placed considerable emphasis on deregulation of prices and quantitative controls throughout the economy, for precisely the reasons just stated, and again with some of the short-term inflationary consequences.

3.d Promoting the Optimal Composition of Production in Goods and Services

Most countries, regardless of their political orientation, have considered that market prices may fail to account for external effects in the production of goods and services. Such market failure would thus warrant corrective government intervention, either in the form of taxation or in the form of subsidies. Externalities can be good or bad, but they share the characteristic that they are unintended consequences of a transaction between buyer and seller. On the negative side, environmental pollution is one of the most commonly cited examples, while traffic congestion is another.

When someone buys a car from a seller, the agreed to price does not embody the cost to third parties, and they may be adversely affected by the pollution that the vehicle will generate. It is a negative externality in that the environmental pollution will reduce someone's physical health, unless otherwise corrected and accounted for. Under such circumstances, the classic response is to impose the equivalent of pollution control taxes that are borne in some proportion by the buyer and seller. These taxes can be in the form of a fiscal levy on the selling price of the vehicle, which could then be used to discourage future pollution, or to simultaneously to provide for compensatory support to victims of environmental pollution, or in equivalent regulation, as in the imposition of catalytic converter exhaust emissions standards.

In developing countries, the issue of environmental pollution is becoming ever more significant as population pressures increase pressure on physical environments, and as countries engage in various strategies designed to promote economic industrialization, all of which usually involve shifting energy resource use from renewable natural resource use (which may be a desirable form of natural resource conservation) to exhaustible resource use such as coal, natural gas, and oil, and which may increase not only dependence on imported energy, but also increase environmental pollution as these resources are used. Thus, how countries adopt policies in support of environmentally sustainable economic growth turn largely on the perception of the relationship of market prices and social prices in which environmental considerations are taken into account.

The other side of the externalities question is the positive one. Here, when buyer and seller agree to a transaction, someone other than them becomes an unwilling beneficiary, i.e., someone gets a free ride. Education, health, and national defense are classic examples. In most developing countries, it has been taken for granted that government would be the provider of education and health services.

While some have rationalized government intervention in the provision of these services is a form of social justice, were this the sole basis, government could also impose taxes on the wealthy and transfer them to the less well off and let each individual make a choice. Since governments have made obvious choices to dedicate expenditures for the provision of particular services, economic justice alone is an insufficient basis on which to justify such actions. What is more compelling is the presence of external benefits.

When someone obtains knowledge and skills from education that is usually transferred willingly to colleagues, friends, and family members, all beneficiaries become free riders. In terms of economic efficiency, such free rides should not exist.   Since third parties are beneficiaries, it is only reasonable that they contribute some proportion of the total benefits, which in this case would be the external benefits, which they receive. The fact that there are private education and health systems which co-exist with public systems in many countries attests to the fact that in addition to these positive externalities, there are also direct private benefits to the immediate recipients of education and health services, and that there is an underlying market demand for them, i.e., a willingness to pay for them.

As to national defense, it is an example, along with the oft-cited public lighthouse, of a pure public good. Such goods embody indivisible benefits with zero marginal costs to extra users. Because no one can be excluded from the benefits of these goods, no private market can exist for their provision, and the responsibility thus falls to government.   Of course, what such examples of pure public goods do not answer is the optimal level of provision, something of significance for both developed and developing countries alike, and which is grounded in abstract notions of national security.

For developing countries, hard pressed governments engaged in difficult programs of structural adjustment, are also engaged in a search for ways to improve the technical efficiency of education and health services, include partial privatization of these services. The logical limit of these measures is that the public share of funding of these services should reflect the magnitude of external benefits provided, once all financing adjustments have been made. This is a point often lost in countries where relatively high rates of population growth create enormous pressures on sustaining existing enrollment and health services ratios.

3.e Policies in Support of Economic Stabilization and Growth
Most countries have fairly clear policies designed to provide economic stabilization and economic growth. Stabilization means the use of monetary and fiscal policy to minimize a country's unemployment and inflation rates, while policies in support of economic growth involve measures designed to promote a country's rate of saving and investment, as well as efficiency in the use of investment resources.   In terms of stabilization, to the extent that government intervention in the form of monetary and fiscal policy is warranted, an activist and discretionary role is predicated on the notion that

the private economy, if left to its own devices, is inherently unstable and subject to business cycles of potentially destabilizing magnitude.

The Great Depression of the 1930's is key to this perspective, having set off a debate among economists and the public at large on what determines economic fluctuations of such magnitudes and to what extent should government intervene to reduce them. Keynesian economics, after the ideas propounded by John Maynard Keynes (1883-1946) was born out of the Great Depression, and which called for an activist fiscal policy to reduce a country's chronic unemployment rate. Though there were many precedents in the mercantile experience of European countries, notably the public works projects initiated by French Finance Minister Colbert under Louis XIV, at the heart of this debate was, and is, the issue of to what extent does government intervention increase an economy's volatility, as measured in its underlying levels and rates of change in its inflation and unemployment rates, rather than reduce it. The recent global recession of 2007-2009 has stimulated anew the net benefits of public sector deficit spending as the most efficient choice to creating sustainable economic growth.

The tools of monetary and fiscal policy are well known and need not be elaborated on here. In brief, monetary policy involves changes in the supply of money, credit, and interest rates through a variety of standard tools. They include: open market operations involving the sale and purchase of government securities in financial markets, setting required reserve ratios of the banking system, changes in the central bank's discount rate, the use of selective credit controls to bias the composition and level of investment spending, and moral suasion designed to influence the level of confidence of the financial community on the direction of economic activity and policy. In terms of fiscal policy, government can use automatic and/or discretionary changes in government spending and taxation to alter the equilibrium level of total spending and output in the economy. While fiscal policy can also be used to promote various forms of economic justice, in the aggregate, such changes are designed to affect the level of aggregate economic equilibrium of the economy.

To the extent that government intervention of an activist nature actually increases economic volatility, then this economic function of the public sector turns out to be a form of government failure rather than of market failure. Given the enormous emphasis on privatization in the developing world, and which has been accelerated through the collapse of the Soviet Union and the Communist regimes in central Europe, the desirability and limits of

discretionary government intervention have become far less appealing than they once were. What has driven this new perspective is not so much ideology as the realization that governments simply do not possess sufficient information to anticipate all key forms of behavior of the economy, despite the impressive advances in econometric modeling and economic theory that have taken place over the years. In short, while reliance on markets is clearly embedded with uncertainty, the relevant test is whether this level of uncertainty is expanded or reduced by a conscious form of intervention by the public sector on behalf of economic stabilization.

Beyond stabilization, governments have also engaged in policies designed to promote economic growth and development. In the most passive sense, as long as governments meet the aforementioned functions, then it could be argued that economic growth would automatically follow within the framework of a private economy. Levels and forms of investment, and the production and dissemination of new technologies, would be dictated by entrepreneurial innovation, as in *The Theory of Economic Development* put forth by Joseph Schumpeter (1882-1950) back in 1911.

In this view, the direction of economic innovation can not be anticipated by conscious government intervention, and today's notion of an industrial policy, typified by Japan's guided economic policies pursued through its Ministry of International Trade and Industry, would ultimately be self-defeating since the information necessary for government to make prudent decisions would be more costly than what the marketplace itself could generate.

Thus, one vision of economic growth, at least insofar as government's responsibility for it is concerned, is a minimalist one, and this is largely the vision based on market-driven economic policies such as those pursued by the United States. It is predicated on the notion that market information will always be superior, i.e., cheaper to society, to government information where economic decisions are concerned, and that government really does not have the capacity to guide the economy along some predetermined path. Japan's unsuccessful support of the Beta technology for videocassette recorders, its support of an unsuccessful fifth generation project of new computer technology, and the U.S. unsuccessful emphasis on nuclear energy over conservation and exhaustible resources, are examples of industrial policy gone awry. The only way that such industrial policy has made some sense is when the products do not have to depend on markets for commercial success, and so many military technologies have been successful through the captive markets

in which they operate, but for which no civilian counterpart would likely have existed.

On a higher level of intervention, some governments practice a form of capital budgeting within the context of annual budget cycles. Capital budgeting selects a basket of projects that under prevailing interest rates and economic conditions offer competitive rates of return to society. In many countries, projects ranging from public infrastructure to local school and sewer construction spending fall into this category. In the public domain, capital budgeting refers only to those publicly financed projects, and their private sector counterparts would be the various investments which individual firms would undertake within a corresponding fiscal year, and over the lifetime of project cycles.

Figure 2

Operational Structure of Economic Planning

A. Funding Agencies
1. CCCE - Caisse Centrale de la Coopération Economique (France)
2. FED - Fonds Européens de Développement
3. CILSS - Comité Inter-étatique pour la lutte contre la sécheresse du Sahel
4. IBRD - World Bank
5. IMF - International Monetary Fund
6. USAID - U.S. Agency for International Development
7. UNDP - United Nations Development Programme
8. Others: UNESCO, UNIDO, FAO, Paris Club, London Club, Stabex, etc.

I. Final Demand: Under the United Nations system, we can derive the principal economic aggregates, of which one of the most often cited is the GNP (Gross National Product), as well as the GDP (Gross Domestic Product). The Gross National Product is defined as:

$Y = C + I + G + E - M$, where:

Y = Final Demand, or GNP, of which:
C = Consumption of finished goods and services
I = Gross Private Domestic Investment
G = Consumption and investment expenditures by the public sector
E = les Exports of goods and services
M = les Imports of goods and services

Beyond capital budgeting, some countries, and developing countries in particular, have engaged in multi-year development plans. These plans articulate a multi-year set of national economic objectives, the resources needed to meet them, and the rational for their adoption. Development planning acquired considerable popularity among developing countries in the 1960's and 1970's, largely based on the notion that a nationally articulated

economic vision would enable a country to mobilize suitable resources to meet common objectives. The typical institutional framework for national development planning is illustrated in Figure 2. It identifies the various sectors involved in economic planning exercises, ranging from domestic public and private financial institution to bilateral and multilateral development agencies, how activities of these institutions bear on a country's balance of payments, and in turn on a country's domestic public sector as well as on the domestic private sector.

The difficulty with national economic planning is that it is nearly impossible to anticipate the many conditional circumstances on which the success of a given scenario will depend. The Soviet Union went in for comprehensive national economic planning, and even with relatively high rates of national saving, still wound up with relatively poor economic performance, particularly as the economy became more and more complex. The failure of national planning in the Soviet Union anticipated the demise of communism, and set the stage for a conversion to a private market economy along the lines which have been unfolding during the past several years.

Historical debates on the virtues and limits of national economic planning such as those put forward by Oscar Lange in 1938 in his book *The Economics of Socialism*, and by Ludwig von Mises in 1944 in his book, *The Road to Serfdom*, recall a once lively debate on alternative economic systems. Few would argue today along the lines of those great debates, and most would begin with the somewhat humble notion that while markets may indeed be imperfect for a variety of reasons relating to imperfect information, that strategies built on the notion of comprehensive national economic planning are far worse. There is virtually no country in the world today that continues to define national economic policy through comprehensive national economic planning. What is left is reliance on periodic statements of the policy environment, with occasional commitments to specific projects in which national strategy may be deemed essential, as in the U.S. space program of the past thirty years.

Beyond the notion of national economic planning, governments do engage in sectoral and regional planning exercises. To the extent that public sector intervention is warranted, such planning turns largely on exercises in project analysis. Project analysis encompasses all steps in a project's life cycle, and which are illustrated below in Figure 3.

Figure 3

The Environment of Development Projects
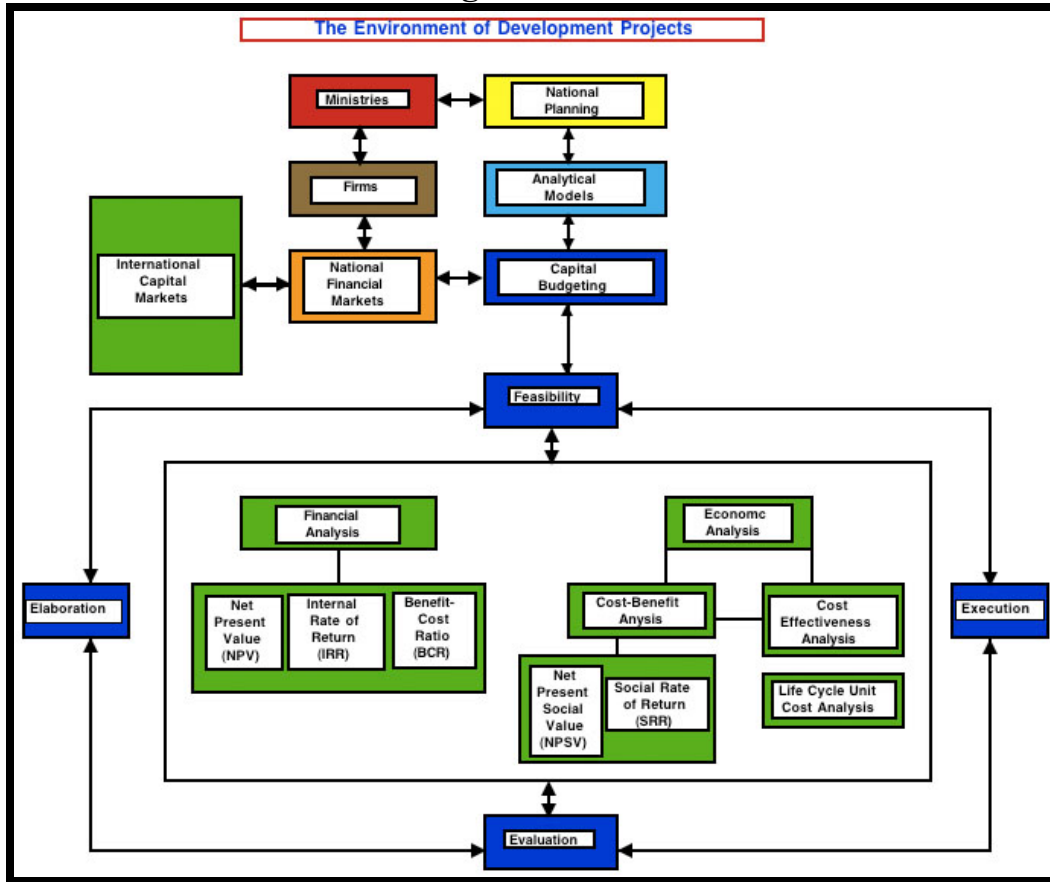
Project analysis builds on the basic tools of capital budgeting. It involves the calculation of various evaluation criteria for projects, notably the net present value, the rate of return, and the benefit-cost ratio. Governments that commit resources to development projects need to derive these measures in order to arrive at suitable rankings of alternatives. Projects with positive net present values are deemed, other things equal, as economically acceptable. Projects with estimated rates of return at least equal to government's own cost of borrowing, or the funding agency's own cost of borrowing, are considered to be economically acceptable, as are projects with positive benefit-cost ratios. The terminology in Figure 3 lists the various ways in which project evaluation information is organized.

Project evaluation is a subset of a project's life cycle. Other stages include the identification of project demand, development of a logical framework statement, deriving a logistical structure for project implementation, notably through critical path methods, identification of project financing sources, implementation of project activities, and post-project evaluation. Where

benefits are indivisible for a project, when such a project has been considered to be economically desirable, instead of applying the techniques of cost-benefit analysis, the most appropriate measure is cost-effectiveness analysis. Cost-effectiveness analysis simply derives, within a project's life cycle, the least costly way of generating a given set of economic outputs from a project. National defense is a typical example.

4. Linking Macroeconomic and Microeconomic Investment Decisions: The Harrod-Domar Model

What ties together the framework for individual project performance to national economic performance is the aggregate efficiency of all projects. The more efficient are all individual projects, as measured by the relative rates of return of these projects in comparison to a country's own cost of borrowing, the less will be the aggregate level of investment needed to obtain a given unit increment in annual national productive capacity.

Figure 4

The Marginal Efficiency of Investment and Macroeconomic Investment Equilibrium
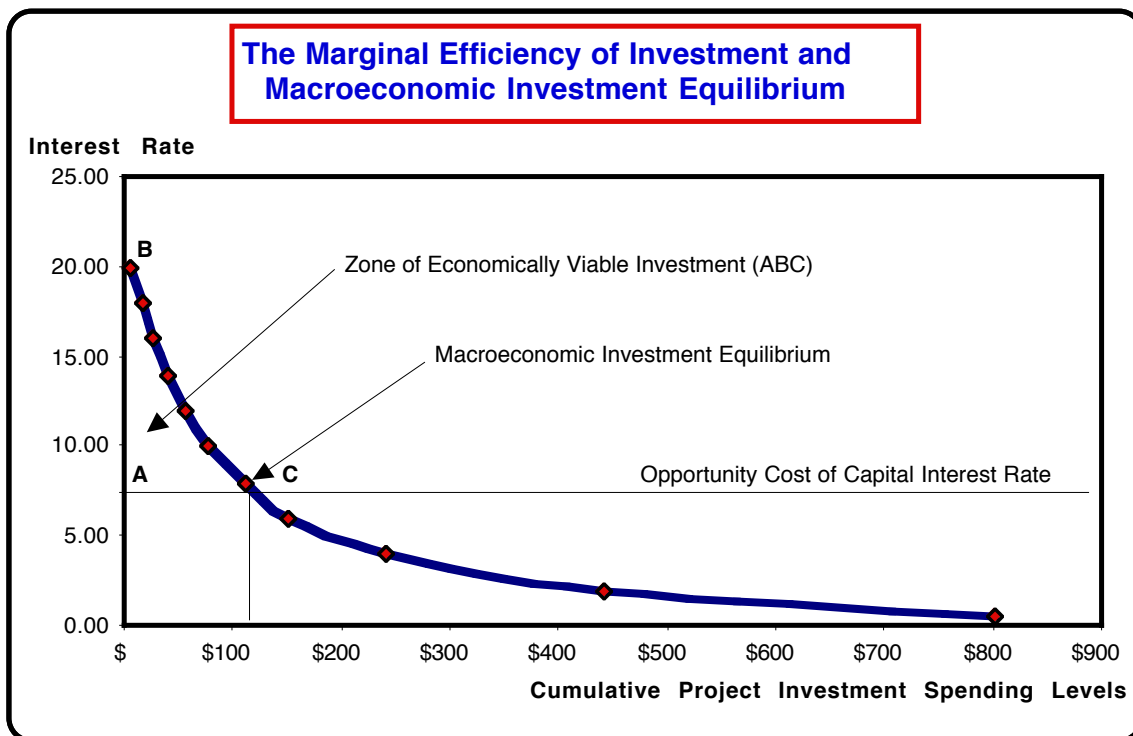
The aggregate level of portraying the efficient ranking of projects is displayed in Figure 4. Across sectors and levels, investment at the macroeconomic level is ranking according to a descending profitability ranking, as in the internal or social rate of return estimated return to a project. Projects with expected rates of return greater than or equal to the opportunity cost of funding, shown here

as the macroeconomic interest rate, are considered to be efficient and acceptable.

Projects falling below this threshold should not be financed, as they do not yield an estimated rate of return at least equal to their opportunity cost. Projects meeting the threshold test result in greater increments to productive capacity per dollar equivalent of investment than projects that do not. The task of project managers, then is to be able to identify and manage those investments selected in such a way that they meet and sustain this test, which we will illustrate in terms of a simple quantitative model used widely in national economic forecasting and development planning models, namely, the Harrod-Domar model.

The Harrod-Domar model, developed independently by British economist Sir Roy Harrod and by Russian emigré economist Evsei Domar in 1948, is based on deriving an economy's underlying warranted, or sustainable, rate of growth. The sustainable rate of growth is defined as a ratio of two key variables in the economy, namely, the national rate of savings, and the capital-output ratio, known often as the ICOR, or incremental capital-output ratio. In this section, we will use this model to explore a few fundamental relationships governing an economy's capacity to grow, beginning first with a definition of the model.

The Harrod-Domar model is formally defined as:

(1.1) $\Delta Y/Y_0 = r = s/k = (z+p)$, where:

$Y_1 = Y_0 x(1+r)$, where:

$Y_n = Y_0 x(1+r)^n$, and:

$Z_1 = Y_1/P_1 = (Y_0 x(1+r))/(P_0 x(1+p)) = Z_0 x(1+z)$, and:

$Z_n = Y_n/P_n = (Y_0 x(1+r)^n)/(P_0 x(1+p)^n) = Z_0 x(1+z)^n$, where:

ΔY = absolute change in GDP (or GNP),

Y_i = the value of GDP in period i (i=0, 1,..., n),

r = the sustainable rate of economic growth of GDP,

s = the national rate of savings (defined as the percentage of GDP in the form of savings),

k = the capital-output ratio (or the value of investment spending necessary to increase annual economic production capacity by one unit),

z = the rate of growth in GDP per capita, defined

endogenously,

p = the rate of demographic growth, exogenously given in the short-term,

n = the number of forecast, or planning, years,

P_i = the population level in period i (i=0, 1,..., n),

Z_i = Y_i/P_i, the level of per capita GDP in period i,

(1.2) $R_{gi} = Y_i T_i$, where,

R_{gi} = the level of treasury tax receipts in period i,

Y_i = the level of GDP in period i (i=0, 1,..., n),

T_i = the rate of taxes, expressed as a percentage of GDP in period i.

Table 3
Economic Growth Scenarios
under the Harrod-Domar Model

1. Base Case	Parameter	Value	0	1	2	3	4	5	6	7	8	9	10
Savings Rate	s	13.00%											
Capital Output Coefficient	k	3.00											
GDP Warranted Growth Rate	r = s/k	4.33%											
Population Growth Rate	p	3.00%											
Per Capita GDP Growth Rate	Wp = r-p	1.33%											
GDP in period i, in billions	Yi	400	400	417.3	435.4	454.3	474.0	494.5	515.9	538.3	561.6	586.0	611.4
Population in period i, in millions	Pi	1.0	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.23	1.27	1.30	1.34
Per Capita GDP in period i	Yi/Pi	400.0	400.0	405.2	410.4	415.7	421.1	426.6	432.1	437.7	443.4	449.1	454.9
National Tax Rate	T	0.100											
Fiscal Receipts	Rg = T(Yi)		40.0	41.7	43.5	45.4	47.4	49.5	51.6	53.8	56.2	58.6	61.1
Disposable National Income	Rn = Yi-Rg		360.0	375.6	391.9	408.9	426.6	445.1	464.3	484.5	505.5	527.4	550.2
Per Capita Disposable Income	(Yi-Rgi)/Pi		360.0	364.7	369.4	374.2	379.0	383.9	388.9	393.9	399.0	404.2	409.4
2. Innovative Management	Parameter	Value	0	1	2	3	4	5	6	7	8	9	10
Savings Rate	s	13.00%											
Capital Output Coefficient	k	**2.00**											
GDP Warranted Growth Rate	r = s/k	6.50%											
Population Growth Rate	p	3.00%											
Per Capita GDP Growth Rate	Wp = r-p	3.50%											
GDP in period i, in billions	Yi	400	400	426.0	453.7	483.2	514.6	548.0	583.7	621.6	662.0	705.0	750.9
Population in period i, in millions	Pi	1.0	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.23	1.27	1.30	1.34
Per Capita GDP in period i	Yi/Pi	400.0	400.0	413.6	427.6	442.2	457.2	472.7	488.8	505.4	522.6	540.3	558.7
National Tax Rate	T	0.100											
Fiscal Receipts	Rg = T(Yi)		40.0	42.6	45.4	48.3	51.5	54.8	58.4	62.2	66.2	70.5	75.1
Disposable National Income	Rn = Yi-Rg		360.0	383.4	408.3	434.9	463.1	493.2	525.3	559.4	595.8	634.5	675.8
Per Capita Disposable Income	(Yi-Rgi)/Pi		360.0	372.2	384.9	398.0	411.5	425.5	439.9	454.9	470.3	486.3	502.8
3. Accelerated Saving	Parameter	Value	0	1	2	3	4	5	6	7	8	9	10
Savings Rate	s	**15.00%**											
Capital Output Coefficient	k	2.00											
GDP Warranted Growth Rate	r = s/k	7.50%											
Population Growth Rate	p	3.00%											
Per Capita GDP Growth Rate	Wp = r-p	4.50%											
GDP in period i, in billions	Yi	400	400	430.0	462.3	496.9	534.2	574.3	617.3	663.6	713.4	766.9	824.4
Population in period i, in millions	Pi	1.0	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.23	1.27	1.30	1.34
Per Capita GDP in period i	Yi/Pi	400.0	400.0	417.5	435.7	454.8	474.6	495.4	517.0	539.6	563.2	587.8	613.4
National Tax Rate	T	0.100											
Fiscal Receipts	Rg = T(Yi)		40.0	43.0	46.2	49.7	53.4	57.4	61.7	66.4	71.3	76.7	82.4
Disposable National Income	Rn = Yi-Rg		360.0	387.0	416.0	447.2	480.8	516.8	555.6	597.3	642.1	690.2	742.0
Per Capita Disposable Income	(Yi-Rgi)/Pi		360.0	375.7	392.1	409.3	427.2	445.8	465.3	485.6	506.8	529.0	552.1
4. Demographic Restraint	Parameter	Value	0	1	2	3	4	5	6	7	8	9	10
Savings Rate	s	13.00%											
Capital Output Coefficient	k	3.00											
GDP Warranted Growth Rate	r = s/k	4.33%											
Population Growth Rate	p	**2.00%**											
Per Capita GDP Growth Rate	Wp = r-p	2.33%											
GDP in period i, in billions	Yi	400	400	417.3	435.4	454.3	474.0	494.5	515.9	538.3	561.6	586.0	611.4
Population in period i, in millions	Pi	1.0	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.23	1.27	1.30	1.34
Per Capita GDP in period i	Yi/Pi	400.0	400.0	405.2	410.4	415.7	421.1	426.6	432.1	437.7	443.4	449.1	454.9
National Tax Rate	T	0.100											
Fiscal Receipts	Rg = T(Yi)		40.0	41.7	43.5	45.4	47.4	49.5	51.6	53.8	56.2	58.6	61.1
Disposable National Income	Rn = Yi-Rg		360.0	375.6	391.9	408.9	426.6	445.1	464.3	484.5	505.5	527.4	550.2
Per Capita Disposable Income	(Yi-Rgi)/Pi		360.0	364.7	369.4	374.2	379.0	383.9	388.9	393.9	399.0	404.2	409.4

What does the Harrod-Domar model show us? Look carefully at the economic growth scenarios illustrated in Table 3. Let us note first of all that

each economic variable is measured in terms of constant prices, that is, net of inflationary considerations. With inflation taken into consideration, the model underscores in the first place the relationships among the rate of population growth, the national savings rate, and the capital-output ratio. Other things equal, the higher is the rate of demographic expansion, less will be the level of per capita GDP (or GNP). In turn, other things equal, the higher is the rate of savings, the higher will be the rate of expansion, and terminal level of per capita GDP. Finally, and this brings home the point regarding the significance of project management skills, the more efficient is the level of investment, the smaller will be the capital-output ratio, which in turn results in a higher rate of expansion and terminal level of per capita GDP.

While structural adjustment programs can and do focus on ways to improve national savings rates, and while structural adjustment programs also have addressed issues of public health and family planning, by placing greater emphasis on market prices, they also tend to improve the performance of investment projects by rewarding economic efficiency. Only in those cases where market failure occurs would market prices fail to improve the performance of investment projects, and as we have seen, adopting suitable shadow prices can adjust market prices to generate efficient social rates of return, and thus, suitable rankings of alternative projects, as summarized in the rankings illustrated in the marginal efficiency of investment curve in Figure 4.

5. Case Study using the Harrod-Domar Model

Using the presentation scenarios under Table 3, suppose the Republic of Sans Souci has a baseline profile based on the following data;

> a. population is growing at 2.5 percent per year (=.025);
> b. the national savings rate is 5 percent (=.05);
> c. the capital-output ratio is estimated at 2;
> d. the baseline level of GDP is set at 95 billion CFA;
> e. baseline population is 5 million.
> f. baseline government taxes are set at 10 percent of GDP

Using the Harrod-Domar model framework, simple inspection tells us that in this economy, there would be no growth in per capita GDP. It is from this baseline scenario that the government chose to adopt a program of agricultural extension and marketing in hopes of raising per capita income levels.

Under the agricultural extension and marketing program, agricultural producers would receive an increase in the real price of cotton, millet, and rice

of 30 percent during the first year. In addition, the government provides a reform credit package to farmers to facilitate the purchase of quality seeds, fertilizers, and for farm equipment such as ploughs, harvesters, graders, and grain storage silos. Estimates of the cost for this program indicate that it will cost 4.75 billion CFA francs, and whose financing would be offset by supplementary tax receipts engendered by higher levels of per capita income.

Based on the foregoing, answer the following questions using the worksheet spaces in Table 4:

1. If the program would have as a consequence an increase in the national savings rate from 5 to 10 percent (reflecting an incentive to farmers to increase their savings out of increased income), should one adopt the program? (Hint: Does the adoption of the program result in an increase in the level of per capita GDP, and do incremental tax receipts based on incremental GDP growth finance the cost of the program?)

2. Prepare a projection evaluation tableau based on the ten-year program horizon, including estimates of total and per capita GDP for each year, and a statement reflecting the impact of the project on the government's budgetary position.

3. If the effect of the program were to increase savings only from 5 to 8 percent, what position would you adopt regarding the acceptability of the program? Justify your response in the context of the model.

4. Considering the economic functions of the public sector, to what extent should it be financed by government resources? Outline in a tabular format the major questions that should be considered on the degree of decentralization and on the role of the private sector of the program.

5. Based on question one, to what extent is it valid to compare the costs of the program that appear in the first year of the program with the per capita and fiscal benefits of subsequent years? How might one address the issue of comparing present and future costs and benefits?

Table 4
Agricultural Extension and Marketing Program Worksheet

1. Base Case	Parameter	Value	0	1	2	3	4	5	6	7	8	9	10
Savings Rate	s												
Capital Output Coefficient	k												
GDP Warranted Growth Rate	r = s/k												
Population Growth Rate	p												
Per Capita GDP Growth Rate	Wp = r-p												
GDP in period i, in billions	Yi												
Population in period i, in millions	Pi												
Per Capita GDP in period i	Yi/Pi												
National Tax Rate	T												
Fiscal Receipts	Rg = T(Yi)												
Disposable National Income	Rn = Yi-Rg												
Per Capita Disposable Income	(Yi-Rgi)/Pi												
2. Savings at 10 Percent	**Parameter**	**Value**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Savings Rate	s												
Capital Output Coefficient	k												
GDP Warranted Growth Rate	r = s/k												
Population Growth Rate	p												
Per Capita GDP Growth Rate	Wp = r-p												
GDP in period i, in billions	Yi												
Population in period i, in millions	Pi												
Per Capita GDP in period i	Yi/Pi												
National Tax Rate	T												
Fiscal Receipts	Rg = T(Yi)												
Disposable National Income	Rn = Yi-Rg												
Per Capita Disposable Income	(Yi-Rgi)/Pi												
3. Savings at 8 Percent	**Parameter**	**Value**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Savings Rate	s	15.00%											
Capital Output Coefficient	k	2.00											
GDP Warranted Growth Rate	r = s/k	7.50%											
Population Growth Rate	p	3.00%											
Per Capita GDP Growth Rate	Wp = r-p	4.50%											
GDP in period i, in billions	Yi	400											
Population in period i, in millions	Pi	1.0											
Per Capita GDP in period i	Yi/Pi	400.0											
National Tax Rate	T	0.100											
Fiscal Receipts	Rg = T(Yi)												
Disposable National Income	Rn = Yi-Rg												
Per Capita Disposable Income	(Yi-Rgi)/Pi												