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People's Democratic Republic of Algeria A Medium-Term Macroeconomic Strategy For Algeria

Sustaining Faster Growth With Economic and Social Stability

(In Two Volumes) Volume II: Annexes

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Vice President:	Jean-Louis Sarbib
Sector Director	Mustapha Nabli
Country Director:	Theodore Ahlers
Sector Manager	Pedro Alba
Task Team Leader	Aristomene Varoudakis

This report was prepared by a team comprising: Sandeep Mahajan, Paul Moreno-Lopez, Shane Streifel, Aristomene Varoudakis (main authors), with significant contributions by Punam Chuhan, Emile Fmateu, Annette de Kleine, Christian Schmidt, Dimitri Vittas, and Leila Zlaoui To the report also contributed Najy Benhassine, Caroline Farah, and Robert Keyfitz. External contributions were provided by Daniel Astier, Ali Bayar, Ghazi Ben-Ahmed, and Said Ighilahriz. Manuel Felix and Ingrid Ivins provided research assistance.

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Democratic and Popular Republic of Algeria
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Annex 1.1: Background data on long-term growth and the quality of institutions

Growth Rates of Output Components

	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	1976-2000
GDP Growth	6.5	6.5	6.2	4.8	0 8	0 3	3.2	3 1
Agriculture Sector Growth	2.1	10.9	4.8	2.9	3.6	4.5	3 9	3.9
Industrial Sector Growth	11.1	2.2	7.0	4.1	1.1	-0.5	4.0	3.2
Non-Oil Industrial Sector	11.7	19.5	12.2	6.4	-1.6	-2.2	1.4	3 2
Oil Sector	11.1	-1.2	4.1	2.4	3 2	0.6	5 5	3 2
Services Sector Growth	-7.4	20.5	5.2	5.9	0.9	1.0	2.2	3.0
Aggregate Consumption Growth	2.1	12.9	7.7	5.5	-1.8	0.9	1.2	2 7
Private Consumption	1.5	12.2	7.8	5.5	-1.8	0.6	1 1	2.6
Government Consumption	4 7	15.4	7.7	4.7	-2.1	5.3	2.8	3.7
Fixed Investment Growth	..	15.2	8.4	3.4	-5 0	-2 5	2 4	1.4
Private Investment	..	..	..	-1.3	1.6	-0.9	-0.7	-0.3
Public Investment	..	..	.	12.5	-12 7	-4.5	14 3	2 4
Exports Growth	7.6	2.5	0.6	5.0	3.5	0.8	5.8	3.1
Imports Growth	8.7	17.1	3.9	5 8	-8.1	-2.4	-1 4	-0 4

	Real GDP Per Capita in constant dollars (International prices, base year 1985)			Average Annual Per-capita Growth Rates			
	1971	1981	1991	1971-80	1981-90	1991-2000	1971-2000
Algeria	1676	2761	2720	3.15	-0.28	-0.08	0.93
Azerbaijan	..	..	..	..	-7.11	-4.75	-5.29
Colombia	2234	2967	3297	3.11	1.28	0.78	1.72
Ecuador	1870	3205	2835	5.95	-0.39	-0.29	1.76
Egypt	1206	1722	1913	4.44	2.89	2.39	3.24
Gabon	3868	4504	3696	5.83	-1.16	-0.12	1.52
Hungary	3656	5147	4947	4.37	1.49	1.28	2.38
Indonesia	737	1480	2044	5.40	4.47	2.70	4.19
Mexico	4213	6467	6018	3.67	-0.22	1.89	1.78
Nigeria	1055	1515	1040	1.92	-1.67	-0.29	-0.02
Poland	3128	3973	3712	..	..	3.60	3.60
Saudi Arabia	8756	13766	7673	5.22	-4.59	-0.58	0.04
Syria	2468	4664	3994	6.82	-0.93	2.41	2.76
Venezuela, RB	7589	7209	6621	-0.71	-1.63	-0.06	-0.80
MNA Average	2596	4249	3571	5.50	-0.23	1.18	2.15
LMIC Average	..	..	..	3.21	2.24	2.31	2.59

Gross domestic investment (% of GDP)				
	1971-80	1981-90	1991-2000	1971-2000
Algeria	41 94	32.90	28 22	34.35
Azerbaijan	..	..	28.12	28 12
Colombia	18.56	19.37	19 27	19 07
Ecuador	24.21	20.46	19.40	21.35
Egypt	24 41	28.78	20 27	24.49
Gabon	45 91	33.97	26.13	35.33
Hungary	35.17	26.63	24.63	28.81
Indonesia	22.45	28 92	26.38	25.92
Mexico	23.07	21.85	22 93	22.61
Nigeria	23.51	15.80	20.63	19.98
Poland	.	30.34	21.36	24.73
Saudi Arabia	19.80	22.80	20 26	20.95
Syria	26.38	21.87	22 87	23.71
Venezuela, RB	33.80	19.67	18.85	24.11
MNA Average	24.72	25 81	23.55	24 73
LMIC Average	28.45	30.46	30.04	29.65

Human Capital Indicators

	Average Fertility Rate				Population growth (annual %)			
	1970-80	1980-90	1990-2000	1970-2000	1971-80	1981-90	1991-2000	1971-2000
Algeria	7.18	5.71	3.80	5.56	3.06	2.93	1.95	2.65
Azerbaijan	3.86	2.94	2.40	2.94	1.76	1.49	1.17	1.47
Colombia	4.67	3.45	2.80	3.60	2.32	2.07	1.90	2.10
Ecuador	5.64	4.33	3.41	4.48	2.88	2.54	2.09	2.50
Egypt	5.46	4.61	3.61	4.49	2.12	2.49	1.99	2 20
Gabon	4.33	4.77	4.67	4.56	3.17	3.01	2.74	2.97
Hungary	2.07	1.82	1.56	1.81	0.35	-0.32	-0.34	-0.10
Indonesia	4.99	3.67	2.79	3.76	2.33	1.84	1.66	1 94
Mexico	5.78	3.81	2.97	3.96	2.89	2.08	1.63	2.20
Nigeria	6.90	6.52	5.71	6.36	2.90	3.02	2.77	2 90
Poland	2.25	2.24	1.69	2.05	0.90	0.69	0.14	0.58
Saudi Arabia	7.29	6.98	6.02	6.74	4.89	5.23	2.71	4.28
Syria	7.56	6.74	4.22	6.00	3.30	3.31	2.90	3.17
Venezuela, RB	4.71	3.79	3.12	3.89	3.42	2.56	2.15	2.71
MNA Average	6.92	6.10	3.81	5.35	3.08	3.24	2.80	3.05
LMIC Average	3.92	2.81	2.26	3.04	1.90	1.58	1 16	1.55

	Life expectancy at birth, (years)				Mortality rate, under-5 (per 1,000 live births)			
	1970-80	1980-90	1990-2000	1970-2000	1971-80	1981-90	1991-2000	1971-2000
Algeria	56.16	63.29	69 36	62.88	165.50	97.00	44.33	92.80
Azerbaijan	68 55	69.73	70.36	69.70	..	..	28.81	28.81
Colombia	63.02	67.22	69.79	66.63	85.50	49.00	30.27	46.05
Ecuador	60.41	65.28	68.09	64.52	120.50	85.50	41 42	72.54
Egypt	53.22	59.04	65.16	59.13	205.00	130.00	66.29	105.92
Gabon	46.11	50.10	52.35	49.44	232.00	..	90.75	126.06
Hungary	69.73	69.60	69.93	69.82	32.50	20.27	13.80	17.00
Indonesia	51.20	58.31	63.94	57.75	148.50	104.00	64.29	88.35
Mexico	64.14	68.81	71.93	68.22	92.00	60.00	40.05	60.83
Nigeria	44 29	47.40	48.82	46.89	198.50	166.00	145.33	166.60
Poland	70.43	70.87	72.00	71.14	36.00	21.85	16.07	18.20
Saudi Arabia	56.57	65.26	70.78	64.07	135.00	65.00	30.68	65.45
Syria	58.65	63.91	68.13	63.50	101.00	73.00	39.00	59.67
Venezuela, RB	66.84	69.75	72.29	69.60	51.50	34.50	25.32	35.79
MNA Average	54.36	61.39	69.10	64.02	114.79	70.95	50.96	69.19
LMIC Average	63.21	67.10	68.69	66.24	105.03	65.52	44.89	68.95

	School enrollment, primary (% gross)				School enrollment, secondary (% gross)			
	1970-80	1980-90	1990-1998	1970-1998	1971-80	1981-90	1990-1998	1970-1998
Algeria	87.76	96.07	105.07	99.79	21.38	48.42	62.30	51.16
Azerbaijan	115.30	115.78	111.17	112.19	94.53	93.72	84.50	86.53
Colombia	106.32	105.35	108.00	107.08	32.77	44.22	56.71	49.63
Ecuador	107.41	117.66	120.40	117.30	39.92	55.45	53.35	50.58
Egypt	70.24	84.11	96.44	89.54	39.72	62.69	76.38	65.96
Gabon	..	..	154.06	154.06	..	..	54.67	54.67
Hungary	97.64	96.68	99.87	99.30	65.32	73.38	91.70	84.10
Indonesia	91.07	113.15	114.22	108.16	21.70	38.10	47.31	39.78
Mexico	112.40	117.29	114.19	114.04	35.55	52.81	59.77	53.93
Nigeria	67.61	101.26	92.38	86.65	10.39	25.62	29.49	24.69
Poland	100.42	99.68	98.53	99.22	70.27	78.92	91.18	84.30
Saudi Arabia	54.71	66.43	74.86	69.43	21.02	37.83	55.02	46.03
Syria	90.91	105.86	103.66	101.17	42.50	52.16	45.62	45.86
Venezuela, RB	95.94	95.06	93.93	94.72	33.50	26.65	35.58	33.96
MNA Average	76.85	84.77	88.96	86.04	31.95	46.04	51.57	46.75
LMIC Average	103.82	112.82	112.83	110.90	40.75	52.39	61.70	55.92

	Illiteracy rate, adult total (% of people ages 15 and above)				Average Years of Schooling			
	1970-80	1980-90	1990-2000	1970-2000	1970	1980	1990	2000
Algeria	70.6	54.0	40.1	55.9	1.6	2.7	4.3	5.4
Colombia	18.3	13.1	9.8	14.1	3.1	4.4	4.7	5.3
Ecuador	21.1	14.5	10.2	15.7	3.5	6.1	5.9	6.4
Egypt	63.8	56.0	48.8	56.7	..	2.3	4.3	5.5
Hungary	1.6	1.1	0.8	1.2	8.1	9.1	8.9	9.1
Indonesia	35.9	24.5	16.6	26.3	2.9	3.7	4.0	5.0
Mexico	20.6	14.3	10.2	15.4	3.7	4.8	6.7	7.2
Nigeria	72.5	57.7	43.7	59.0	1.2	1.6	2.7	3.5
Poland	1.3	0.6	0.3	0.8	..	..	..	..
Saudi Arabia	56.2	39.5	28.7	42.5	..	..	..	..
Syria	51.3	39.6	30.2	41.1	2.2	3.7	5.1	5.8
Venezuela, RB	19.0	12.9	9.2	14.0	3.2	5.5	5.0	6.6
MNA Average	61.3	49.1	39.0	50.6	2.0	3.0	4.4	5.3
LMIC Average	34.8	25.2	18.2	26.1	..	..	..	5.6

Macroeconomic Indicators

	Total trade (imports+exports) (% of GDP)				Foreign direct investment, net inflows (% of GDP)			
	1971-80	1981-90	1991-2000	1971-2000	1971-80	1981-90	1991-2000	1971-2000
Algeria	63.72	48.50	52.70	54.97	0.47	0.00	0.02	0 16
Azerbaijan	..	..	94.70	94.70	..	..	12.08	12.08
Colombia	30.01	28.58	36.30	31.63	0.35	1.38	2.30	1.34
Ecuador	50.89	50.26	58.71	53.29	2.29	0.60	3.06	1.98
Egypt	53.97	55.53	49.58	53.02	1.25	2.59	1.21	1.68
Gabon	107.42	94.96	87.08	96.48	3.07	1.90	-2.17	0.93
Hungary	80.53	75.14	84.16	79.94	0.00	0.00	4.92	1.64
Indonesia	43.99	47.16	59.52	50.22	0.71	0 44	0.67	0.61
Mexico	19.44	30.86	51.67	33.99	0.81	0.98	2.32	1.37
Nigeria	38.47	44.14	81.89	54.83	1.28	2.02	4.13	2.48
Poland	..	50.16	52.09	51.92	..	0.15	2.91	2.66
Saudi Arabia	99.58	86.57	75.34	87.16	..	..	..	..
Syria	52.05	43.92	67.09	54.35	0 00	0.33	0.71	0.35
Venezuela, RB	48.25	45.80	50.25	48.10	-0.34	0.25	2.88	0.93
MNA Average	67.86	72.69	75.44	72.00	0.75	1.11	1.56	1.14
LMIC Average	27.77	35.97	55.76	39.84	0 50	0.51	2.49	1.41

	General government final consumption expenditure (% of GDP)				Overall budget deficit, including grants (% of GDP)			
	1971-80	1981-90	1991-2000	1971-2000	1971-80	1981-90	1991-2000	1971-2000
Algeria	15 23	17 29	16.51	16.34	-7.41	-7 90	-0 30	-5.20
Azerbaijan	.	..	16.25	16.25	..	..	-4.60	-4.60
Colombia	9.14	9 98	15 90	11.67	-0.81	-1.99	-2.58	-1.76
Ecuador	12.78	11.89	9.94	11.53	-1.07	-0.97	0 48	-0.74
Egypt	22 42	15 80	10.31	16.17	-15.73	-9.10	-0 78	-8.29
Gabon	14.12	18.35	14.19	15 55	-6.59	0 16	-1 65	-2.86
Hungary	10 18	10 37	10.98	10 51	.	-1.23	-4.07	-2.65
Indonesia	9.26	10.05	7.57	8.96	-2.61	-1 45	0.02	-1.35
Mexico	9 85	9.15	10 39	9.80	-3.69	-8.45	0 30	-4.11
Nigeria	11 70	14.19	13.44	13.11	-1.97	-5.01	..	-3.07
Poland		19.29	18.49	18 56	.	-1.44	-1 32	-1.36
Saudi Arabia	17 27	33 42	29 35	26 68		..	..	..
Syria	20 03	19.60	12.92	17.52	-6 35	-2.71	-0.45	-3.35
Venezuela, RB	11.52	10.77	7 53	9.94	-0 11	.-0 92	-1.71	-0.91
MNA Average	19.27	21.43	18 01	19 57	-7 15	-6.74	-2.37	-5.42
LMIC Average	11.52	13 31	13 19	12 67		..	-1 99	.

	Inflation, consumer prices (annual %)				Average Annual Terms-of-Trade Growth (%)			
	1971-80	1981-90	1991-2000	1971-2000	1971-80	1981-90	1991-2000	1971-2000
Algeria	8 52	9 74	18 78	12 12	17.06	-5 92	-1 40	3 41
Azerbaijan		.	459 27	459 27			-3 91	-3.91
Colombia	21 28	23 72	20 50	21 83	2 36	-1 26	0.30	0.47
Ecuador	12 66	37 52	43 79	31 32	2 15	-4 48	-2 90	-1 70
Egypt	9 47	16 96	9 11	11.85	1 57	-6 68	1 03	-1 45
Gabon	11 92	6 03	4 25	7 75	11 72	-5 07	-4 62	0 86
Hungary	5 14	10.93	20 25	12.60	-2 82	-0 60	0 91	-1 03
Indonesia	17.49	8 61	14 11	13 40	15 89	-0 54	1 37	6 04
Mexico	16 80	69 08	18 69	34 86	4 21	-3.55	-0 47	0 08
Nigeria	15 29	22 81	30 60	22 90	22 32	-4 35	-1.32	5 79
Poland	4.69	107 67	28 43	46.93	.	.	0.23	-0 36
Saudi Arabia	12 84	-0 13	0 98	4 56				.
Syria	10 71	22 62	6 35	13 23	4 03	-1 20	-5 99	-1.54
Venezuela, RB	8 51	24 93	33 49	22 31	8 61	1 50	-0 05	2 65
MNA Average	10.59	10.36	7 58	9 51	1.79	-1.38	-1 94	-0 46
LMIC Average		..		.	.	-1 69	-0 30	-0 65

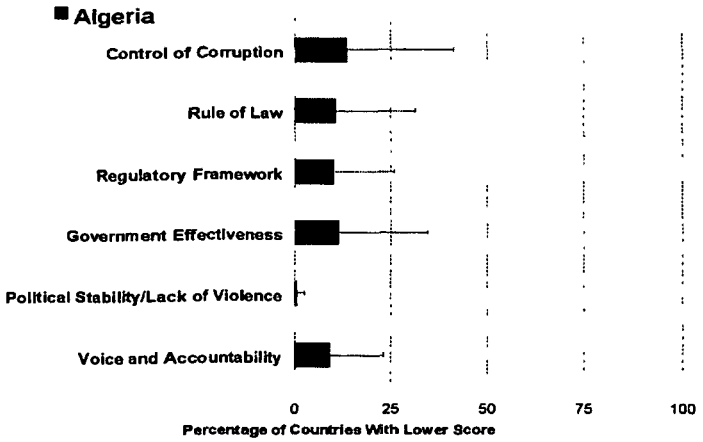
Institutional Indicators

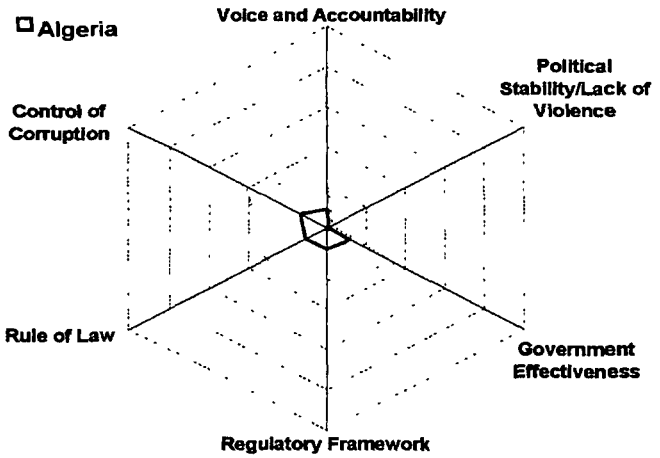
International Country Risk Guide (ICRG) Ratings (Scaled to a Score of 1-10)								
	Bureaucracy Quality		Law and Order		Corruption		Democratic Accountability	
	1986-88	1998-2000	1986-88	1998-2000	1986-88	1998-2000	1986-88	1998-2000
Algeria	2.27	3.33	3.80	3.38	6.67	3 33	3 38	3 52
Azerbaijan	.	1 67	.	6.80	.	3.33		4 07
Colombia	5.00	3 33	1.67	2 87	5.00	3 06	6 67	5 00
Ecuador	3 33	3.33	6 67	5.19	5.00	5.00	6.67	6.67
Egypt	3 33	3 33	4 44	6 67	3.33	3 33	6 67	3 33
Gabon	5 00	3.33	3 33	5 00	3 33	1 67	3 33	5 09
Hungary	5 00	6 67	8 33	9 07	6.67	8 29	8 33	10 00
Indonesia	0 00	4 35	3 33	3 61	0 19	2 36	5 00	4.21
Mexico	2.31	5 00	5.00	3 56	5.00	4 35	5 65	8.56
Nigeria	1 76	0 83	1 67	5.00	3.33	1 94	5 32	3 61
Poland	1.67	5.00	6.67	7 55	6 67	6 48	3 33	10 00
Saudi Arabia	5 00	3.33	6 67	8.33	4.44	3 33	3 33	0.00
Syria	1 67	1.67	3.33	8 33	3 33	6.02	3 33	1 67
Venezuela, RB	3 33	1.67	6 67	6 67	5.00	5 00	8 33	7.45
MNA Average	3.45	2 86	4.09	7 46	4 17	4.76	4 17	3 64

	Voice and Accountability	Political Stability	Government Effectiveness	Regulatory Quality	Rule of Law	Control of Corruption
Algeria	-1 19	-1.27	-0.81	-0 79	-0 97	-0 62
Azerbaijan	-0 70	-0.70	-0.95	-0.14	-0 78	-1 05
Colombia	-0 41	-1.36	-0 38	0.02	-0 77	-0 39
Ecuador	-0 14	-0 80	-0 94	0.00	-0 76	-0 98
Egypt	-0.65	0 21	0.27	0.13	0.21	-0 16
Gabon	-0 40	-0.44	-0 45	-0 12	-0 44	-0 58
Hungary	1 19	0 75	0.60	0.88	0.76	0 65
Indonesia	-0 40	-1.56	-0 50	-0.43	-0 87	-1 01
Mexico	0 12	0.06	0 28	0 58	-0 41	-0 28
Nigeria	-0.44	-1 36	-1 00	-0 39	-1 13	-1.05
Poland	1 21	0.69	0 27	0.41	0 55	0 43
Saudi Arabia	-1 07	0 51	0 00	-0 11	0.19	-0.35
Syria	-1 40	-0.28	-0 81	-0 66	-0 52	-0 83
Venezuela	-0 34	-0 33	-0 81	-0 30	-0 81	-0 59
MNA Average	-0 64	0 07	0 07	0 16	0.10	-0.09
Source:	Kaufman, Kraay, Zoido-Lobaton (2002), "Governance Matters II· Updated Indicators for 2000/01" World Bank WP.					

Algeria Relative to Rest of World on Governance Indicators:

The accompanying graphs show the percentile rank of Algeria on each governance indicator, either as a blue bar (in the Bar Chart) or as a thick line (in the Diamond Chart). In the Bar Chart, the statistically likely range of the indicator is shown as a thin red line. For instance, a bar of length 75% with the red lines extending from 60% to 85% has the following interpretation: An estimated 75% of the countries rate worse and an estimated 25% of the countries rate better than the country of choice. However, at the 90% confidence level, only 60% of the countries rate worse, while only 15% of the countries rate better. In the Diamond Chart, the basic indicator contour (shown as a thick line) is framed by two thin lines (an outer one and an inner one) which define the shaded range depicting the 90-percent confidence interval for that country's relative ranking on each indicator. Thus, in both charts, higher values imply better governance ratings.





The governance indicators reported in these charts reflect the statistical compilation of perceptions of the quality of governance of a large number of survey respondents in industrial and developing countries, as well as non-governmental organizations, commercial risk rating agencies, and think-tanks during 1997 and 1998. They in no way reflect the official position of the World Bank, its Executive Directors, or the countries they represent. As discussed in detail in the accompanying papers, countries' relative positions on these indicators are subject to large margins of error that are clearly indicated in the charts above.

Source: Composite Governance Indicators Dataset, Governance Research Project by Daniel Kaufmann, Aart Kraay and Pablo Zoido - Lobaton, as described in 'Aggregating Governance Indicators' and 'Governance Matters' research papers (PRWP #2195 and #2196). To access the complete dataset, as well as the accompanying papers, please return to www.worldbank.org/wbi/governance/gov_data.htm .

Annex 1.2: Methodology of growth accounting

Here we develop a growth accounting framework to estimate the contributions of capital (physical and human), labor, and total factor productivity (TFP) toward determining long-term growth. We develop two measures of TFP, both as residuals from aggregate production functions.

For the first measure, we use the standard neoclassical CRS Cobb-Douglas production function,

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

where Y is the aggregate output, K and L are capital and labor inputs into production, α is the share of capita stock in output under perfect competition, and A is the first TFP measure. Consistent with individual country studies, α is set equal to 0.4 here. By dividing both sides by L, we get the per-worker output function:

$$y_t = A_t k_t^{\alpha} \; ; \; y = Y/L, \; and \; k = K/L.$$

Let A = TFP1. The growth rate of TFP1 may then be written as

$$g(TFP1) = g(y) - \alpha * g(k),$$

where g(X) indicates the annual growth rate of variable X.

The second TFP measure is obtained by adjusting for the quality of the labor force—or the human capital

$$y_t = A_t k_t^{\alpha} (h_t)^{1-\alpha}$$

where h_t is a measure of human capital based on education stocks and returns on education.[1] Following Ghosh and Kraay (2000), we define $h = e^{0.1S}$, where S is the average years of schooling per worker, and 0.1 is the returns to education that is consistent with estimates found in the literature. By using the exponential form for calculating human capital, we assume that human capital grows faster at higher levels of education: a fact confirmed by studies in the field. The formula for the growth rate of the second TFP measure, TFP2 may be written as:

$$g(TFP2) = g(y) - \alpha * g(k) - (1 - \alpha) g(h),$$

Estimates of the contributions to total GDP growth are presented in table A1.2.1

Table A1.2.1: Contributions to total GDP growth

	GDP Per-Worker	Capital Stock Per-Worker	Human Capital	Total Factor Productivity TFP1	TFP2
A. Average Growth Rates					
65-71	2.32	0.90	0.88		
72-74	8 54	2.85	0.90		
75-78	3.57	6.83	1 20		
79-81	0.18	5.89	1.44		
82-85	1.11	3.17	1.60		
86-94	-3.63	-0.92	1.39		
95-00	-0.22	-2.42	1.10		
B. Contribution to Output Growth (TFP1 = Solow Residual)					
65-71	2.32	0 36		1.96	
72-74	8.54	1.14		7.40	
75-78	3.57	2.73		0.84	
79-81	0 18	2.36		-2.18	
82-85	1.11	1.27		-0.16	
86-94	-3.63	-0.37		-3.26	
95-00	-0.22	-0.97		0.75	
C. Contribution to Output Growth (TFP2 = Solow Residual)					
65-71	2.32	0.36	0.53		1.43
72-74	8.54	1.14	0.54		6.86
75-78	3.57	2 73	0.72		0.12
79-81	0.18	2.36	0.86		-3.04
82-85	1.11	1 27	0.96		-1.12
86-94	-3 63	-0.37	0.83		-4.09
95-00	-0.22	-0.97	0.66		0 09

Annex 1.3: Measuring macroeconomic volatility in Algeria

What is the degree of volatility faced by Algeria? To answer this, we construct two measures of volatility each for the rate of inflation (of the consumer price index), per-capita growth rate, natural log of the terms of trade index, and the annual terms of trade growth: 8 indicators of volatility in all. The first measure is simply the standard deviation of the variables over a period of time. This gives us VOLAT(Inflat1), VOLAT(Growth1), VOLAT(TOT1), and VOLAT(TOT2), with each indicator being the standard deviation of the above-mentioned variables. The calculations for Algeria and a group of comparator countries are shown in Tables 1.3.1 and 1.3.2.

The second measure, following Serven (1998), aims to separate the uncertainty element from volatility. This measure is given by the conditional variance of the innovation to each variable considered, constructed using the generalized autoregressive conditional heteroskedasticity (GARCH) specification of Bollerslev (1996). Specifically, we estimate the following univariate GARCH(1,1) model for each of the four macro variables:

$$x_{it} = \alpha + \beta\, x_{i,t-1} + \varepsilon_{it} : t = 1 \ldots. T\ ;\ i = 1 \ldots\ldots N$$

$$\sigma^2_{it} = \gamma_i + \theta_i\, \varepsilon^2_{i,t-1} + \delta_i \sigma^2_{i,t-1}$$

where σ^2_t denotes the variance of ε_t conditional on information up to period t. The two-equation model is jointly determined. We estimate the model separately for Algeria and the group of benchmark countries for the four variables. The measure σ^2_t from the estimation is then used as a measure of uncertainty. This is then calculated for the above-mentioned 4 variables to give us volatility indicators VOLAT(Inflat2), VOLAT(Growth2), VOLAT(TOT3), and VOLAT(TOT4). The calculations for Algeria and the benchmark countries are shown in the tables below.

Table 1.3.1: Terms of Trade Volatility

	1970-80	1980-90	1990-2000	1970-2000	1970-80	1980-90	1990-2000	1970-2000
		Volat(TOT1)				Volat(TOT2)		
Algeria	0.42	0.37	0.12	0 42	31.3	23.0	12.2	24 0
Colombia	0.13	0.08	0 05	0.10	13.0	10.4	5.2	10.4
Ecuador	0.22	0.26	0.10	0.27	23.8	12 4	11.9	17 1
Egypt	0.09	0.35	0.09	0.29	11.3	10.9	10 4	11.2
Gabon	0.29	0.41	0 14	0.36	31.1	20.8	12 2	22.9
Hungary	0.12	0.04	0.04	0.13	4.3	2 2	2.2	3 5
Indonesia	0.41	0.15	0.05	0.40	19.2	14.3	7 2	16 1
Mexico	0 11	0.23	0.04	0.16	9 4	15.4	4 2	9.7
Nigeria	0.54	0.44	0.21	0.47	35 3	26.5	27 7	30.5
Syria	0.10	0.14	0 19	0.28	5.8	13 0	14 8	13.1
Venezuela, RB	0.17	0.23	0.10	0.21	22.5	26.6	12 9	19.8
MNA Average	0.08	0.08	0 09	0.10	8 2	3.6	10.0	7.6
		Volat(TOT3)				Volat(TOT4)		
Algeria	0.05	0.03	0.01	0.03	523.6	448 8	497 5	553 8
Colombia	0 01	0.01	0 01	0.01	86.0	137.6	109.7	58.0
Ecuador	0.04	0.03	0.01	0 03	339.0	987.7	417.4	236 0
Egypt	0.01	0 01	0.00	0.01	84 0	101.3	77 3	91.6
Gabon	0.04	0.01	0.02	0.02	160.7	440.6	104.8	214 1
Hungary	0.00	0.00	0 00	0.00	5 7	7.6	5.8	5.8
Indonesia	0 02	0.01	0.00	0.01	75.6	272.0	93.1	47.0
Mexico	0.00	0.03	0 01	0.01	221.8	30.0	366.5	53.8
Nigeria	0.07	0.05	0 05	0.06	808.3	716.4	805.9	814 8
Syria	0.01	0.01	0.02	0.01	154.7	169.5	170.0	134.0
Venezuela, RB	0.04	0.03	0 01	0.02	381.5	426 4	316.6	444.3
MNA Average	0.01	0.01	0.01	0 01	69 4	203 3	77 9	58 2

Table 1.3.2: GDP growth and Inflation Volatility

	1970-80	1980-90	1990-2000	1970-2000	1970-80	1980-90	1990-2000	1970-2000
		Volat(INFLAT1)				Volat(Growth1)		
Algeria	4 3	3.6	11 8	8.4	9 2	3 1	2 6	5 8
Colombia	7.8	4.1	6.6	6.4	1.8	1.6	2.9	2.3
Ecuador	4.7	19.9	20.7	21.6	5.9	4.4	3 3	5.4
Egypt	5.3	4.0	6.1	6.2	4.5	2.1	1.6	3 0
Gabon	7.7	6.7	14 8	10.1	18.8	8.2	4.1	12.0
Hungary	2.7	7 2	7.8	9.0	3.6	2 1	5.3	4.0
Indonesia	10.8	3.7	15.2	11 4	1 3	2.5	6.5	4.1
Mexico	8.4	38.9	9.6	33.3	2 4	3.9	3.8	3 7
Nigeria	8.7	18.3	25.0	19.1	8.5	7.0	4 0	6.6
Syria	6.3	15.5	7.1	12.4	10.3	6.7	3.3	7 8
Venezuela, RB	5.5	22.4	48.8	33.0	3.3	4.8	4 5	4 2
MNA Average	4.9	2.4	5.1	4.4	5.9	4 8	3 9	5.6
		Volat(INFLAT2)				Volat(Growth2)		
Algeria	20.0	21.2	60 8	34.9	84 2	13.1	13.1	38.1
Colombia	47.9	24.3	15.5	29.2	3.3	3.0	3 9	3.5
Ecuador	37.4	131.1	212.5	130.3	20 2	17.7	13.4	17.7
Egypt	31.8	18.0	22.1	23.7	11.4	7.0	5 1	8.1
Gabon	24.9	56.2	132.2	64.8	156.1	91.7	62.6	102 8
Hungary	6.0	26.3	17 8	17.0	11.9	8.8	20.9	14.0
Indonesia	197.5	105.0	277 0	198.2	19.9	19.8	17.4	19 0
Mexico	164 1	7026.3	443.2	2625.5	15.0	16.2	10.1	13.6
Nigeria	80.2	240.2	399.4	241.3	141.6	72 3	9.9	75.8
Syria	53.8	178.7	54.6	97.5	71.0	35.7	5.5	38 6
Venezuela, RB	10.5	138.2	1359.6	527.5	18.8	27.9	13.3	19.6
MNA Average	51 0	40.6	20.5	35.3	29.9	26 7	14.3	24 5

Annex 1.4: A framework for assessing factors of long-term growth performance in Algeria

Solow-Swan Framework: The early neoclassical models of Solow (1956) and Swan (1956) highlight the importance of (exogenous) saving, population growth, and technological advance for steady-state income levels and long-run growth. Under this framework, saving and population growth rates affect steady-state per-capita *income levels* and hence determine short-run growth dynamics: the further an economy finds itself short of the new steady-state, the faster it grows in the short-run. Per-capita *long-run growth* is determined only by the rate of technological progress. Applied across countries, this rudimentary framework hypothesizes that international income and growth differences are based on countries' saving behavior and population dynamics: the higher the rate of saving of the country the richer it is, and the higher the rate of population growth the poorer the country.

In a seminal paper, Mankiw, Romer and Weil (MRW) (1992) test this hypothesis quite successfully: they find that indeed cross-country differences in saving and population growth rates explain a significant proportion of the cross-country variation in per-capita income levels. They also test an augmented Solow-Swan framework (by including human capital in the production function), and find that differences in human and physical capital accumulation, population growth rates and initial income account for almost 80 percent of cross-country income variation. This suggests a very limited role for technological progress in explaining cross-country differences in income levels and growth. They also find evidence of *conditional convergence*: countries move to different steady-state per-capita income levels that are based on their saving rates (in human and physical capital) population rate, and exogenous technical progress common to all countries at growth rates that are proportional to the distance between the initial income levels and steady-state income.[2] As mentioned, MRW ignore international differences in technology levels and growth: in their view technology dispersion across the world should be straightforward.

Consistent with the MRW framework, we run a regression of the average per-capita GDP growth (1971-2000) (y) on the average investment rate (INV), the initial income in 1970 (INI), the average population growth rate (POP), and the average level of secondary school enrollment (SEC) (as a measure of human capital) during this period. Results are reported below with the relevant t-statistics in the parenthesis. The signs are as predicted: the sign on initial income is negative (suggesting conditional convergence), that on the investment rate is positive, that on population growth is negative, and that on secondary enrollment is positive.

$$y = -6.2 + \ln(SEC)*0.77 + \ln(INV)*3.3 - \ln(INI)*0.6 - POP*4$$
$$(-3.3) \quad (3.0) \quad (6.4) \quad (-2.2) \quad (-2.0)$$

Adjusted $R^2 = 0.44$

According to this estimation, the average per-capita growth rate in Algeria during the 1971-2000 period should have been 3.2 percent, and not the 0.92 actually seen. This is mainly driven by a high average investment ratio in Algeria: one of the highest in the sample. These gains from capital accumulation are offset to some extent by the relatively high population growth rate and weak average human capital indicators: although these have improved significantly in recent years.

We obviously need to dig a bit deeper to get a better sense of the growth performance in Algeria. Even within the MRW framework, we can explore a couple of possible alternate explanations. First, capital accumulation per-se is not relevant for evaluating the impact on growth. Khan and Kumar (1997) show that the mix of public vs. private investment is what matters. Conceptually, it is not clear whether accumulation of capital by the public sector is necessarily beneficial. On the one hand, public sector investments in infrastructure and human capital can improve the efficiency of private investment and hence increase growth. On the other hand, public investment often targets projects of dubious quality and also tends to crowd out private investment, which hurts the growth process. Khan and Kumar find that during the period 1970-1990, private investment had a larger impact on growth than public investment: the difference is much larger during the 1980s. Although exact data are lacking, we know that public sector investment dominates private investment in Algeria. During the 1970s, this investment mix produced reasonable growth performance: as we saw in Annex 1.2, the TFP growth rates for Algeria were largely positive during the 1970s. However, consistent with Khan and Kumar's results, diminishing returns seemed to have set in more rapidly for public investment in the 1980s and 1990s, and TFP and growth suffered as a result thereafter.

Second, the impact of human capital *accumulation* on growth has been shown to be ambiguous. (Pritchett (1997), Easterly (2001)). Instead, later studies have focused on the *starting level* of human capital, which goes against Algeria. In the 1970s and 80s, Algeria had one of the lowest levels of human capital among the group: it's only in the 1990s that it started to catch up due to rapid accumulation. Accordingly, the recent improvements in human capital indicators auger well for future growth, but cannot help explain the past growth performance in Algeria.

Empirical literature that extends the MRW framework aims to expand the set of variables that conditions countries' steady-state income levels – either via changing incentives to accumulate capital or by improving the productivity – and hence their transitional growth dynamics. The most common of these additional variables relate to the size of the government, policies (such as inflation rate and degree of trade and exchange restrictions), governance, and efficacy of political and market institutions.

For example, using a panel of about 100 countries, Barro (1998) finds that for a given level of initial real per-capita income, growth is increased by higher initial schooling and life expectancy (human capital measures), lower fertility, lower government consumption to GDP ratio, better maintenance of rule and law, greater degree of democracy, and improvements in terms of trade.

The important of trade openness is highlighted by Edwards (1992), Sachs and Warner (1995), and Dollar and Kraay (2001). Dollar and Kraay (2001) show that on average countries that saw larger increases in trade to GDP ratios saw higher increases in growth rates. They also show that increases in FDI/GDP ratio too impact growth positively. Klein, Aaron, and Hadjimichael (2001) also document the importance of FDI for growth. They argue that (with the exception of Japan and Korea) fast-growing countries -- such as China, Thailand, Malaysia, Singapore, and Chile – have relied on FDI for their rapid progress. FDI impacts growth by allowing faster capital accumulation, increased competition, as well as improving productivity by transfer of technology, organizational innovations, and managerial skills.

Emphasizing the importance of a stable macro environment for higher growth, Fischer (1993) shows that large budget deficits, inflation, and distorted foreign exchange markets slow down growth. Further, he shows that inflation and large budget deficits impact growth both by slowing down capital accumulation and by reducing productivity growth, while TOT increases impact growth by improving productivity growth and a higher black market premium lowers capital accumulation. According to Fischer, an unstable macro environment leads to increased uncertainty and reduction in the efficiency of the price system, which impact capital accumulation and the efficiency of its use. A high budget deficit also affects capital accumulation via crowding-out effect. Easterly and Rebelo (1992) also find a negative relation between growth and budget deficits.

The importance of social and institutional factors for growth is being increasingly recognized in the growth literature. Empirical evidence clearly shows that security of property rights and contractual rights, efficiency of the government service delivery, social and political stability, predictability of government rules impact growth. During periods of political instability, governments decisions tend to become short-sighted, placing less emphasis on maximizing longer-term gains. Also, during these periods, property and contract enforcement becomes weaker, inhibiting the private sector from making productive investment. Low security of property rights over profits, ownership of capital, and patents may reduce incentives and opportunities to invest, innovate and receive the benefits of foreign direct investment. On the other hand, cumbersome and dishonest bureaucracies delay the process of and make more expensive distribution of licenses and permits, thereby delaying productive investment.

Using institutional indicators compiled by two private international investment risk services, International Country Risk Guide (ICRG) and Business Environment Risk Intelligence (BERI), Knack and Keefer (1995), show that these indicators significantly predict future growth after accounting for other standard growth-determinants. They also show that institutional weaknesses inhibit investment, and the impact of these variables on growth is negative even after taking into account the impact of investment, which implies that efficiency of investment is also hurt by poor institutions. Similarly, using several subjective indices of corruption, the amount of red tape, the efficiency of the judicial system, and various categories of political stability, Mauro (1996) shows that corruption lowers investment and economic growth.

To account for the "missing growth" of 2.3 percent in Algeria we extend the regression to include broader measures of growth determinants, drawing on variables suggested in the growth literature.

$$y = 4\ 5 - SEC*0\ 02 - MORT*0.01 + \ln(INV)*2\ 3 - \ln(INI)*1\ 1 - FERT*0.4 - VOLAT*0.05 + ICRG*0\ 04 - BMP*0.001$$

(1.2) (-1 6) (-3 0) (-5 0) (-2 8) (-1 7) (-2 5) (2 2) (-2 5)

Adjusted $R^2 = 0.64$

where, SEC, MORT and FERT are human capital indictors and stand for the average secondary enrollment rate, the average mortality rate, and the average fertility rate respectively, VOLAT is a volatility measure (calculated as standard deviation of annual terms of trade growth during 1971-1999), ICRG is the average rating of political institutions over 1984-2000 by the ICRG, [3] and BMP is the average black market premium. The relevant t-statistics are in the parenthesis.

All signs are as expected, except for human capital—but the coefficient on human capital is not significant at the 10 percent level. All t-statistics are significant at least at the 5 percent level, except for FERT, which is significant at the 10 percent level.[4] The adjusted R^2 increases significantly to 64 percent. This estimation predicts an average per-capita growth of 1.3 percent for Algeria, which is much closer to the actual performance of 0.92 percent. Therefore, much of the "missing growth" is accounted for by including proxies for market distortions, volatility, and institutions.

Annex 1.5: Accounting for long-term "growth crashes"

The standard Barro-type empirical regressions, supporting the neoclassical hypothesis, work well in terms of explaining average growth performance over extended periods of time. However, these fails to explain an important feature of the growth dynamics observed during the past two decades: growth collapses in a number of parts of the world, including Algeria, in the 1980s and 1990s.[5] For example, Temple (1999) reports that for a large cross-section of countries the correlation between growth over 1960-75 and that over 1975-90 is just 0.17. Similarly, according to Easterly (1999), while the median per-capita growth in developing countries was 2.5 percent during 1960-79, it was only 0.0 percent during 1980-98. This swing in growth rates over the different periods would seem even wilder if one were to exclude the exceptional performance of the East Asia region.

Now, if this growth collapse in the developing world, including Algeria, was due to a consistent worsening of growth-determining policies, then it is easy to understand the phenomena within the standard empirical literature. However, as noted by Easterly (1999), the conundrum arises out of the fact that the policy environment in developing countries improved in general during this period. The variables identified above as being important for explaining long-term growth in Algeria therefore provide an incomplete explanation for the growth crash seen in Algeria since the mid-eighties.

It is important then to develop a framework that would include this missing driver of the growth process to obtain a meaningful insight into Algeria's growth performance. Easterly et al (1993) argue that this weak persistence of growth against a backdrop of persistence in policies can be explained by random shocks. They argue that changes in terms of trade help account for the variations in growth performance. These random shocks have later been given different interpretations in the literature. Easterly (1999) claims that the shocks arose mainly from a slowdown in the industrial countries. Rodrik (1999) interprets them as external term-of-trade shocks (which he defines as standard deviation of terms of trade growth times initial trade to GDP ratio), whose impact on the growth process is magnified by latent social conflict and weak institutions of resolution.

Taking a cue from Pritchett (2000), we estimate a growth model that seeks to explain the growth differences between the periods 1971-1985 and 1986-2000. 1985-86 seems like a good break point since oil prices dropped by 50 percent during that year, and it is potentially interesting to see how countries performed differentially coming out of this major global shock. Consistent with previous analysis, and also cognizant of their important for Algeria, we will incorporate the role of shocks and evaluate why some countries showed greater vulnerability to shocks than others.

Consider the standard cross-country growth regression:

Eq. 1 $y_{ct} - y_{c,t-k} = \alpha + \beta_1 \cdot y_{c,t-k} + \boldsymbol{\beta}'\mathbf{X}_{ct} + \eta_c + \gamma_t + \varepsilon_{ct}$

where y is the log-level of per worker GDP in country c at time t, k is the number of lag years, **X** is a set of independent explanatory variables. The disturbance term has three components; η_C is an unobserved country-specific effect that is constant over time and randomly and independently distributed among the countries; γ_t is a period effect that is common to all countries, distributed randomly and independently across time periods; and ε_{ct} is a shock term that varies across both countries and time.

First-differencing Eq. 1 and re-arranging gives us:

Eq. 2 $(y_{ct} - y_{c,t-k}) - (y_{c,t-k} - y_{c,t-2k}) = \beta_1 (y_{c,t-k} - y_{c,t-2k}) + \boldsymbol{\beta}'(\mathbf{X}_{ct} - \mathbf{X}_{c,t-k}) + (\gamma_t - \gamma_{t-k}) + (\varepsilon_{ct} - \varepsilon_{c,t-k})$

This equation represents a regression of the increase in growth between 2 consecutive periods on lagged growth and *changes* in explanatory variables. According to Dollar and Kraay (1999), this format (with differenced data) has the advantages of reducing measurement error and controlling for omitted variables that may be persistent over time (such as geography, culture, etc.). It also allows us to eliminate the country-specific shocks.

Given that changes in period-average growth rates are attributed to volatility by researchers, we add a measure of volatility (V) to the above equation and for convenience take out the $(\gamma_t - \gamma_{t-k})$ term:

Eq. 3 $(y_{ct} - y_{c,t-k}) - (y_{c,t-k} - y_{c,t-2k}) = \beta_1 (y_{c,t-k} - y_{c,t-2k}) + \boldsymbol{\beta}'(\mathbf{X}_{ct} - \mathbf{X}_{c,t-k}) + \theta \cdot V_C + (\gamma_t - \gamma_{t-k}) + (\varepsilon_{ct} - \varepsilon_{c,t-k})$

We take t = 2000 and k = 15. In practice, we proxy the dependent variable by the average per-worker growth rates during 1986-2000 minus the average per-worker growth rate during 1971-1986.[6] This is regressed on lagged per-worker growth, changes in control variables over the two periods and a volatility term. For the set **X**, several candidate variables covering macroeconomic and institutional conditions of the country were considered. We settled for the decadal average rate of inflation (proxy for domestic macro policy), and decadal averages for FDI/GDP and Trade/GDP ratios (proxies for outward orientation). **X** also includes a dummy for the oil-exporting countries to account for their larger exposure to the oil price shocks. Note that we do not include the investment term as a regressor, since we expect investment to be fully determined by the other RHS variables.

We use two measures of volatility. The first measure, V1 is from Rodrik (1999). V1 = standard deviation of the annual growth rates of the country's terms-of-trade (over the period 1980-2000) times its initial trade to GDP ratio (averaged over the period 1981-1985). The second shock measure, V2, is the VOLAT(TOT4) indicator described in Annex 1.3, measuring uncertainty arising out of TOT fluctuations. We then replace the volatility measure with two synthetic measures that capture the interaction of volatility with social and political conditions. The first synthetic term, V3, equals [V2*(50-ICRG)*(5-POL)]/[STDEV(V2*(50-ICRG)*(5-POL))];

where ICRG is the increase in average ICRG ratings for political institutions during the 1990s over 1980s, and POL is the measure for Political Stability and Violence from Kaufmann et al (2002).

An additional synthetic measure, V4, captures the interaction between volatility and the relative the size of government expenditures. The second synthetic term, V4, equals:

[V2*GOVT_CONS]/[STDEV(V2*GOVT_CONS];
where GOVT_CONS is the average government consumption to GDP ratio during 1986-2000.

The results are presented in the table below. The coefficients in all 4 regressions are of the correct sign and mostly significant at the 1 and 5 percent levels. The adjusted R^2s in all estimations are close to 70 percent.

As predicted, the increase in per-worker GDP growth is negatively correlated with previous period growth (shows mean reversion in growth, and hence conditional convergence), with an increase in the inflation rate (which is a proxy for worsening macro policy), with higher volatility, and positively correlated with increases in the FDI/GDP and Trade/GDP ratios. The coefficient for the oil-country dummy is negative and significant in the first regression. Importantly, the two synthetic indicators are highly significant and adversely impact growth. This indicates that interactions of volatility with weak institutions and social and political instability, and with a large government are extremely harmful for growth. The indicator V4 too affects growth negatively, suggesting that adjustment of expenditure in the face of shocks is slower when the government absorbs a large part of resources. The predicted change in growth from this estimation is –3.9 percent. Calculations show that the interaction of a relatively large government with external volatility likely cost Algeria close to 0.8 percent in average growth. Results also suggest that delayed macro stabilization (proxied by higher average inflation), low foreign direct investment, and restricted openness to non-oil trade, also contributed significantly to the sharp decline in growth in Algeria..

Dependent Variable: Average Per-Worker Growth in 1986-2000 minus Average Per-Worker Growth in 1971-1985	(1)	(2)	(3)	(4)
Independent Variables				
Lagged Growth	-0.68	-0.75	-0.71	-0.74
	(-8.2)***	(-9.4)***	(-8.6)***	(-9.6)***
Volatility Terms				
V1	-0.08			
	(-2.4)**			
V2		-0.002		
		(-3.7)***		
Synthetic Indicators				
V3			-0.61	
			(-4.1)***	
V4				-0.54
				(-4.6)***
Decadal Changes in:				
Average FDI/GDP Ratio	0.32	0.24	0.34	0.23
	(2.8)***	(2.4)**	(4.0)***	(2.4)**
Average Trade/GDP Ratio	0.05	0.05	0.05	0.06
	(4.9)***	(5.3)**	(4.9)***	(5.2)***
Average Inflation Rate	-2.71	-2.38	-2.40	-2.61
	(-3.7)***	(-2.9)***	(-4 2)***	(-3.5)***
Dummy for Oil-exporting countries	-0.77	-0.43	-0.07	-0.37
	(-2.2)**	(-1.1)	-0.1	(-0.9)
Adjusted R^2	0.68	0.72	0.75	0.73
Obs	74	70	62	70
Value Predicted for Algeria	-3.86	-3.96	-4.58	-3.84

*, **, *** implies that the coefficient is significant at the 10, 5 and 1 percent

Annex 1.6: Simulating the impact of oil shocks with a Computable General Equilibrium model for Algeria

The impact of hydrocarbon revenues on economic performance will also depend on the way these revenues are intermediated. When the hydrocarbon revenues are exclusively intermediated by the state, as is the case in Algeria, the pattern of expenditures and the amounts allocated to savings and investment may be different from the patterns that would prevail under disbursement of rents to the private sector.

A dynamic sectoral general equilibrium model was used to shed some light on key policy issues for Algeria that may shape future growth performance. This Annex provides a brief overview of the computable general equilibrium (CGE) model used in this study and outlines the main simulation results.

- ***An outline of the model's structure***

The model is characterized by an input-output structure (based on regional and national input-output tables) that explicitly links industries in a value added chain from primary goods, over continuously higher stages of intermediate processing, to the final assembling of goods and services for consumption. Inter-sectoral linkages are direct, like for example the input of steel in the production of transport equipment, and indirect, via intermediate use in other sectors. The model captures these linkages by modeling firms' use of factors and intermediate inputs. The most important aspects of the model can be summarized as follows:

(i) it covers all the important production sectors;
(ii) it allows for dynamics including capital accumulation, adjustment costs, labor force participation—including endogenous TFP in one of its versions;
(iii) it includes intermediate linkages between sectors;
(iv) it allows for endogenous unemployment, skilled and unskilled labor.

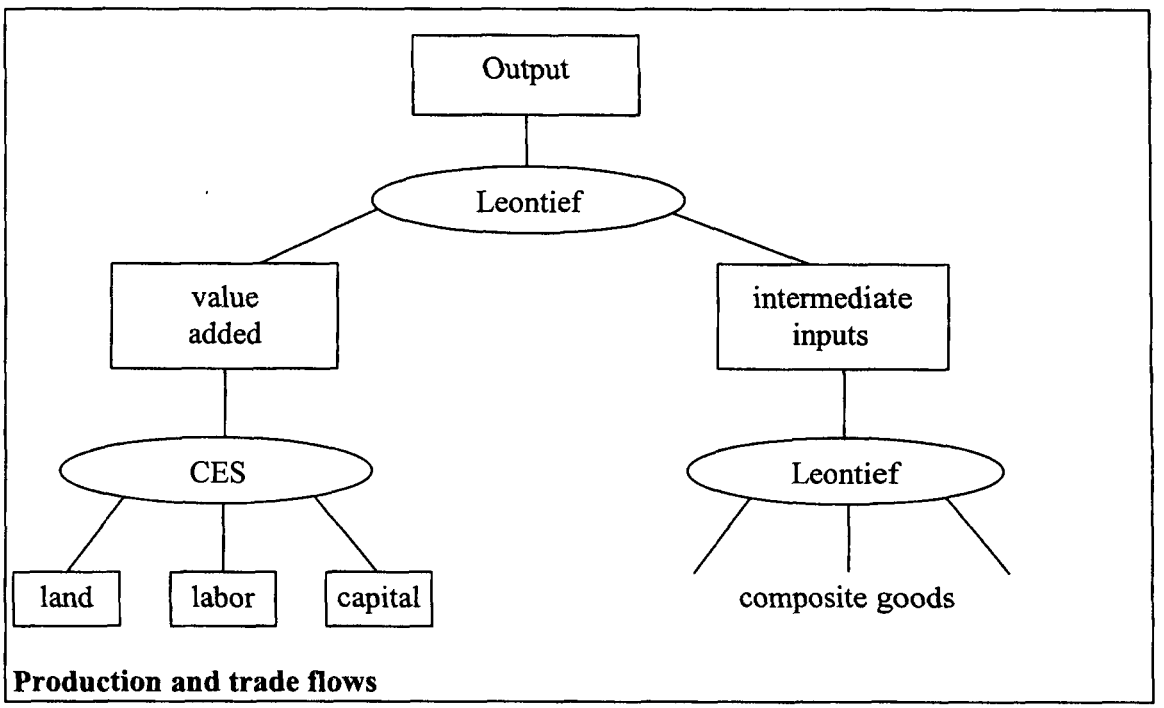
In its current version, the model distinguishes 11 sectors and for some simulations it is integrated within a multinational model of 9 regions/countries specified in Table A1.6.1. It is calibrated upon the most recent data (year 2000) from the World Bank and various Algerian ministerial departments, and also the updated 2000 input-output matrix made available by the Algerian Statistical Office (ONS).

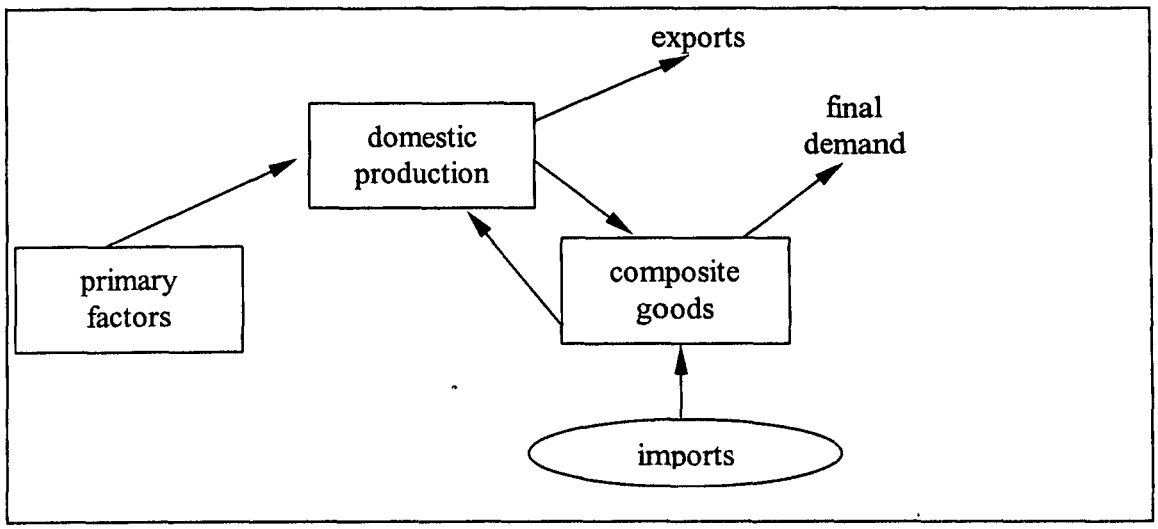
Table A1.6.1: Sectors and Regions

Sectors	Regions
Agriculture, fisheries	Algeria
Natural resources extraction	Arab Republic of Egypt
Textile Industry	Morocco
Food Processing	Tunisia
Other Manufacturing	Rest of MENA
Energy and Water Distribution	European Union
Construction	EU accession candidates
Finances and Insurances	NAFTA
Transport and Communication	Rest of the World
Other private services	
Government services, education, health	

The model is a fairly standard general equilibrium model: All sectors are assumed to operate under constant returns to scale and cost minimization. Service production is subject to constant returns to scale as well, though in the initial benchmark it is monopolized (see Box). In all sectors, production functions are specified using nested CES functions, describing the substitutability between the different inputs (intermediate inputs, capital, rural skilled labor, rural unskilled labor, urban skilled labor, urban unskilled labor). Within each segment labor is fully flexible. Capital is sector-specific.

Box : Specification of production in a representative sector





Goods are differentiated according to their origin. Import demand results from a CES aggregation function of domestic and imported goods (Armington assumption). Export supply is symmetrically modeled as a constant elasticity of transformation function. The representative agent maximizes its utility function under budget constraint, which determines its consumption as well as labor supply.

Several macro-economic constraints are introduced in the model. Net capital transfers are exogenous, so that balance of payments equilibrium is achieved through real exchange rate movements. Investment is determined by the availability of savings, the latter originating from households, government and capital transfers from abroad.

The sequential dynamic path of the model results from this last closure rule, with capital stock being accumulated through past investments (using a permanent inventory type specification). Aggregate investment is determined by national savings. Foreign savings are partially exogenous (as a constant share of GDP). Once the level of investment is determined by relative profitability based upon current prices, the model assumes that total investment is ventilated across sectors depending on the observed return to capital in the previous period. Therefore, rental rates might differ in the short run across sectors, reflecting capital market imperfection. Other variables affect the dynamic path of the economies: the growth in working age population, and an exogenous technical progress parameter.

- Simulations and results

Two alternative scenarios for the management of the hydrocarbons sector were explored.

- The first scenario simulates a temporary (over five years) increase in the real world oil price by 20 per cent. The government uses the additional revenue according to the historical pattern of current and capital expenditures, while keeping the budget balance constant in real terms.
- The second scenario simulates the same temporary (over five years) increase in the real world oil price by 20 per cent, with a change in the "intermediation conduit" of

the windfall. Now the government keeps both the level of public expenditure and the budget balance constant. All additional revenues are transferred to the households in lump-sum amounts.[7]

The results show that oil shocks are transmitted to the Algerian economy via two principal paths—through higher domestic demand, and through changes in relative prices mediated by the real exchange rate. In the first scenario, domestic demand is primarily fuelled by stepped up government expenditures, which, in a second round also boost private sector incomes and expenditures through increased public sector employment and investment. In the second scenario, increased private sector spending is the driver of domestic demand. In both cases the level of GDP increases by about 7 per cent over the 5-year period (amounting to a 1.4 per cent increase in the annual growth rate)—with a somewhat smaller increase in non-hydrocarbon GDP (table A1.6.2).

Table A1.6.2: The summary impact of a temporary increase in hydrocarbon revenues [1]
Scenario 1: Oil prices increase by 20% for 5 yrs—windfall to the govt. (macroeconomic impact)

	Year 1	Year 5	Year 10	Long run
Real GDP	1.52	7.25	6.72	1.01
Real non-oil GDP	-0.01	5.00	6.76	1.25
Exchange rate[2]	-13.28	-14.61	-1.51	0.61

Scenario 2: Oil prices increase by 20% for 5 yrs—windfall to private sector (macro impact)

Real GDP	0.78	7.44	8.49	8.25
Real non-oil GDP	-1.23	4.54	7.98	7.78
Exchange rate[2]	-13.16	-14.46	-1.99	-1.77

Notes: [1] In per cent with respect to the baseline, defined under constant hydrocarbon revenues. [2] A decrease in the real exchange rate indicates appreciation;
Source: Based on a contribution to this report by Bayar and Ben-Ahmed (2002)

At the same time, the increase in domestic demand stimulates imports for all manufactured goods, but also in agriculture and services (especially in transport and communications). But the increase in imports does not offset the increase in hydrocarbon export earnings, so that the real exchange rate tends to appreciate. Demand pressures also increase the prices of non-tradable goods, due to short-term supply rigidities. This increase in non-tradable prices can generate inflationary pressure, further appreciating the real exchange rate. In response to the changes in the real exchange rate, the increase in GDP growth, spurred by the hydrocarbon windfall, is also accompanied by a substantial change in the structure of the economy (Table A1.6.3.).

The sector that benefits most from the expansion in domestic demand is construction, where, over the 5-year period, output increases by 16 per cent in the first scenario, and by 21 per cent when hydrocarbon rents accrue to the private sector. This reflects the strong linkages of construction with the hydrocarbon boom and the ensuing increase in investment. Moreover, sectors with more non-tradable content, such as utilities and financial services, also benefit from increased domestic demand.

Exports of textiles, processed goods, other manufactures, and agricultural products decline, as the real exchange rate appreciation leads to losses of foreign market shares. These sectors also face a steep increase in imports. However, because Algerian manufacturing industries and agriculture mainly supply the domestic market, where demand grows rapidly on the back of increasing incomes, they see an expansion in their output in the medium term. Nevertheless, some industries particularly exposed to foreign competition, included in "other manufacturing", suffer declines in output owing to displacement from higher imports.

Except for "other manufacturing", the simulations do not reveal "Dutch disease" effects of higher hydrocarbon revenues in Algeria, as buoyant domestic demand boosts production in most tradable goods sectors, offsetting the impact of lower competitiveness. However, prospects for sustained growth and diversification of the non-hydrocarbon industries would be weaker in the face of a loss of their limited export market shares. Growth of these industries would become increasingly dependent on the uncertain momentum of domestic demand, which relies heavily on the performance of the hydrocarbon sector. The simulations, thus, highlight the importance of pursuing an appropriate exchange rate policy, aimed at maintaining a competitive real exchange rate, similar to the policy followed by Algeria since 1994.

In both scenarios, the impact of the temporary increase in hydrocarbon export revenues on the growth rate wanes after the reversal of the shock (i.e., beyond year 5). However, the long-term impact of the temporary shock on the level of GDP differs significantly in the two scenarios. When the windfall is intermediated by the government, the impact dies out almost completely after the tenth year. The small remaining impact of 1 per cent in the long term reflects some increase in productive capacity, as public sector investment increases during the boom years. By contrast, when the private sector intermediates the windfall the long-term increase in GDP is sustained, with gains spread across all economic sectors.

The stronger expansion of productive capacity, as a result of higher investment, explains the lasting long-term impact of the hydrocarbon windfall in the second scenario. The increase in private sector's real income boosts savings and investment in productive activities, thus directly expanding productive capacity and output in the long term. When the windfall accrues to the government, productive capacity increases only indirectly, to the extent public investment in infrastructure boosts private sector productivity—assuming that the windfall does not end up in the hands of low productive, loss-making public enterprises. In that case, the government spends a large part of the additional revenue on current consumption and transfers (about 75 per cent), so that there is little impact on capital accumulation over time.

Detailed simulation results are provided below.

Table A1.6.3: Detailed simulation results
Simulation 1: Oil prices increase by 20% for 5 years--*windfall to the government*

Table 1.1: Output (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long-run
Agriculture	0.47	7.26	7.68	2.32
Oil and gas	-0.03	6.51	6.55	0.54
Electricity and water	1.13	9.81	9.24	2.16
Textiles	3.69	9.69	7.74	1.05
Processed food	0.77	7.86	8.01	1.87
Other manufacturing	-3.95	-2.16	3.53	0.06
Construction	10.73	16.33	5.95	0.49
Transport & communications	-0.10	6.89	7.72	0.93
Finance	0.97	8.99	8.41	1.59
Other services	-1.33	3.80	6.67	0.92

Table 1.2: Capital (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	0.00	7.31	8.39	2.75
Oil and gas	0.00	6.69	6.77	0.59
Electricity and water	0.00	10.07	10.44	2.67
Textiles	0.00	8.63	9.11	1.33
Processed food	0.00	8.94	9.14	1.66
Other manufacturing	0.00	5.04	6.88	0.26
Construction	0.00	9.99	9.76	2.60
Transport & communications	0.00	8.14	8.64	0.99
Finance	0.00	10.07	9.99	1.99
Other services	0.00	6.05	7.79	0.95

Table 1.3: Employment (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	3.04	7.14	4.73	0.48
Oil and gas	-0.76	1.68	2.72	0.23
Electricity and water	3.82	9.30	6.96	1.21
Textiles	3.81	9.74	7.80	1.09
Processed food	2.61	5.44	5.73	2.50
Other manufacturing	-7.99	-9.30	0.24	-0.06
Construction	19.17	21.16	3.42	-0.94
Transport & communications	-0.41	2.53	4.89	0.94
Finance	4.58	5.23	3.26	0.37
Other services	-8.39	-7.85	1.24	1.01

Table 1.4: Exports (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	-13.83	-7.33	8.93	4.85
Oil and gas	3.45	10.08	6.26	0.46
Electricity and water	-6.35	1.00	8.04	2.49
Textiles	-18.13	-18.90	1.64	0.51
Processed food	-25.94	-22.75	5.44	3.58
Other manufacturing	-26.07	-29.68	-2.44	-0.66
Construction	0.00	0.00	0.00	0.00
Transport & communications	-30.65	-31.17	-0.73	0.00
Finance	0.00	0.00	0.00	0.00
Other services	-24.59	-25.84	1.50	-0.04

Table 1.5: Imports (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	17.45	24.46	6.42	-0.19
Oil and gas	436.44	474.55	7.73	0.84
Electricity and water	0.00	0.00	0.00	0.00
Textiles	31.50	48.61	14.26	1.59
Processed food	37.31	50.82	10.64	0.17
Other manufacturing	29.77	42.69	11.00	0.92
Construction	0.00	0.00	0.00	0.00
Transport & communications	53.50	78.70	19.02	2.10
Finance	0.00	0.00	0.00	0.00
Other services	32.82	50.27	12.81	2.00

Simulation 2: Oil prices increase by 20% for 5 years--*windfall to the private sector*

Table 2.1: Output (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	0.62	9.10	11.00	11.11
Oil and gas	-0.02	7.76	9.25	8.93
Electricity and water	1.61	11.85	12.42	12.10
Textiles	6.07	16.89	13.78	13.35
Processed food	2.00	12.13	12.71	12.55
Other manufacturing	-1.81	3.18	7.64	7.35
Construction	12.33	20.77	9.93	9.54
Transport & communications	1.53	12.30	13.26	12.88
Finance	3.43	16.26	15.06	14.64
Other services	-0.38	7.34	10.53	10.20

Table 2.2: Capital (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	0.00	8.90	11.79	11.98
Oil and gas	0.00	7.94	9.53	9.20
Electricity and water	0.00	10.58	12.87	12.54
Textiles	0.00	8.97	11.47	11.13
Processed food	0.00	10.20	12.14	11.70
Other manufacturing	0.00	5.68	9.27	9.03
Construction	0.00	10.65	12.26	11.96
Transport & communications	0.00	10.06	12.41	12.02
Finance	0.00	12.06	13.98	13.56
Other services	0.00	7.70	10.77	10.36

Table 2.3: Employment (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	4.46	11.38	8.41	8.08
Oil and gas	1.98	8.35	7.34	7.14
Electricity and water	5.78	15.51	12.11	11.82
Textiles	6.34	17.35	14.08	13.64
Processed food	7.06	17.39	14.77	15.27
Other manufacturing	-3.56	0.94	6.34	6.00
Construction	22.29	29.01	8.63	8.18
Transport & communications	7.69	21.79	17.42	17.09
Finance	17.16	33.74	20.10	19.72
Other services	-1.98	6.58	10.59	10.67

Table 2.4: Exports (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	-14.16	-6.49	12.04	12.85
Oil and gas	3.36	11.10	8.69	8.38
Electricity and water	-4.97	4.19	11.43	11.17
Textiles	-14.19	-9.59	7.88	7 59
Processed food	-24.69	-19.16	9.09	9.42
Other manufacturing	-22.64	-22.81	1.75	1.66
Construction	0.00	0.00	0.00	0.00
Transport & communications	-29.10	-27.25	2.18	2.13
Finance	0.00	0.00	0.00	0.00
Other services	-23.89	-23.47	2.84	2.42

Table 2.5: Imports (changes in % with respect to the baseline)

	Year 1	Year 5	Year 10	Long run
Agriculture	18.25	27.62	9.96	9.36
Oil and gas	438.72	487.63	11.52	11.15
Electricity and water	0.00	0.00	0.00	0.00
Textiles	31.27	51.37	20.05	19.46
Processed food	38.36	55.77	16.47	15.78
Other manufacturing	29.22	43.92	15.00	14.45
Construction	0.00	0.00	0.00	0.00
Transport & communications	55.00	86.51	28.35	27.49
Finance	0.00	0.00	0.00	0.00
Other services	34.13	55.77	19.85	19.63

chapter 2 - annexes

Annex 2.1: The privatization method and the quality of the overall business climate are key to successful restructuring

Privatization is a necessary condition for turning around the enterprise sector during transition. Imposing market discipline on firms and establishing adequate mechanisms to monitor managerial behavior requires strengthening the legal framework, ensuring the enforcement of property and contract rights, implementing bankruptcy laws to provide viable exit mechanisms for inefficient enterprises, introducing international auditing and accounting standards, adequate disclosure of economic performance and financial information, and enforcing the rights of creditors and shareholders.

The lessons from transition countries are clear. Small enterprises under state ownership (generally enterprises with fewer than 50 employees) should be sold quickly and directly to new owners through an open and competitive auction with no restriction on who may bid for the shares. Medium-size and large enterprises should be targeted for sale to strategic outside investors. The evidence on privatization's effect on medium-size and large enterprises over the past decade in transition economies indicates that privatization to concentrate outside owners such as investment funds, foreign strategic investors, and blockholders has benefited restructuring. In contrast, privatization to diffuse owners and to enterprise owners and managers (so-called insiders) has not been conducive to enterprise restructuring.[8] Actually, privatization to workers in the CIS has proven worse than state-ownership.

Although enterprises under concentrated ownership generally fared better, there are wide variations depending on the type of concentrated ownership. Enterprises controlled by strategic investors have performed much better than those controlled by investment funds, holding companies or other financial institutions. This is not surprising as strategic investors are able to provide more resources and skills for restructuring, and are far better connected with international markets for technologies, inputs and products. The selection method of strategic investors also appeared to matter significantly. Enterprises sold through transparent tenders or auctions have generally attracted better owners, outperforming enterprises sold directly to politically connected parties, frequently at highly subsidized prices. Hence the ideal strategy was to transfer assets as rapidly as possible to individual investors or concentrated groups of strategic investors through open, fair and transparent methods (Box A2.1).

Box A2.1: Privatization -What Matters
Privatization Methods and Accompanying reforms

The Czech and Slovak Republics- Vouchers and Opaque Direct Sales. The two countries opted for different privatization methods, but in both cases the hoped-for rapid turnaround of the enterprise sector did not materialize. The Czech Republic policy makers opted for a fast and massive transfer of shares, with as their prime objective to create new owners who would support further market reforms. Vouchers were the cornerstone of the Czech mass privatization, and investment funds were created to consolidate the diffuse ownership of vouchers and to diversify risks. The Slovak Republic started its first wave of mass privatization through vouchers but soon shifted to direct sales. But the sales were not conducted through open and transparent methods and they favored politically connected parties. The performance of both the Czech and Slovak mass privatizations was disappointing for three reasons. First few investment funds had the resources and the skills to drive enterprise restructuring. Second little was done to introduce adequate regulatory framework governing enterprises, investment funds, and capital market activities. Third, surveillance by creditors was weak because of delays by privatizing the largest banks and weak insolvency and collateral legislations. Cross-ownerships between banks and investment funds weakened the governance structure and softened budget constraints further, eventually contributing to a large build-up of contingent liabilities in the insufficiently reformed, state-dominated commercial banks (see Box 1).

Hungary and Poland - Accompanying reforms matter. The experience of Hungary and Poland underscores the importance of effective ownership, corporate governance and creditor discipline for successful privatization programs. Hungary bid on outsiders and based its privatization on sales to strategic investors, opening the process entirely to foreign investors. A politically controversial but courageous move which proved effective. Foreign capital into Hungarian enterprises and banks brought much needed investment, know-how and competition. Combined with strict banking regulation and bankruptcy laws, the privatization method led to a successful restructuring of the Hungarian enterprise sector and explains to large extent Hungary's solid growth performance in the second half of the 1990s. From the outset Poland pursued a rich menu of privatization options, including the first five flotations on the Warsaw Stock Exchange and the sale of assets and selected liabilities of some 1,000 medium size enterprises through installment sales, a process described as "privatization through liquidation". But Poland's success in privatization and its solid growth performance in the second half of the 1990s was also the result of other important complementary reforms. Like Hungary, Poland imposed hard budget constraints on enterprises, a policy largely facilitated by the successful efforts to restructure and privatize the banks and address the bad loan problem in the early stages of the transition.

Source: World Bank Transition Report

Hard budget constraints entail eliminating a wide range of explicit and implicit mechanisms to channel public resources to enterprises and banks, including tax exemptions, fiscal and financial subsidies, budget and tax offsets, directed credits and contingent liabilities. Failure to do so, may put macroeconomic stability at risk. The examples of Bulgaria and the Czech Republic illustrate the potential macro-economic costs associated with soft budget and contingent liabilities (Box A2.2)[9].

Box A2.2: The Macroeconomic Costs of Soft Budget Constraints
The Cases of Bulgaria and the Czech Republic

Bulgaria: a full-fledged macroeconomic crisis. Massive external borrowing from official and private sources during the last half of the 1980s, stop and go stabilization policies and a slow pace of structural reforms delayed Bulgaria's transition from plan to market for about a decade. During that period, widespread lack of discipline of large state-owned enterprises, financial institutions and budgetary agencies resulted in large budget deficits and hyperinflation which culminated by 1997 in a severe banking and foreign exchange crisis. The banking crisis toll amounted to the closing of 17 banks (or about one third of the banking system). Consolidated over the 1991-98 period, the fiscal expenditures due to the lack of discipline and the banking crisis amounted to the equivalent of 22 percent of GDP while the cumulative fall in real output in 1990-97 approximated 34 percent of GDP.

Czech Republic –How contingent liabilities change the fiscal risk picture. Since the beginning of the transition, the Czech government maintained a fiscal policy aimed at achieving a nearly balanced budget seemingly with great success. The fiscal performance, however, encompassed a significant amount of government activities under taken by a variety of public agencies outside the budgetary systems. Those activities, which included *inter alia* bank revitalization programs, agricultural and forestry guarantee and support programs, support to ailing enterprises such as the railways were generating fiscal risks which became gradually more visible as state guarantees and agencies explicitly or implicitly guaranteed by the government were generating significant claims on the budget. While official government debt stood at only 18 percent of GDP in 2000, adding the debt of the transformation agencies (which were in charge of the banks rehabilitation programs) would raise it to 29 percent of GDP. But this is still not the full picture as the amount of classified loans which would remain on bank books even after clean up approximates 15 percent of GDP. Furthermore outstanding government guarantees extended for a variety of developmental purposes (adjusted for risk) were estimated at 6 percent of GDP in 1998. These two latter are obviously potential contingent liabilities but they do change radically the debt and overall fiscal risk picture.

Source: World Bank staff

Annex 2.2: The political economy of reforms can make or break the transition

There are three key dimensions to the politics of reforms during transition:

- Costs accrue in the short term while gains take more time to materialize;
- Every single reform has its own set of winners and losers but winners tend to be a diffuse constituency (because of the longer term horizon of the gains from reforms) while losers are concentrated;
- Gains and losses are not static and winners from initial and intermediate stages of transition may lose from further reforms.

The costs of the economic reforms associated with discipline of the "old economy" are short-term while gains will require a longer term horizon to accrue. Higher unemployment, higher prices, lower provision of subsidized social services by public enterprises are among the costs of the restructuring of the enterprise sector required to correct for a legacy of inefficient investment and distorted policies. In contrast, the gains associated with policies to enable a dynamic "new economy" to emerge will accrue only after the key market institutions have been established. These institutions will establish and implement the rules to promote entry and encourage competition, secure property rights, vigilant contract enforcement, good access to financing and so on...

Transition reforms are rarely of a win-win type. Virtually, every single reform will benefit some while hurting others. And winners and losers from reforms do play a fundamental role in the transition process. Workers and managers in the old sector will oppose enterprise restructuring and privatization. The less poor and vulnerable beneficiaries of social protection policies will oppose restructuring aiming at targeting the poorest and most vulnerable. The general public will oppose policies leading to utility and other price increases such as removal of subsidies and price controls. Holders of trade and investment licenses will oppose full liberalization. Uncertainty about property rights before privatization allows insider managers to tunnel assets from nominally state-owned enterprises to newly created spinoffs under managers' personal control and will therefore attempt to prevent establishment of clear property rights and corporate governance rules.

Partially liberalized prices spur arbitrage opportunities between fixed price and market price sectors that can generate enormous gains. Incomplete trade liberalization create highly profitable monopoly rents. These gains are highly concentrated, accruing to the select few with control over nominally state-owned assets and those with close ties to politicians able to award such advantages. By contrast, the potential winners from liberalization, such as potential investors who could enter new lines of businesses, potential workers who would find employment in newly created enterprises or consumers who would benefit from lower prices resulting from the competition that importers or new investors would bring along, those winners tend to be diffuse.

The decade of transition experience has shown how groups who benefit from initial or intermediate stages of transition will attempt to prevent further reforms to preserve their gains. Short-term winners of economic reforms can convert parts of their financial gains into political influence to restrict entry, undermine competition, and preserve the very distorsions that generate their rents. That is how enterprise insiders who gained minority stakes in privatized enterprises have opposed improvements in corporate governance and the security of property rights that would limit their ability to tunnel assets. Similarly, new banks created in the liberalization of financial markets fought to keep soft government credits flowing to their enterprise clients and recycled in volatile local bond and foreign exchange markets. Finally, those who gained from the opening of foreign trade in partially liberalized markets struggled to build entry barriers to prevent competition. The ability of these groups of oligarchs and insiders to preserve their rents was based on their capacity to influence the political process and in some cases to capture key institutions of the state.

- ***Political systems play a key role in transition success or failure.***

The end result of the *"reform freeze"* is generally a situation of liberalization without discipline and a business environment characterized by an uneven playing field. Situations of reform freeze tend to produce a highly unequal pattern of costs and benefits of market-oriented transition in the long term, marked by high unemployment and very unequal income distribution. The potential problem posed by initial winners from the transition was not foreseen early on and few recognized that these initial winners would be able to stall the transition in a state of partial reforms, a common problem in CIS countries.

The question is then why did some governments succeed in implementing policies which imposed discipline on the old sector and enabled the development of a dynamic private sector, while others protected inefficient enterprises and discouraged new entry at considerable social costs? Three intertwined factors have been associated with the successes and failure of transition:

- The speed and extent of reforms;
- The political system in transition;
- The extent of participation of civil society in public policy making.

For all the constituencies of losers and winners from reforms identified above, gains and losses depend on how radical the first move in the reform process is at the start of the transition. The more radical the move, the greater the initial adjustment costs to both state workers and enterprises. If reforms however lead to a rapid establishment and effective functioning of the institutions that encourage entry and competition, investment rises, jobs are created and prices adjust to equilibrium levels with associated improvement in the quality of goods and services. For the oligarchs and insiders, radical reforms generate fewer distorsions and imbalances which would otherwise allow them to extract rents and tunnel assets. As discipline is imposed and further reforms encourage competition from new entrants and implementation of the rule of law, their initial gains are dissipated and

less resources and opportunities are created for them to influence policies and capture state institutions to their favor.

In transition countries, the credibility of the government's commitment to reforms—a key factor for their acceptability by the general public—has been associated with the nature of their political institutions. These institutions were shaped by the cultural and historical legacies that guided the exit from communism. Political systems designed to concentrate power and restrict contestability have proven at greater risk to be captured by small powerful interests. Such systems make it more likely that those with access to political power will be able to distort policymaking to their favor. By contrast, political institutions designed to foster political contestability, thanks to participation by competing groups, were less vulnerable to capture by a corrupt political elite or interest groups. Genuine political competition raises the costs to politicians of pleasing narrow constituencies and increases the likelihood that broader ranges of interests will be represented by governments over time. Experience confirms that the quality of institutions and the openness of the political regime are positively associated with the likelihood of a low-cost transition to the market (Table A2.1).

Table A2.1: Selected indicators of reform, democracy and economic performance

	EBRD ECA Transition Indicators (unweighted average)		GDP per capita growth (y-o-y %)		CPI (y-o-y % change)		Unemployment* (% of total L-force)	
Ranking	Institutional Performance	Cumulative Democracy	1991-95	1996-00	1991-95	1996-00	1992-95	1996-99
Algeria-unranked	n.a.	n.a.	-2.0	1.5	27	7.0	24.6	28.7
Rating=3+ (high)	3.3	10.5	-1.6	4.3	95	11	8.8	9.1
Rating=2>3 (mid)	2.4	6.3	-8.9	2.7	601	35	10.7	12.9
Rating=1>2 (low)	1.7	2.1	-10.5	3.3	837	72	6.8	8.2

*Sources: EBRD Transition Reports 1995-2000 and WDI 2000. *Excludes Kyrgyz Republic & Turkmenistan.*

To avoid "reform freeze" scenarios, where winners from initial stages of reforms hold the economy in a partially reformed status, the political system must both ensure broad and genuine representation and constrain the power of interest groups to capture the state. Expanding the range of social groups competing for influence over policy making increases the costs to politicians of skewing reform in the interest of a single group. And the Government's ability to credibly commit to broad-based reforms is much greater in political systems that promote competition and contestability.

Civil society participation in the policy making, monitoring and evaluation is invaluable to the success of reforms in transition. Key among components of a vibrant civil society are NGOs, consumer and producer associations, and the media. Their participation tends to foster a public debate whereby the nature of the costs and benefits of reforms, as well as their respective horizons, are unveiled. It puts pressure on governments to identify and implement mitigating strategies to deal with issues of social costs. Finally, it is a very effective way to enforce government accountability to broader citizenry rather than to selected interest groups.

- ***Social policies need to support transition.***

The break-down of the socialist system not only meant the break-down of an inefficient production system but also the collapse of a fairly generous but highly cost-ineffective and fiscally unsustainable social services system which was characterized by guaranteed employment, retirement security and extensive consumer subsidies.

The loss of fiscal control and the need to reduce the fiscal deficit to stabilize inflation reduced government expenditures as a share of GDP in virtually all transition countries. Social sector expenditure, as a result, had to be restructured and made fiscally affordable. Safety nets, in particular needed to target the most vulnerable and those affected by sharp increases in utility prices and the labor shedding resulting from the imposition of hard budget constraints on enterprises. As for pensions, most countries shared the worrisome combination of declining fertility, low demographic growth (in some cases demographic decline), and high dependency ratios due to aging population and raising unemployment. Pension systems needed to meet the dual challenge of providing adequate income for retired workers while preventing payroll taxes to raise labor costs and undermine employment creation or shift incentives toward informal market employment. Many countries are still struggling with these challenges.

Box A2.3: Bulgaria Safety Nets during Transition

The 1996-97 crisis in Bulgaria had a drastic impact on poverty levels. The headcount ration (or share of the population living below the poverty line) increased to 36 percent in 1997 from 5.5 percent in 1995. The government which took office in 1997 in the midst of a macroeconomic crisis (see Box 2) introduced a Currency Board Arrangement to stop the vicious circle of government subsidies and soft commercial bank financing (that had kept loss-making enterprises afloat), impose fiscal and financial discipline and stabilize the economy. With the CBA as the cornerstone of its economic program, the government implemented a program of structural reforms encompassing virtually all sectors of the economy. While the program was successful in restructuring the economy and reestablishing it on a solid growth path, unemployment soared from 14 percent in 1997 to 18.6 percent in 2001. Yet during the same period poverty declined by about two third from 36 percent in 1997 to 12.8 percent in 2001.

What role did the restructuring of safety nets play? While a number of factors appear to have contributed to the decline in poverty within the context of increasing unemployment, it is clear that the role of social assistance in mitigating poverty has been sizable. Social protection programs, including social insurance (pensions and unemployment benefits) and social assistance (family and poverty benefits) had wide coverage in Bulgaria. According to the 1997 survey, approximately 81 percent of households received some form or another of social benefit. Since 1997, the government has undertaken substantial reforms in social protection. In pension, reforms to the Pay As You Go system reduced the categories of workers eligible for early retirement, increased the pension age, and changed benefit levels. In social assistance, welfare benefits were streamlined and their financing was partially centralized to reduce the dependence of benefit payments on the availability of revenues at the local level. These changes appear to have had had an impact on the targeting and coverage of benefits. As a result of the social transfers, poverty rates in the group receiving social assistance dropped by about 28 percent (from 20.6 to 14.9 percent) which translates in an overall decline in poverty rate of 3.2 percentage point nationally.

Source: World Bank: "Bulgaria—The Dual Challenge of Transition and Accession".

Annex 2.3: The design of state bank restructuring is key to future profitability of banks and to success of reform program

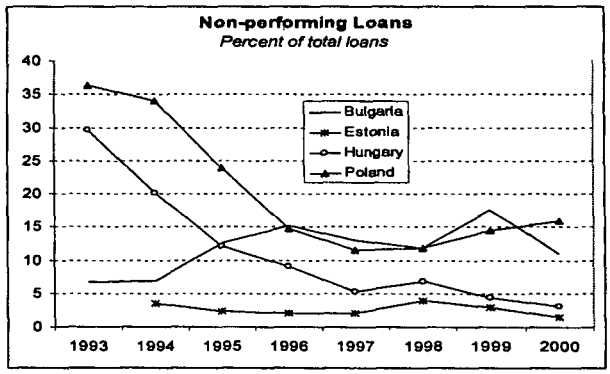
Until the beginning of the last decade, the banking system of transition countries was one of the key levers of the state control over economic activity, and until the mid 1980's financial services were usually provided by a single bank. In the years immediately preceding the collapse of communism some countries introduced sector specific banks such as an agricultural, industrial or foreign trade bank. However, these remained under state control. Liberalization allowed the creation of privately owned banks—although in the first instance, this was often restricted to domestic participants. But the path of liberalization was by no means smooth, and a pattern of banking sector crises arose, which appear to reflect the nature of reform undertaken, notably failures to introduce proper incentives or supervision.

After the demise of the Soviet Block, economic output fell across Eastern Europe, particularly in the heavy industry sectors. At this time, the state banks—which still dominated the nascent financial markets—were heavily exposed to these sectors. Governments were faced with political pressures to prop up distressed enterprises and stem rising unemployment, but at the same time faced a deteriorating fiscal environment as revenues collapsed and debt increased. Given these political constraints, governments often forced the banks to keep lending to these sectors. In the private sector there were often significant conflicts of interest, with powerful individuals able to use their political muscle to stymie efforts to introduce effective regulations, or directed baking lending towards enterprises in which they (or associates) held interests. In an environment where market forces had been suppressed for half a century or more, governments failed to make explicit the consequences of failure. There were widespread expectations that banks would not be allowed to fail, and bankers often took on excessive risk. In addition, in the command economy, there were few consequences for failing to repay a loan (as few loans were actually made on commercial criteria). This lax attitude towards financial responsibilities appeared to extend into at least the early years of transition.

The impact of distorted incentives on the banking system was both exacerbated and masked by the inadequacies of the institutional environment—such as government failure to establish the proper legal framework for banking, to develop effective supervision and regulation of banks, and government failure to implement disclosure and auditing standards, among others. Low capital adequacy requirements allowed for the creation of small and weak banks. Unsound accounting procedures and standards allowed the deterioration of bank portfolios to go unnoticed for an extended period. In addition, central banks lacked sufficient staff with the requisite skills to supervise existing standards and regulations. The regulatory efforts of the central bank were further hampered by generally weak legal institutions. Insolvency and collateral laws were often ineffective, and the legal system was biased towards debtors (IMF, WP/02/56).

In a number of transition countries, banking crises brewed as a result of these institutional weaknesses and incomplete banking sector reforms and enterprise privatization. In particular, the soft budget constraint on enterprises were reflected in mounting bad debts to the banking system (Figure A2.1). However the ability of governments to provide fiscal or quasi-fiscal transfers to clean up and recapitalize the banks was limited by falling tax revenues and spiraling public debt. In some cases, high inflation rates hid the problems for a time. However, as stabilization programs led to lower inflation, the underlying weaknesses were exposed, triggering bank runs and panics.

Figure A2.1: Non-performing loans in transition economies

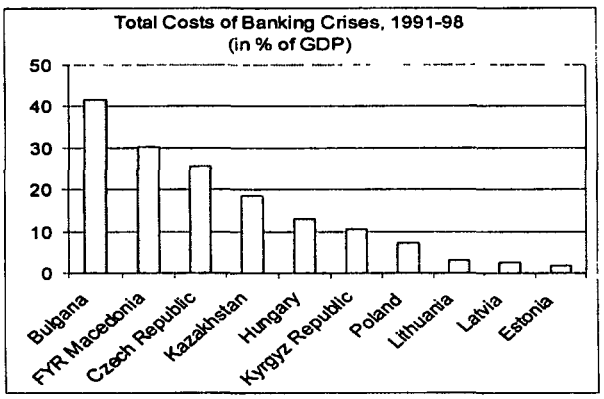


Source: EBRD, Transition Report 2001.

The fiscal costs of banking sector crises to the economy can be very high. The 1993 banking crises in Poland and Hungary, as a share of GDP, reached an estimated 5.7 percent and 12.2 percent, respectively, in cumulative fiscal outlays. In Bulgaria, the total costs of bank restructuring and deposit compensation over 1991-98 surpassed 40 per cent of GDP. Unlike most other transition countries, the central bank bore a significant share of these costs, thus fermenting hyperinflation. In Hungary the cost was nearly 13 per cent of GDP, financed entirely by the government. For both Poland and Estonia, the burden was comparatively light, at under 3 per cent of GDP. The wide variation in fiscal costs reflects not only the initial conditions—in terms of inherited non-performing loans—but also the methods of bank restructuring (Box A2.4).

Box A2.4: Sharing the costs of bank restructuring—lessons from transition economies.

Fiscal and quasi-fiscal costs of bank restructuring were much higher in the Central and Eastern European Countries (CEECs) than in the Baltics and the CIS (Figure). In the CEECs financial restructuring of troubled banks usually involved injection of new capital, after which banks were to be privatized. This was the case in Hungary, Poland, the Czech republic and Bulgaria. Banks were recapitalized to a large extent with government bonds. In the Baltic states and the CIS the governments generally adopted a lower cost approach, relying on recapitalization by private shareholders. When this was not possible, the banks were liquidated, with only minimal compensation for depositors. This was the case in Georgia, Kazakhstan, Estonia, Latvia, and to a lesser extent in Ukraine. Moreover, the much higher inflation in the CIS compared to the CEECs shifted a larger share of the costs to depositors.



The much higher fiscal and quasi-fiscal costs in the CEECs also reflect several weaknesses of bank restructuring:

* In many cases, the financial restructuring programs did not provide adequate recapitalization from the beginning. Undercapitalized banks were facing distorted incentives in granting new loans, resulting in moral hazard and excessive risk taking. This led to recurrent banking crises and successive rounds of recapitalization, raising fiscal costs even further.
* Financial restructuring was not coupled with operational and institutional restructuring, leading to renewed banking crises and raising fiscal costs. The recurrent crises in Hungary, Bulgaria, and the Czech Republic are cases in point.
* In several cases, bank restructuring was not coupled with enterprise restructuring. For example, in Bulgaria, banks continued to lend to bankrupt enterprises, further worsening their financial positions. This resulted in a more severe banking crisis in 1996-97, after an initial recapitalization in the early 1990s.
* Repetitive bailouts induced moral hazard, further encouraging excessive risk taking in lending.
* No clear lines between old and new loans were drawn. In some cases the authorities also provided support to non-performing loans extended after the collapse of the socialist system.

The experience of the transition countries also suggests that bank restructuring should be undertaken by the government and not the central bank because: (i) central bank financing is non-transparent and the costs will eventually burden the budget; (ii) central bank financing could lead to hyperinflation, with the risk of an economic collapse. Moreover, experience also supports the established principle that for bad debt recovery to be successful, the bad debt collector needs to operate within an adequate legal environment—in particular effective collateral, foreclosure, and bankruptcy laws—and be given appropriate incentives, while the enterprises in distress need to be subject to hard budget constraints.

Source: Tang, Zoli, Klytchnikova (2000)

In Central and Eastern Europe countries (CEECs)—intensive bad loan buy-backs and recapitalization of banks minimized loss-sharing with bank depositors through bank liquidations and hyperinflation. This raised the fiscal burden of bank restructuring but mitigated the direct costs in terms of growth. By contrast, in a number of transition countries in the CIS and the Baltics the failure of the banking system triggered a financial crisis and exacerbated the economic slump.

The entry of foreign banks in general proved to be a stimulus to the domestic banking sector. Increased competition lowered interest rate spreads and improved the efficiency of financial intermediation. In addition, the entry of foreign banks often led to improvements in the system of regulation and disclosures. For example, in Hungary, the government introduced a policy of selling shares in state-run banks to strategic foreign investors. This increased the banking system's capacity in terms of risk management and credit evaluation, and Hungary now arguably has the most advanced and modern financial system amongst the transition economies (IMF: WP/01/141): However, the experience of other countries was more muted. In Bulgaria, the government also hoped that foreign banks would force greater competition in the domestic banking sector and improve the capacity for financial intermediation of domestic banks. However, weak domestic banks were easily undermined by foreign banks, which acquired the most profitable business and were able to hire the best local staff (IMF: WP/02/56).

Annex 2.4: Trade liberalization in transition economies has been an important factor of market discipline

Subsequent to the collapse of the central planning system and the break-up of the COMECON, most transition countries quickly moved toward forging market-based foreign trade regimes. The pace and measures of trade reforms pursued in the four comparator countries (Bulgaria, Estonia, Hungary, Poland) varies somewhat. However, their trade policies are similar and converging, in that they are largely shaped by WTO commitments and by efforts to join the EU. Regional agreements signed by the four countries—especially the European Association Agreements (AAs)—provided important anchoring for their reforms. All of these factors combined have contributed to a remarkable expansion of openness in these countries, with the notable exception of Bulgaria, until very recently.

Estonia benefited from early efforts to secure free trade agreements with Nordic countries and had, by 1992, concluded bilateral agreements with Sweden and Finland.[10] Estonia removed almost all of its export controls in mid-1992. Its tariff rates were set very low compared to the other comparator countries, e.g., at 5.5 percent vs. 11.6 percent in Poland, and 16.1 percent in other LDCs as a group (unweighted averages for 1995). Subsequently, tariff rates were reduced to zero in 1996, making it one of the isolated few free trade economies in the world. At the time, aside from the one exception of metals exports, the government did not introduce any quantitative import restrictions.

Hungary's trade liberalization path can be characterized as being gradual and uneven, with some slippage. At first, beginning in 1989, liberalization of Hungary's foreign trade system was pursued gradually, with 20 to 25 percent incremental reductions to be spread out over four years, beginning with controls on capital goods imports. The pace accelerated quickly, as central controls eroded, and in 1990 the government abandoned rationing of imports of intermediate goods and discontinued most quotas on a number of consumer goods.

Along with the stabilization program and systemic reforms introduced by the new government in 1990, Poland introduced current account convertibility of domestic currency and opened up almost all sectors of the economy to foreign competition at once. The government almost completely eliminated quantitative restrictions and abolished import licensing for almost all traded goods. Accompanying these the liberalizations, the customs tariffs were reformed, and the average tariff for manufactured goods was set at about 12 percent and tariffs for imported capital goods were set below 12 percent. Thereafter, the government, gradually reversed its policy and tariff rates have been raised, particularly in the second half of the 1990s.

Among the four countries, Bulgaria was the last country to begin liberalizing its trade regime in earnest, which it did in the wake of the 1996 financial crisis. Bulgaria reduced its average import tariffs significantly from 1999 to 2001. Export taxes, which had been used widely, were gradually removed, and eventually the last export tax was removed in

January 2000. Further, the government committed to another round of reductions in average most-favored nation tariff rates. Tariffs on industrial products range from zero to 30 percent, and averages to 10 percent. Tariffs on agricultural goods range from close to zero to 74 percent, with the average tariff on agricultural goods equivalent to 10 percent.

For most countries considered, applying trade weights produces a lower average tariff rate compared to the simple average tariff rate. By this measure, again, the comparator transition countries have lower rates compared to all income groupings, aside from high income countries. In contrast, Algeria's average weighted tariff is above that of transition economies, although lower than in other countries in North Africa.

An important factor in the process of opening up to international trade is making multilateral commitments. Of particular importance to these transition countries is the EU accession process. Greater integration into global markets of the CEECs is being driven, to a large extent by the accession to the EU, although other factors certainly have played a role. The EU, for example, has not only provided an anchor for reforms, but has also provided a very comprehensive direction on reforms through the adoption of the "Acquis communautaire" (EU body of law). The AA's and accession process have provided the accession countries preferential access to EU markets. Moreover, the EU accession process has provided a great deal of credibility to the reform process, which in turn has bolstered investor confidence, both internally and abroad. These factors have been especially important for foreign investors.

Table A2.2: International trade liberalization commitments of transition countries

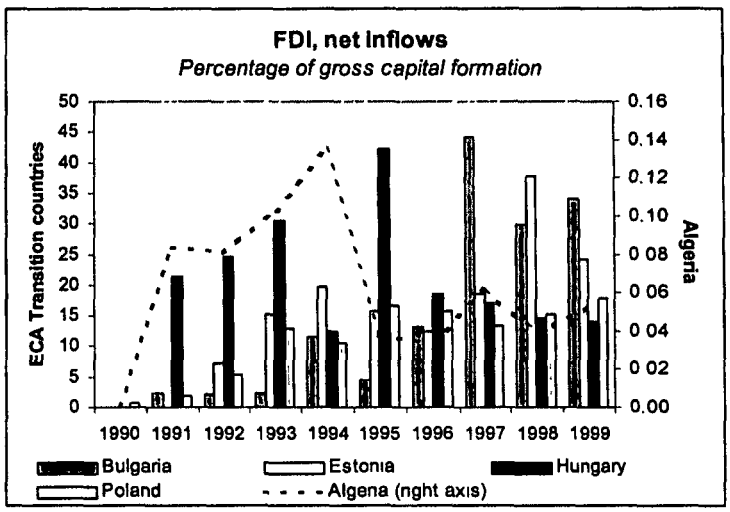
	GATT/WTO membership	Status IMF Article VIII - current account convertibility	EU Assoc. Agreements (AA) free trade & integration
Algeria	**Observer status**	**Sept – 1997**	**Apr - 2002 EU-Med AA**
Bulgaria	**Dec - 1996**	**Sept – 1998**	**March - 1993 AA**
Estonia	**Nov - 1999**	**Aug – 1994**	**June - 1995 AA**
Hungary	**Jan - 1995**	**Jan – 1996**	**Dec - 1991 AA**
Poland	**Jul - 1995**	**Jun – 1995**	**Dec - 1991 AA**

Sources: EC, IMF and WTO websites(http://europa.eu.int/, and www.imf.org and www.wto.org), and EBRD Transition Reports.

Annex 2.5: FDI and trade integration in transition economies

The process of integration with global markets has involved large FDI-inflows to transition economies in Central and Eastern Europe. These inflows have been especially valuable, as they have contributed to increasing productivity and output. Aside from supplementing domestic investment, FDI has generated a number of positive spillovers, such as bringing in cutting edge technologies, managerial and technical know-how, and giving access to international production networks. FDI has also been an important source of financing of the budget deficit (through privatization) and the current account deficit. FDI has provided a relatively stable source of finance, and has been more resilient to volatility than other types of capital flows. In all four comparator countries, net FDI inflows came to represent a significant share of gross capital formation, spiking in some cases to well over 40 percent (Bulgaria and Hungary) before stabilizing in the range of 15 percent to over 30 percent in 1999. (Figure A2.2).

Figure A2.2: In transition economies FDI has been an important source of investment financing



Source: World Bank staff.

Factors that have been important in determining FDI inflows include the mode of privatization, the record of servicing sovereign debt, and in particular the institutional environment. With respect to privatization, Hungary's program opened strategic sectors (telecoms, utilities, etc) to foreign investors very early on and privatization-related FDI flows reached about 40 per cent of total inflows. In contrast, the Czech privatization program—which barred FDI—discouraged foreign investors. With respect to sovereign debt, Hungary's low foreign debt—and decision to service it—assured foreign investors of its commitment to its obligations. In contrast, the protracted negotiation's with the London Club on Polish private debt, discouraged foreign investment in Poland until

1993-94, even though it opted for a similar privatization program to that of Hungary. In the case of Bulgaria, stalled-reforms kept foreign investors out until efforts to stabilize and liberalize the economy began in earnest following the 1996 crisis.

FDI has also played an important role in the restructuring of industries, in part through productivity increases and the transfer of technology and skills, but also by contributing to the development of the export infrastructure and related services. These effects can be generated not just through the home country of the investor, but also through other countries, such as via supply chains and marketing networks across a number of third party countries. Evidence from a number of ECA transition countries indicates that foreign firms are more foreign trade-oriented than domestic firms, thus contributing more strongly to the process of integration with world markets. For example, foreign firms have emerged as the largest exporters in Estonia, Hungary and Poland (Kaminski, 2000). FDI by a foreign firm in one industry can also lead to more FDI in that industry (by example) or in other industries (by generating demand for inputs or services), such as insurance agents, thereby leading to a kind-of FDI multiplier effect.

In the comparator ECA transition countries, FDI has had a strong impact on their trade with the EU by shifting production from unskilled, labor-intensive and natural-resource-intensive products to skilled, labor-intensive and technology-based products (Kaminski). Furthermore, the share of intra-industry trade with the EU (measured by the Grubbel-Lloyd index) has increased in a number of ECA transition countries (Table A2.3).

Table A2.3: Trade expansion in transition economies

Country :	Year	Share in exports of networks and other parts and components in EU-oriented exports of manufactures (%)*	Grubbel-Lloyd Index** of intra-industry trade	Share of skilled-L & K-intensive products in EU-oriented exports (%)	Ratio (%): cumulative FDI to GDP
Bulgaria	1993	5.7	39	32	1.5
	1998	4.1	39	35	6.7
Estonia	1993	12.5	30	16	5.3
	1998	34.2	39	25	13.5
Hungary	1993	15.2	53	40	16.4
	1998	42.0	55	67	31.3
Poland	1993	21.2	40	31	3.2
	1998	30.0	43	45	8.9

Source: Kaminski.
*** excluding chemicals**
**** Grubbel-Lloyd index measures the difference between unity and the quotient of the absolute difference between exports and imports of a given sector and the total of imports and exports for this sector. Calculations are based on 4-digit SITC data.**

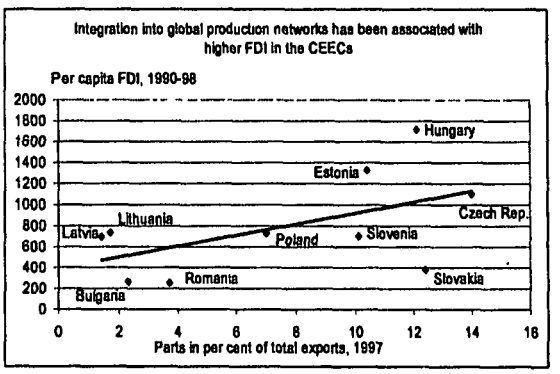
The Central and Eastern European countries that gained EU accession status, carried forward broad-based restructuring programs, while aligning their regulatory framework to the EU single-market. More ambitious reformers and countries that were more successful in integrating EU production networks attracted massive FDI that boosted growth (Box A2.5).

Box A2.5: Integration into EU trade networks and FDI—lessons from the Central and Eastern European Countries (CEECs)

In the wake of the collapse of the communist regimes, the Central and Eastern European Countries (CEECs) were forced to look for new commercial partnerships that would assist them in the path to economic recovery. The European Union (EU) responded by providing aid and preferential access to markets—in the form of the European Association Agreements (EAAs). By 1997 CEEC exporters of manufactures had gained duty-free market access to the EU. Eventually, the EAAs provided for free trade of industrial goods, which came into force as of January 1, 2002.

Apart from expanding trade with the EU on a preferential basis, trade liberalization and regulatory reform in the CEECs under the EAAs also spurred a deeper integration of these countries into the EU production sharing networks. CEECs exports of parts have thus increased four-fold from 1993 to 1998—to about US$ 12 billion, or 14.2 per cent of CEECs manufactured exports (Kaminski and Ng, 2001). The shares of parts in manufactured exports have thus approached those seen in more integrated countries in global production sharing—such as Malaysia and Mexico (about 19 per cent in 1998). The EU absorbs the lion's share of CEECs exports of parts—about 79 per cent in 1998. At the same time, 82 per cent of CEECs imports of parts in 1998 originated in the EU. Germany has emerged as the main trading partner among EU countries, as it takes almost *half* of CEECs exports of parts. Among the CEECs, the Czech Republic, Hungary, Slovenia, Estonia, and Slovakia had the highest participation of parts in their trade.

Various studies have shown that geography, the method of privatization, and the quality of governance, have been main factors driving differences among transition economies in attracting FDI, and accounting for the sharp increase of foreign direct investment in a number of the CEECs (World Bank 2002; Garibaldi and others-IMF, 2002). But integration in EU production networks has been also a factor in attracting FDI—as evidenced by the positive correlation between FDI per capita and the share of parts in total exports (Figure).



Source: World Bank staff

Annex 2.6: Reducing the cost of infrastructure services and basic inputs to the business sector

Infrastructure systems in the transition countries have undergone massive restructuring to become more efficient. Compared to market economies, infrastructure systems under the previous command systems varied in a number of important ways. Governments often pursued policies of high energy production, but usually provided energy (electricity, gas and coal) at below cost, sometimes to both enterprises (to raise production) and to households (for income allocation). Power sector infrastructure is thus often characterized on the production side by high energy intensity and overcapacity of supplies and on the consumption side by low tariffs and inadequate payments collection. Utility companies were typically short on finances and fuel. Similarly, extensive railroad networks and urban transport systems were often built and subsidized (including fuel) to provide cheap transport. In contrast, telecommunications tended to be neglected, as services were deemed less valuable than material output and as a consequence telecommunications are typically in short supply and of poor quality.

Restructuring across the different infrastructure sectors has been targeted to cover costs and to improve efficiency and responsiveness to demand. Fostering transition in infrastructure requires entry liberalization, commercialization, introduction of competition, tariff reform, establishment of independent yet accountable regulatory institutions and accounting for environmental impacts (such as pollution). Effective tariff reform and regulatory framework are crucial. Tariff reform, usually entailing raising household tariffs for utility services and improving payments discipline. Utilities that cannot cover their costs--due to pricing problems or inability to collect payments—will not be attractive to investors. Further, countries that established a regulatory authority prior to privatization were able to attract higher paying investors, i.e., that the investors demand a premium (lower prices) where the risks are higher, where the regulatory framework is not yet in place.

Air transport

With 51 airports having paved runways, Algeria lags behind Egypt, though is ahead of Morocco and Tunisia (table A2.4). Most notable is the volume of air freight, a strikingly low 11.7 million ton-kilometers, the smallest of all the comparators and little more than half the amount of Tunisia which is the second smallest. Partly, this reflects the small share of non hydrocarbon goods in Algerian exports. Calculating ratios of passengers per airport and ton-km of freight per departure shows Algeria to be at or near the bottom of the range in both measures, suggesting relatively small operations which may fail to realize important scale economies.

Ports

In terms of container traffic, Algeria ranks second from last, likely reflecting Algeria's export dependence on hydrocarbons. In terms of port facilities, Algeria has the same number of container berths as Egypt and Morocco and fewer than Tunisia (table A2.5).

Calculating TEUs per berth indicates a far lower utilization rate than for any other country save Tunisia. Since ports have strong scale economies (due to availability of more efficient, higher volume equipment such as gantry cranes), this also suggests that Algeria's ports are likely to be relatively costly.

Table A2.4: Indicators for Air Transport, Algeria and comparators,

	Algeria	Egypt	Greece	Morocco	Portugal	Spain	Tunisia	Turkey
Airports w/ paved runways	51	69	65	26	40	75	15	86
Air transport, freight (million tons/km)	11.7	278.1	129.2	62.5	224.6	871.5	20.8	374.8
Air transport, passengers carried	2,995	4,522	7,099	3,671	6,563	39,559	1,908	11,513
Aircraft departures	36.7	47.4	99.2	44.5	110.2	479.2	19.9	114
Departures per airport	719.6	687	1526.2	1711.5	2755	6389.3	1326.7	1325.6
Tons of freight per flight	81.6	95.4	71.6	82.5	59.6	82.6	95.9	101
Passengers per airport	58.7	65.5	109.2	141.2	164.1	527.5	127.2	133.9
20 lb. package to New York, FedEx priority.		277.0	229.1	295.0	171.0	195.6	295.0	319.7

sources: WDI, CIA World Factbook

Table A2.5: Indicators for Ports, Algeria and comparators,

	Algeria	Egypt	Greece	Morocco	Portugal	Spain	Tunisia	Turkey
Container traffic ('000 TEUs)	270.7	1246.1	1205.9	314.6	611.1	5121.6	214.7	1223.0
Number of container berths	13	13	16	13	6	72	17	47
Thousand TEU per container berth	20.8	95.9	75.4	24.2	101.8	71.1	12.6	26
CIF/FOB factor (1995)	1.10	1.11	1.13	1.09	1.10	1.06	1.07	1.06

source: Containenzation International Yearbook 2001, IMF International Financial Statistics

Moreover, harbors are poorly managed, particularly the port of Algiers, and productivity is low. Unloading ships and handling goods across the harbor is still a public monopoly. The equipment needs to be upgraded. On average, a ship waits over 7 days before being berthed in the Algiers harbor, while unloading takes another 7 days. Storage areas within harbors are by far insufficient. Overall harbor staff is not business friendly. Security is expensive and problematic. Corruption is said to be pervasive. A World Bank study by Amiot and Salama 1996 carried out a detailed comparison of port efficiency in Algeria, Morocco and Tunsia using early 1990s data. In part this comparison was based on evaluations of infrastructure obtained through surveys of port users. Algeria scored particularly badly on four measures: (1) handling; (2) unloading and storage; (3) computerized customs processing; (4) shortage of ro-ro facilities.

Rail Transport

Algeria has the second largest rail network in North Africa after Egypt. That is partly explained by its large area, which is twice that of Egypt and four and a half times that of Spain. With 133 kilometers of track per million inhabitants, Algeria is above average for the Maghreb, but half the average for Portugal, Spain and Greece. However, the rail network's efficiency is low and Algeria scores poorly in most performance indicators (table A2.6). Employee productivity – the ratio of freight-tons and passenger kilometers per employee – is the second lowest in the sample at 228, compared to 595 in Morocco

and 808 in Spain. Similarly, at 197 thousand freight-tons kilometers per wagon, wagon productivity is the second lowest, above Greece but well below the sample average.

Table A2.6: Indicators for Rail Transport, Algeria and comparators,

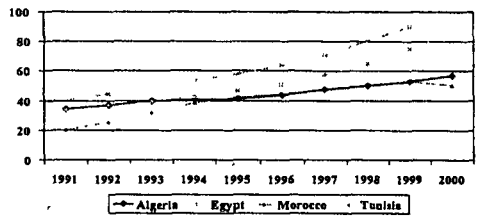
	Algeria	Egypt	Greece	Morocco	Portugal	Spain	Tunisia	Turkey
Total length of line worked at year end (km)	3,973	5,024	2,299	1,907	2,813	12,319	1,820	8,682
Track per million inhabitants (km)	133	81	219	69	282	322	195	137
Average staff strength (thousand)	14	96	11	11	13	39	8	43
Passenger kilometers (millions)	1,069	67,981	1,583	1,880	4,329	19,245	1,136	6,146
Freight ton-km per wagon [000]	197	305	92	712	543	604	452	472
Employee productivity	228	753	182	595	508	808	421	334
Employee per km of line	3.4	19	4.6	5.8	4 6	3.1	4.5	4.9
Traffic density [000 of TU per km]	781	14,308	830	3,466	2,314	2,524	1,896	1,644
Wagon productivity [000 of Tkm per wagon]	197	305	92	712	543	604	452	472

sources: International Railway Statistics 1999, International Union of Railways, Statistics Bureau.
Louis S Thompson and Julie M Fraser, "World Bank's Railway Database", Infrastructure Notes, Transportation, Water ar Dept., World Bank Oct. 1993 Transport No RW-6
note: TU is traffic unit, the sum of freight-tonne km and passenger km.

Telecommunications

The density of telephone mainlines (table A2.7) is quite low at 57 per 1000 people in 2000, and this ratio has been largely static in the last 10 years (Figure A2.3). Tunisa and Egypt, with a similar teledensity in the early 1990s, outstripped Algeria by the end of the decade. Teledensity is somewhat higher when measured as the number of mainlines per employee with similar growth experienced by North African countries. The slow growth of mainlines in Algeria, at approximately 10 percent each year, is partly due to the limited ability of the public monopoly to satisfy growing demand. The supply of public telephones is quite low (less than 0.2 per 1000 persons in 1999), and most of the revenues from the telecommunications sector come from landlines. Mobile phones have not made inroads into the Algerian market, but the recent sale of two GSM licenses may remedy this situation.

Figure A2.3: Telephone mainlines per 1000 inhabitants



Source WDI

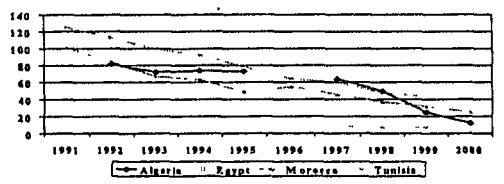
Table A2.7: Indicators for Telecommunications, Algeria and comparators, 2000

	Algeria	Egypt	Greece	Morocco	Portugal	Spain	Tunisia	Turkey
Telecommunications								
Tel mainlines per thousand	57	86	532	50	430	421	90	280
Mainlines per employee	98	100	289	98	234	415	129	254
Cost of 3-min local call [1]	0	0	0 1	0 1	0.1	0 1	0	0 1
Business telephone monthly subscription (US$) [1]	2 7	1.8	6 6	9 4	10 3	10 7	2 2	3 2
Business telephone connection charge (US$) [1]	46 5	288 2	27 4	94.1	65.9	157 6	67.2	20
Faults per 100 mainlines [2]	12 0	6 9	10 0	24 8	10 5	1 5	43.0	55 4
Telephone mainlines, waiting time (years)	5 4	1 9	0.2	0 1	0 2	0	0.9	0 5

sources WDI, International Telecommunications Union
note 1 Data for Tunisia and Spain are 1999. 2 Data for Egypt, Morocco and Tunisia are 1999

The waiting time for a mainline telephone connection is extremely long. In 2000, the waiting time was almost 6 years, which is lower than the 8 years experienced in 1997. Most high income countries have waiting times of less than one month. Of the North African comparator countries, Morocco has a waiting time similar to high income countries and Tunisian telecommunications can provide a mainline within 1 year. Only Egypt approaches the waiting time experienced in Algeria at just under two years but Egypt has a sliding scale of fees that allows those paying higher connection fees to be connected in a shorter time period.

Figure A2.4:: Telephone faults per 100 mainlines

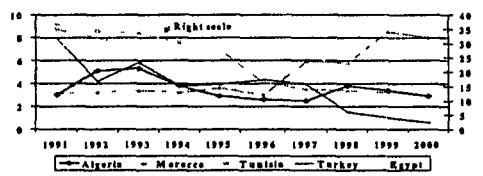


Source International Telecommunications Union

Once connected, Algerian telephone faults are no higher than many comparator countries in 2000, and compare favorably with Greece and Portugal (table A2.7). In the early 1990s, all the North African countries experienced high levels of faults in mainlines, which gradually declined to the lower levels seen in recent years (Figure A2.4). Of the comparator countries, only Egypt and Spain have more reliable mainlines, and Algeria's system is more reliable than all other developing country comparators except Egypt. Costs of subscription and connection for business mainlines shown in table 1 indicate that business charges in telecommunications in Algeria compare favorably with comparator countries. Connection fees (in US dollars) are far below Egypt, Morocco and Tunisia with only Greece and Turkey facing lower costs. The monthly subscription charges show a less favorable picture, with Egypt and Tunisia charging lower monthly fees.

Looking at business charges in terms of GNP per capita reveals a slightly different picture. The high income countries in the sample show much lower business telecommunications charges. For example, connection charges in 2000 in Greece, Spain and Portugal are less than 1 percent of per capita income. Of the developing countries in the sample, business telecommunications charges have been falling in the 1990s as a share of per capita income with the exceptions of Morocco, where connection charges have risen to 8 percent of per capita income and subscription charges have risen to 0.8 percent in 2000 (Figure A2.5). Algeria compares favorably, with business connection charges falling to 3 percent of per capita income, compared to 19 percent for Egypt and 8 percent for Morocco.

Figure A2.5: Business telephone connection charge/GNP per capita, US$



Source International Telecommunications Union

The 1990s has seen successive waves of liberalization and privatization in the telecommunications industry in the southern Mediterranean countries but Algeria has lagged behind in several areas until quite recently. The supply of telecommunications

infrastructure has not grown markedly in the 1990s but the recent efforts at reform, particularly in the mobile telecommunications area should result in a boost to growth in this sector.

Annex 2.7: Recent reforms in Algeria's energy and hydrocarbon sectors

In August 2001, Algeria opened its largely untapped mining sector to foreign operators following the approval of a new mining law by both houses of parliament. The new law will allow mining companies to freely transfer capital and profits, and will be overseen by two new government agencies—one responsible for issuing permits and the other for sector supervision. The law provides for standard exploration permits of five years and exploitation permits of up to 30 years. It also introduces fiscal incentives, including rebates on infrastructure and equipment.

On 19 December 2001 the lower house of the Algerian parliament approved the new electricity and gas law which lays the framework for major private investment in the sector through lifting the state monopoly of Sonelgaz over the domestic power and gas markets. Sonelgaz is a fully integrated SOE that has been responsible for the generation, transmission and distribution of electricity, and distribution of natural gas by pipeline. The government is committed to opening up a minimum of 30 percent of the domestic gas and power sectors to competition within three years. Retail competition will be introduced for large consumers, with the level of consumption determining their eligibility. The law will open electricity generation to full private competition, and a new independent regulatory body will be created—the Commission for Regulating Electricity and Gas (CREG)—responsible for enforcing technical, environmental and economic regulations. Transmission will remain publicly owned and provide open access to suppliers and purchasers. Two new subsidiaries of Sonelgaz will be created, one for the transmission of electricity and one for gas, and will operate under licenses from MEM. For power markets, a system operator and market operator will be created, the latter to match bids and offers for power. Prices will be liberalized at the generation level and regulated at the transmission and distribution levels. Sonelgaz will be reorganized to adjust to the new legal framework and market forces.[11]

The draft Hydrocarbon Law has been delayed, and will not be presented until after the 30 May 2002 legislative elections. The draft legislation clarifies the role of the state as policy-maker and regulator, and defines the competitive environment in which energy companies, including state-owned Sonatrach, will be operating. A number of modifications have been made to the original draft, partly in response to trade unions who are opposed to reforms, fearing job loses and privatization of Sonatrach. The main principles of the draft law are to open all activities, both upstream and downstream, to national and international investors.

The law sets up a new three-tier regulatory structure. At the top of the regulatory framework will be a Council of Ministers, which the Energy Minister will report directly. The Energy Minister will frame broad policies towards the sector and approve exploration and production contracts. Two new entities are to be created—a regulatory authority and a contracting authority, to be known as Al Naft, which will conduct tenders for exploration and production licenses. However, their autonomy will be limited as they

will be placed under the Minister's oversight. The new system is aimed at speeding up bidding procedures and improving transparency through the non-discriminatory awarding of contracts. The government hopes that this will ultimately increase foreign investment in the sector and boost production levels.

Algeria also plans to invest in new gas pipelines linking Algeria directly to Spain with a new 8-10 bcm underwater line, as well as a 10 bcm line to Italy via Sardinia—and possibly to France also via Sardinia. European dependence on gas imports is set to grow significantly, and Algeria is well positioned to be the most competitive supplier of gas into Europe. However, Europe is liberalizing supply of natural gas to electricity markets, which will increase competition in Europe. In the longer term, gas prices are likely to be de-linked with oil prices to a degree, and shorter-term contracts and spot sales will be increasingly common. Moreover, the prospect of liberalization of Algeria's main gas markets in Europe will translate into higher volatility of gas prices, and higher exposure of fiscal hydrocarbon revenues to price swings.

At present the EU and Algeria are in a dispute over the "destination" clauses in long term gas export contracts, which prevents the resale of gas in Europe. The EU says that these clauses are anti-competitive. Algeria has proposed a profit-sharing arrangement of profits on resold gas, until such time as the Europe market is truly more competitive and transparent. However, the EU and Algeria have yet to settle this issue.

Annex 2.8: Algeria's non-hydrocarbon exports

The Algerian exports are dominated by hydrocarbons. Export earnings in 2000 reached a total of US$ 21.7 billion, with hydrocarbons accounting for 97.2 per cent. Exports, besides hydrocarbons, remain very marginal, adding up to barely US$ 623 million—amounting to no more than 10 per cent of Algeria's imports and around 4 per cent of exports. This export level is lower than the one of Lebanon (US$ 677 million in 1999). These exports are concentrated, mainly composed of semi-finished products: basic chemistry (slightly more than half, an important part of which derives from hydrocarbon such as naphtha and cyclic hydrocarbons) and basic iron and steel products. Other export products include olive oil, dates, wine, fisheries, salt, cork, and the a few manufactures (food products and some textile). Most are very basic products, with limited processing. Export markets are the European Union, sub-Saharan countries and Iraq. We count few non-hydrocarbon exports that show dynamism, apart from fishery and wood products but they remain marginal (Table A2.8).

Table A2.8 – Algerian Non-Hydrocarbon Exports, 1997-2000

	Exports (million US$)			
	1997	1998	1999	2000
Agriculture and hunting	25	20	16,6	16,3
Fishing	0,8	0,7	0,8	2,2
Mining of metal ores	0,4	0,2	0,1	0,1
Other mining	26,4	29,7	30,2	23,8
Food products, beverages and tobacco	15,5	16,8	11,5	19,2
Textile, clothing and leather	9,3	11,3	7,8	13,8
Wood and of products of wood	5,6	10,4	11,3	17,1
Paper and printing	3,1	3,4	2,7	4,2
Chemicals and plastic products (1)	273,8	183,1	210,8	352,9
non-metallic mineral products	0,3	0,7	0,2	0,2
Manufacture of basic metals	119,4	72,4	70,9	100,5
Fabricated metal products, machinery and equipment	24,6	22,2	76,2	60,7
Other manufacture	6,8	1,2	0,6	0,9
Electricity	3	0	0	1,9
Others	0,5	0,2	0	0
Non-hydrocarbon exports	**515**	**372**	**438**	**614**

Notes: (1) other than products of refining
Source: CNIS, 2000

However, Algeria used to be an exporting country, mostly of agricultural products before the discovery of oil. Export capacity in non-hydrocarbon products weakened after independence, when the Government focused excessively on revenues from hydrocarbons and derivatives to finance the state-driven industrialization. Exports of other goods were neglected, in particular of agricultural products. Private enterprises were already weak and struggling to survive in the centrally-planned economy. State monopoly of foreign trade and the Government focus on import substitution further weakened private sector involvement in export. The private sector has not recovered yet,

despite the liberalization of foreign trade and the gradual demise of the public enterprises. For more than 30 years, private entrepreneurs lost or could not acquire export expertise, and this has become a major bottleneck to developing export capacity in today's increasingly competitive global markets.

chapter 3 - annexes

Annex 3.1: Macroeconomic stability and growth: The role of fiscal performance

The role of a stable macroeconomic framework as a pillar for higher and sustainable growth is undoubted, as proven by robust research and international experience[12]. Macroeconomic instability affects growth through uncertainty, fueled by the authorities' loss of macroeconomic control. As high inflation signals a government that has lost macroeconomic control, inflation is one of the best indicators of the conduciveness of macroeconomic policies. High inflation often means unstable inflation and volatile relative prices, leading to macroeconomic uncertainty.

This uncertainty reduces the information content of price signals and thus distorts the efficiency of resource allocation, causing harmful effects over extended periods on investment and the rate of capital accumulation, and on the growth of total factor productivity. As showed in Barro (1997), other things being equal, a 10 percent increase in the inflation rate reduces long-run growth by about 0.025 percent per year, being the level of inflation, rather than its variability, that affects growth adversely. Based on cross-country evidence, Bruno and Easterly (1998) found that growth fell by an average of 2.8 percent during high inflation, but rose by an average of 3.8 percent during a successful stabilization. The transition from high to low inflation, however, cannot be expected to bring contemporaneous acceleration in growth. Also, the effects of inflation on growth are possibly nonlinear (Agénor 2000). When inflation is low, it appears that inflation has no significant effect on growth. But when inflation is high, it has a negative and significant effect on growth.

Empirical international evidence shows a positive link between growth and macroeconomic stability (Chapter 1 in the main document, and Fischer (1993), Bleaney (1996), and Agénor and Montiel (1999))[13]. If a stable macroeconomic framework requires inflation stabilization, the latter requires reducing fiscal deficits and maintaining a stable and sustainable fiscal policy.

Thus, fiscal policy has an *indirect effect* on higher and sustainable growth, as a prudent fiscal policy is the foundation of a stable macroeconomy. Poor fiscal management may lead to resorting to the inflation tax and seignorage. Printing more money to finance the deficit, more than what households want to hold, rises prices and may lead to lessen the willingness of households to hold non-interest bearing assets. Moreover, as Tanzi-Olivera effects materialize, the deficit will widen in real terms, and money creation will increase, thus establishing a vicious circle leading to hyperinflation. Excessive domestic borrowing to finance the deficit can lead to higher interest rates and crowd out the private sector. Domestic borrowing also has limits as the public, at some point, will be unwilling to hold more debt or will do so only at higher interest rates, further increasing the cost of debt

service. Eventually, deficits must be brought down with cuts in spending or through higher taxes to avoid inflationary financing of the deficits.

Fiscal policy has also a *direct effect* on growth. Low budget deficits resulting from prudent fiscal policies contribute *directly* to long-run economic growth, and in a robust manner (Fischer, 1993). The fiscal surplus positively influences capital accumulation and causes a stronger effect on the rate of growth of productivity. Bleaney (1996) shows further that the fiscal balance is one of the aspects of macroeconomic policy which appear to be most clearly correlated with growth principally by increasing the effectiveness of fixed capital investment (through lowering the intensity of credit rationing to the private sector)[14]. However, empirically the direct relationship between individual fiscal revenue and expenditure items and growth is inconclusive (Agénor, 2000). Neither the level nor the composition of public expenditure appear to have a clear-cut effect on long-run growth. The studies on the differential role of public and private investment in the growth process is also inconclusive[15]. The consensus view, however, is that changes in the composition of government spending toward higher outlays on health, education, and basic infrastructure tend to have a positive impact on growth.

Annex 3.2: A framework to assess medium-term fiscal sustainability.

1. Fiscal sustainability and macroeconomic consistency

The analysis of fiscal sustainability in the medium-run is based on the accounting approach (as compared to the present value constraint approach used for long-run fiscal sustainability analysis). An 'integrated budget" constraint for the public sector is adopted here, involving the central government operations and the balance sheet from the Central Bank. The particularity of this integrated budget constraint for Algeria is that it allows to highlight a notion of "net" foreign public debt (foreign public debt minus foreign exchange reserves) and the importance of Central Bank net profits as a source of "exceptional revenue" in the government fiscal accounts. The model here also reflects the characteristics of the Government budget constraint for Algeria, including the roles played by hydrocarbon revenues (which incorporates the Revenue Stabilization Fund, see below), the State oil company's profits in the revenue side, and the limited reliance on seignorage for deficit financing[16].

The analysis of fiscal sustainability begins with the public sector budget constraint, which links the evolution of the primary surplus to total public sector liabilities, and is particularly focused on the primary deficit. A primary deficit or surplus is defined as sustainable if it does not generate an ever-increasing debt/GDP ratio, under a given set of macroeconomic assumptions and policy targets. The indication of the sustainability of the fiscal program is provided by the comparison of the actual or projected primary balance with the primary balance that would be needed to stabilize the ratio of debt to GDP around a predetermined level, generally its current level. That difference is a measure of the additional "fiscal effort" needed to stabilize the debt.

It will depend on the level of the debt, real interest rates, and the growth rate of GDP, as well as on the actual primary balance. For the situation in which the interest rate exceeds the growth rate, a primary surplus would be needed to stabilize the debt-to-GDP ratio; with a growth rate higher than the interest rate, the debt-to-GDP ratio will fall without the need to run a primary surplus.

The Government budget in Algeria, in nominal terms and discreet times is:

$$G - T^{NO} - \lambda E X^{O} - E(RFS) + iB_{-1} + Ei^{*}Bg^{*}_{-1} = \Delta L^{g} + \Delta B + E\Delta Bg^{*} \qquad (1)$$

where G is primary expenditure, T^{NO} is total non-oil fiscal revenues, λ is the percentage of total oil revenues transferred by SONATRACH, the oil company, to the Treasury, E is the nominal exchange rate DA/US$, as oil exports are US$ denominated, X^{O} is the total oil revenues in US$, RFS is the exceptional revenue transfers from SONATRACH out of its profits, i is the nominal interest rate on domestic public debt, B is the stock of

domestic public debt, i^* is the nominal interest rate on foreign public debt, Bg^* is the total stock of foreign public debt, and L^g is Central Bank financing to government.

In (1), profit transfers from SONATRACH to Treasury are distinguished from normal fiscal oil revenues as they are realized on discretionary basis, upon a decision by the authorities to draw funds from the oil company for marginal financing of the deficit. However, the distinction with the Revenue Stabilization Fund is not made in expression (1) as the Fund resources are already included in the actual oil-related fiscal revenues. This is presented in section 2 here below in this annex, along with the methodology to obtain the parameter λ.

In order to consolidate Central Bank operations with central government operations in Algeria, the balance sheet from the Central Bank is interpreted as follows. Assets consist of credit to the authorities and the net foreign exchange reserves position. Liabilities consist of currency in circulation and reserves from commercial banks deposited in the Central Bank, netted out by credit to the private sector and others, and by credit to the banks, respectively. The sum of these net values constitutes an adjusted monetary base. The balances is ensured by the net worth, or accumulated profits by the Central Bank. The change in the net worth of the Central Bank defines its profits, which are assumed to be exclusively interest earnings on the stock of foreign exchange reserves. Profits by the Central Bank are a source of non-oil fiscal revenues in the budget constraint for Algeria.

The consolidated budget constraint is similar to (1), except that now the stock of public foreign debt is netted out by the stock of foreign exchange reserves, to reflect a more realistic situation of public foreign debt.

It can be showed that the consolidated budget constraint, divided by the price index P and real GDP y, yields:

$$\tilde{g} - \tilde{t}^{NO} + \left(\frac{r-n}{1+n}\right)\tilde{b}_{-1} + \left(\frac{r^* + \hat{e} - n}{1+n}\right)\left(e_{-1}\tilde{b}^*_{-1}\right) - \lambda e\tilde{x}^O - er\tilde{fs} = \Delta\tilde{b} + \Delta e\tilde{b}^* + \left(\Delta AM/P\right)/y \qquad (2)$$

where all lower case variables with a tilde are the same as in (1) but deflated by the price index, and expressed as percentage of real GDP. Furthermore r and r^* are the real interest rates applied to domestic and foreign public debt, respectively, n is the growth rate of real GDP, e and $\hat{e}$ are the (DZ/US$) RER and its rate of depreciation, respectively, and $\left(\Delta AM/P\right)/y$ is the expression for seignorage as percentage of real GDP, including the adjusted monetary base.

Given the policy targets, in this framework a sustainable fiscal program implies that $\Delta\tilde{b} = \Delta e\tilde{b}^* = 0$. That is, the debt to GDP ratios are kept constant at some level. As a result, for the case of Algeria, a sustainable level of primary expenditure in real terms and as a percentage of GDP results from:

$$\tilde{g} = \tilde{t}^{NO} - \left(\frac{r-n}{1+n}\right)\tilde{b}_{-1} - \left(\frac{r^{*}+\hat{e}-n}{1+n}\right)\left(e_{-1}\tilde{b}^{*}_{-1}\right) + \lambda e\tilde{x}^{o} + er\tilde{f}s + \left(\Delta AM/_{P}\right)/y \qquad (3)$$

In this framework, and given the recent economic policy history since the stabilization program in 1994, seignorage for Algeria is assumed to be 0. The actual average value as percentage of GDP for 1995-2000 has been 0.5 percent of GDP. The results in the main text in Chapter 3 are calculated based on (3).

2. *Calculation of Government's oil revenues*

Total value added from SONATRACH and its affiliates (SONATRACH in what follows, for brevity) is

$$VT = VI + VX \qquad (4)$$

$$VI = \sum_{j=1}^{m} P_j Q_j \qquad j = 1....m \text{ oil products for domestic consumption} \qquad (5)$$

$$VX = E\sum_{i=1}^{n} P_i^{*} Q_i^{*} \qquad i = 1....n \text{ oil products exported} \qquad (6)$$

where: VT : Total value added, in Dinars
VI : Domestic value, in Dinars
VX : Export value, in Dinars
P : Domestic price of oil product for domestic consumption
Q : Volume of oil product for domestic consumption
E : Nominal exchange rate Dinars/US$
P^{*} : Export oil product price, actual
Q^{*} : Volume of export oil product, actual

Treasury then extracts the rents as follows ("redevance")

$$R = \mu VT \qquad (7)$$

where
R : Rent perceived by treasury
μ : Percentage applied to obtain the rent (currently at 20%)

Then the taxable base is established as follows:

$$B = VT - R - C \qquad (8)$$

with $C = \omega VT$

Where:

B : Taxable base for direct oil tax

C: Structural Charges (operations costs) for SONATRACH

ω: Percentage for structural charges applied to total value added.

ω is determined by SONATRACH's Board year by year (currently estimated at 29%).

The direct oil tax recovered by the Treasury is

$$TP = \Lambda B \tag{9}$$

or, taking into account (7) and (8)

$$TP = \Lambda(1 - \omega - \mu)VT \tag{10}$$

where:

TP : Direct oil taxes by the Treasury

Λ : Legal percentage applied to the taxable base (currently at 85%)

Therefore, Government's total oil revenues are

$$FP = TP + R \tag{11}$$

or, taking into account (7) and (10)

$$FP = [\mu + \Lambda(1 - \omega - \mu)]VT \tag{12}$$

and still, with $\lambda = \mu + \Lambda(1 - \omega - \mu)$ and taking into account (5) and (6)

$$FP = \lambda\left[\sum_{j=1}^{m} P_j Q_j + E\sum_{i=1}^{n} P_i^* Q_i^*\right] \tag{13}$$

where:

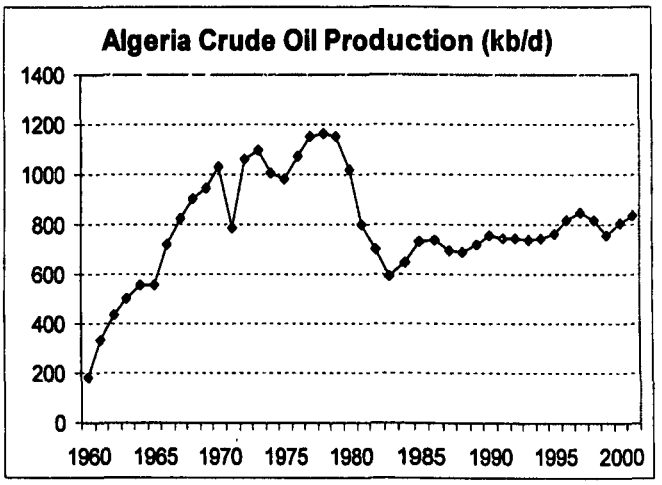
FP : Total oil revenues transferred to the Treasury

Funds for the Revenue Stabilization Fund are calculated based on (13). The procedure to calculate these funds is exactly the same as the one applied for (13), except that the information on prices and quantities comes from the Budget Law. The difference is then computed between the calculation of (13) based on actual prices and quantities (ex-post figures) and the same calculation based on budget-reference prices and quantities (ex-ante figures). The resources resulting from this difference are then transferred to the Revenue Stabilization Fund.

Annex 3.3: Medium-term hydrocarbon revenue projections for Algeria

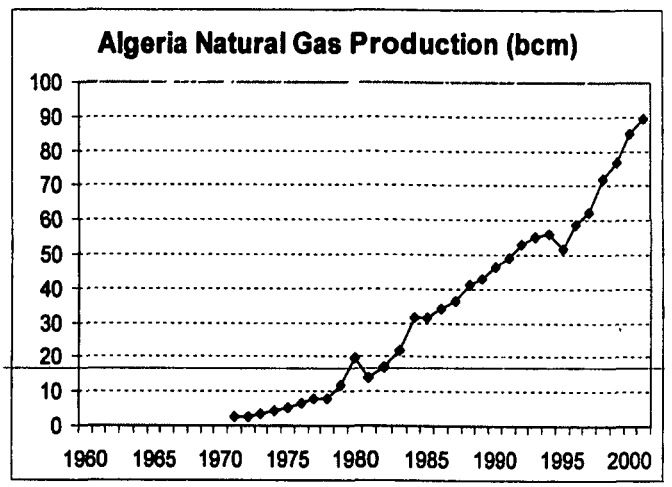
Overview of past trends: Oil and Gas Production, 1960-2001

Algeria is a relatively young oil and gas producing country, with oil production commencing in 1958 and gas production in 1961. (By contrast the US and Russia have been producing for nearly a century and half, and remain among the three largest producers in the world.) Algeria's oil production rose rapidly during the 1960s, but since 1973, Algerian oil production has been constrained by OPEC production and pricing policies. Algeria became an OPEC member in 1969 and began nationalizing assets of foreign oil companies in 1971. Current production of 0.80 million barrels per day (mb/d) is more than 30% lower than in the late 1970s.



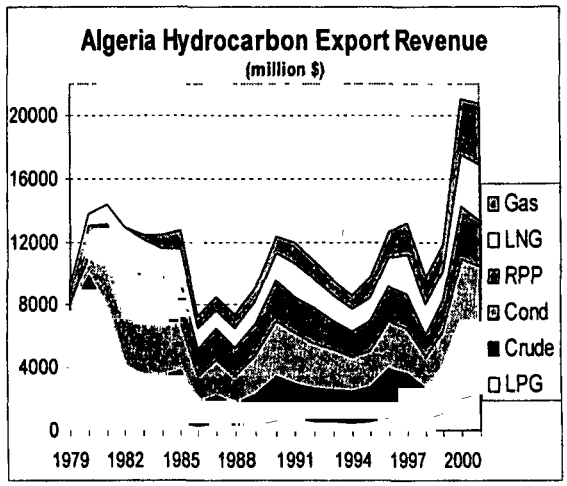
Algeria's oil production has largely followed OPEC's overall production profile, although over the last fifteen years its output has grown only modestly, compared with OPEC's average growth of around 4% per annum (see Box on OPEC). Algeria's oil capacity has been constrained by lack of investment, partly due to civil conflict. Recently, Algeria has been very successful attracting foreign capital and technology, and oil production capacity is expected to increase significantly over the next several years. Nevertheless, Algeria expects actual production to be set by its OPEC quota.

Algeria's gas production has risen quite rapidly and, unlike oil, is not subject to production quotas (graph shows gas production since 1970, although it began in 1961 and LNG exports commenced in 1964). Algeria is extremely well placed geographically to help supply Europe's increasing appetite for gas. Europe's gas and electricity markets are in the process of deregulation, and gas demand is expected to continue increasing strongly requiring increasing imports from Algeria and other countries. However rising competition could lead to lower prices and help dismantle the

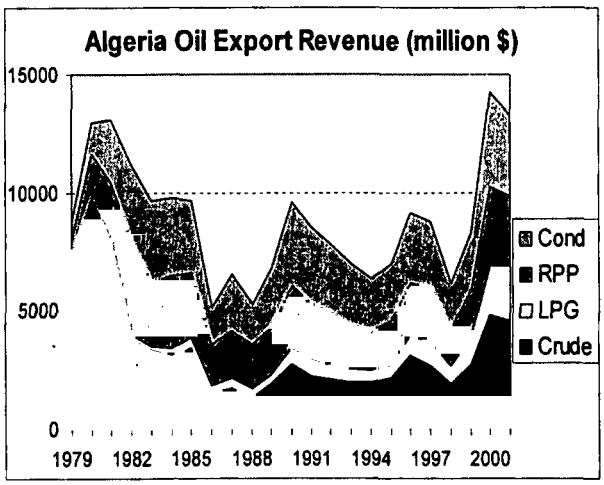


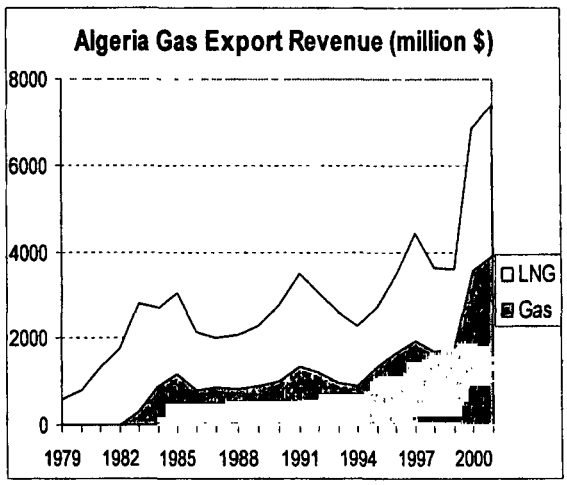
traditional gas-trade of long-term contracts indexed to oil prices. Presently, Algeria and the EU are discussing the "destination" clause in current contracts (that prevents resale of the gas in Europe) that the EU says is illegal under its new rules.

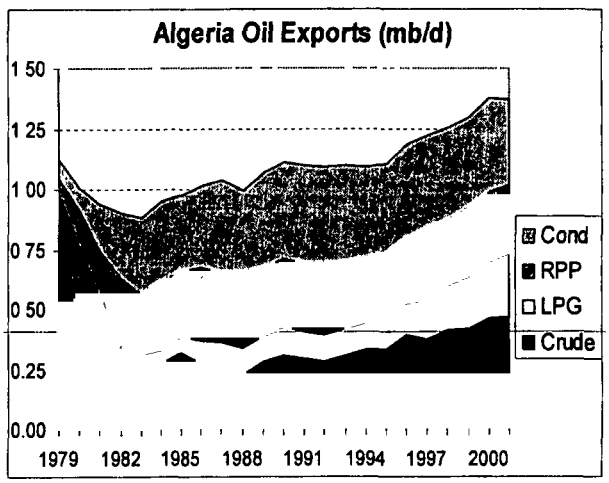
Hydrocarbon Export Revenues 1979-2001

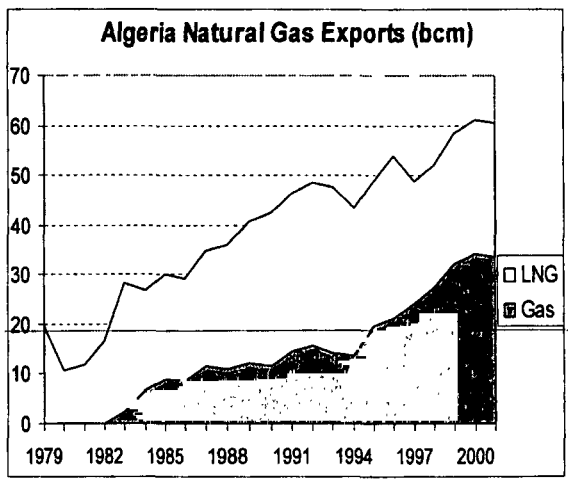


Algeria's hydrocarbon revenues have generally followed a similar volatile path as for OPEC as a whole—mainly due to fluctuating prices—while non-crude export volumes have been relatively stable and rising (see graphs). Algeria's oil production volumes have been constrained mainly because of OPEC production quotas. However, the country benefits from large exports of condensate which is outside OPEC's quota system. Revenues from condensate helped cushion the contraction in oil production in the early 1980s and have generated significant income with the subsequent restraint on oil output (see graph).









Refined petroleum products (RPP) are produced from crude oil and are effectively under OPEC quota, including a small portion of LPGs produced at refineries. However, most LPGs are produced from natural gas and, as such, are outside the quota system.

Unlike some other OPEC countries, Algeria benefits from large and growing volumes of natural gas exports. And unlike oil, gas exports on not subject to production quotas. Initially Algeria exported only liquefied natural gas (LNG), but pipeline exports into Europe have been rising steadily and now exceed 50% of total gas exports.

Clearly Algeria has benefited from the recent rise in oil and gas prices—the latter linked to oil prices under long-term export contracts. In future, the country has the potential to significantly increase its production and exports of oil and gas, but prices for both oil and gas will remain volatile and uncertain. In addition, Algeria's oil export volumes will remain at risk, constrained by OPEC quotas. Rising oil exports could be easily absorbed into the global crude market, but as long as OPEC sustains high prices, its production (and that of Algeria) will remain below potential—perhaps far below depending on the level of prices and the level of oil demand (see Box on OPEC). If OPEC retains its market power, higher prices will necessitate that output be constrained. However, OPEC is at risk of losing market dominance from competition outside the organization, and possibly from within if some members wish to increase market share.

The country is well situated to increase its pipeline gas exports into Europe—its natural market—as well as via expanded LNG shipments to Europe and other destinations. European gas demand is expected to increase significantly in the coming years, but increasing competition could lead to lower gas prices, shorter-term contracts, and de-indexation of gas prices from oil. Similarly, increasing competition in the LNG industry is leading to growing spot markets, and new technologies have reduced the cost of producing and shipping LNG. Consequently, lower LNG prices are also likely. Algeria's gas export volumes should be under much less risk than oil, as gas is presently the hydrocarbon fuel of choice on environmental and other grounds, and its use globally is projected to grow most rapidly of all hydrocarbon fuels (see forecasts).

Hydrocarbon Reserves

Algeria is well endowed with oil and gas resources, and the country has tremendous potential to increase oil and gas production far into the future. With relatively modest domestic demand, it also has the potential to increase exports of both fuels well into the future. The only caveat with regard to domestic demand is that enduring subsidies on domestic consumption have the potential to limit exports. According to the government, relatively modest subsidies on oil products are to be phased out in five years, while very large subsidies on natural gas are not expected to be phased out until 2010.

Algeria's current level of recoverable crude oil reserves is 1.8 billion cubic meters (bcm), or 11.4 billion barrels (Bbbl) according to the Ministry of Energy and Mines, and represent half of the original recoverable reserves in place (see table). Condensate and LPGs add almost 7 Bbbl of additional reserves. The estimates represent only proven, economic reserves that are planned for development. They do not include undeveloped

proven reserves or estimates of probable and possible reserves. For natural gas, proven recoverable reserves are 3139 (bcm) or 100 trillion cubic feet (tcf). The Ministry did not provided estimates for probable, possible and ultimate recoverable reserves of oil, gas and other liquids.

Algeria: Recoverable Reserves		
	Reserves	**Percent of Original Reserves**
Crude Oil	1813 million cubic meters	50%
Natural Gas*	3139 billion cubic meters	70%
Condensate	410 million tons	54%
LPG	277 million tons	74%
* before extraction of liquids		
Source: Ministry of Energy		

The Ministry's estimate of recoverable oil reserves for oil are similar to estimates of other organizations, but gas reserve estimates vary considerably. The Oil and Gas Journal (OGJ) places Algeria's crude oil reserves at 9.2 Bbbl[17]. However, OGJ reserve estimates do not change frequently, especially for developing countries, and for Algeria reserves have not changed since 1990. Petroleum Economics places crude oil reserves at 11.3 Bbbl, condensate at 3.5 Bbbl, and LPGs at 2.5 Bbbl. The World Energy Council assess crude oil and natural gas liquids at a combined 10.0 Bbbl.

USGS - Algeria Undiscovered Resources				
	F95	**F50**	**F5**	**Mean**
Oil (million barrels)	1,765	6,919	16,386	7,732
Gas (billion cubic feet)	12,441	43,434	104,176	48,982
NGL (million barrels)	505	1,835	4,789	2,135
F95 represents a 95 percent chance of at least the amount tabulated (other fractiles defined similarly).				
Source: U.S. Geological Survey				

In the latest U.S. Geological Survey (USGS) assessment of world oil and gas reserves, it places Algeria's mean reserves of undiscovered oil at 7.7 Bbbl (see table). The USGS includes probability ranges for reserves actually occurring, and places an upper estimate for oil at 16.4 Bbbl—at 5% probability. For natural gas reserves, the USGS is even more conservative than the Ministry, with a mean reserve estimate of 48.9 tcf, or less than 1400 bcm. Its upper estimate is below the Ministry's current estimate. The OGJ, on the other hand, places recoverable reserves at 159.7 Tcf, or some 4500 bcm. Petroleum Economics places known recoverable reserves at 4000 bcm and estimates that another 5700 bcm reserves exist, for a total of 9700 bcm. The US Department of Energy sites a Sonatrach estimate of 204 tcf of ultimate reserves (5800 bcm)[18].

Reserve estimates tend to rise over time from greater knowledge through increased exploration and development. Since 1981, USGS estimates of global oil and gas reserves have risen by 76 percent and 66 percent, respectively (see Box), mainly because of chronic underestimation of reserve growth in already discovered fields. In the US—a mature oil province—reserve appreciation from 1978 to 1991 accounted for more than 90 percent of additions to proved reserves[19]. In the North Sea—a younger offshore province—reserve appreciation between start-up and 1996 was about 20 percent in the UK, and close to 50 percent in Norway. In the UK, the bulk of the appreciation for oil-in-place, while in Norway, 75 percent of the appreciation was accounted for by an increase in the recovery factor[20].

It is highly likely that the level of recoverable reserves could rise significantly in future, especially if the Ministry's reserve estimates only reflect recoverable reserves planned for development. With an expected rise in investment, discoveries, and enhanced recovery programs, reserves should surely grow. Related to the under-estimation of reserves has been chronic under-estimation of non-OPEC production forecasts over the past two decades which, among other things, contributed to a view that the world was running out of oil and led to forecasts of extraordinarily high real oil prices.[21]

In several OPEC countries during the latter 1980s, there were large, arbitrary changes to reserve estimates that instantly lifted reserves by more than 60%. The changes were not derived from detailed technical or development efforts, but rather were politically motivated to help support proportionally higher oil production quotas. With surplus capacity in OPEC countries and limited upstream development, there likely was not sufficient technical activity to support such radical changes to reserve estimates. This is not to doubt that the higher reserve estimates might indeed be accurate, only that the manner of their abrupt, arbitrary revision is in question. At that time, there were no large adjustments to Algerian reserves, as they rose less than 10 percent for that period..

Projections of Hydrocarbon Production and Revenue

Algeria has the potential to raise oil and gas production significantly in coming years given its large reserve base. There is also the possibility of significant reserve growth which could expand its capacity to produce and export hydrocarbon fuels into the indefinite future. The only limitation to oil production and exports the past 20 years has been the lack of upstream investment and commitment to OPEC quotas. Given current investment plans to raise capacity, the major constraint will be adherence to its OPEC quota. Natural gas exports have the potential to grow more freely, without a policy constraint on output. Algeria benefits from being a major low-cost gas supplier situated close to Europe, where gas demand is expected to expand significantly in the coming two decades. However Algeria will face increasing competition as the EU liberalizes its gas and electricity markets, and prices are likely to be increasingly de-linked from oil prices. In future, the maintenance of large subsidies on domestic gas demand could distort the sector and potentially limit exports. However, subsides on gas use are scheduled to be removed over the coming decade. Oil subsidies, on the other hand, are relatively small, and are expected to be removed within five years.

Ministry of Energy Projections to 2005

In recent years Algeria has taken steps to liberalize its oil and gas sectors and is attracting significant levels of foreign investment into the upstream sector [see BOX]. This is expected to result in significant growth of production capacity over the next several years. The Ministry of Energy and Mines expects oil production capacity to rise to 1.5 mb/d in 2005, from 0.9 mb/d in 2001. Consultants Petroleum Economics Limited projects that Algeria's oil productive capacity will reach 1.6 mb/d by 2006, based on current development plans. New capacity of natural from the In Salah, In Amenas, and Ohanet fields is expected to add 24 bcm by 2004. With continued investment into the sector, the Ministry expects production capacity of oil and gas to keep growing in subsequent years. Gas exports are expected to reach 85 bcm per year by 2010, from around 60 bcm currently[22].

Under an assumption of oil prices at $22/bbl, the Ministry projects oil export revenues (all liquids) of $17.0 billion in 2005. The increase in oil revenues is largely from crude oil exports, which reach 1.5 mb/d in 2005 (see table). Gas export revenues are projected at $6.2 billion, split roughly equally between LNG and piped gas.

Risks to the revenue forecast are both export prices and volumes. International oil prices will largely depend on OPEC policy, essentially its ability support a relatively high level of prices. As gas export prices are presently linked to oil under contract, risks to oil prices are similar for gas. Oil production volumes are also far from certain, and are intertwined with OPEC pricing objectives—in addition to global oil market fundamentals. The Ministry forecast implies that Algeria will produce most of its planned increase in oil productive capacity. This may be quite optimistic, if it assumes that Algeria remains a solid member of OPEC, and if OPEC continues to target higher prices. Under a favorable scenario of world oil demand growth of 2 mb/d and OPEC capturing half that growth, it would mean an increase of less than 4% per year for each OPEC member, assuming pro rata adjustment to quotas. This is far less than the Ministry's projection of more than 15 percent growth in production. If OPEC is able to keep prices high, then the demand for OPEC oil will be far less than implied under the Ministry's forecast. Should global demand become more sluggish at high prices than indicated above, it is possible that the demand for OPEC oil might increase very little. In such case, Algeria's oil revenues will be much lower than projected, and the country may end up with significant surplus capacity in the medium term. A large surplus may also impinge upon foreign investment in the oil sector, or Sonatrach's ability to absorb the surplus, or both.

Algeria Oil and Gas Production and Revenue Projections to 2005					
	Unit	2002	2003	2004	2005
Production					
Crude Oil	10*3 tons	49,641	64,805	72,133	74,222
Condensate	10*3 tons	14,733	14,520	15,688	16,725
LPG	10*3 tons	8,228	8,398	9,529	9,976
Natural Gas	10*6 m3	134,370	136,641	154,864	165,915
Exports					
Crude Oil	10*3 tons	29,889	44,663	52,797	55,067
Refined Products	10*3 tons	12,965	13,265	12,640	13,018
Condensate	10*3 tons	13,917	13,519	14,453	14,656
LPG	10*3 tons	8,040	8,242	9,575	9,982
LNG	10*6 m3 gas	29,204	30,600	30,600	30,600
Natural Gas	10*6 m3	32,750	34,195	37,750	37,750
Export Revenue					
Crude Oil	$ millions	5,188	7,753	9,165	9,558
Refined Products	$ millions	2,497	2,555	2,434	2,507
Condensate	$ millions	2,687	2,610	2,791	2,829
LPG	$ millions	1,718	1,761	2,046	2,132
Total Liquids	**$ millions**	**12,090**	**14,679**	**16,436**	**17,026**
LNG	$ millions	3,022	3,143	3,155	3,094
Natural Gas	$ millions	2,705	2,812	3,090	3,090
Total Gas	**$ millions**	**5,727**	**5,955**	**6,245**	**6,184**
Total Exports	**$ millions**	**17,817**	**20,634**	**22,681**	**23,210**
Conversion factors: 1 ton = 7.3 bbl; for LPG 1 ton=11.6 bbl					
Source: Ministry of Energy and Mines. Annual Report 2001, and projections.					

The Ministry of Energy and Mines plans to partially offset an impending surplus capacity, given its large investment plans, by trying to negotiate a higher OPEC quota in future[23]. Algeria was given a lower production quota in the late-1980s/early-1990s based on its production capacity at the time. Its quota share fell from slightly more than 4.0 percent (including Iraq) in 1988 to the present 3.2 percent (excluding Iraq). An increase in Algeria's quota to 4 percent would add 175 kb/d at today's level of output (raising Algeria's production by 25 percent from 693 kb/d to 868 kb/d). This would clearly benefit Algeria, but to raise its production significantly even under a new quota arrangement requires strong growth in oil demand and OPEC capturing a significant portion of that growth. This could possibly occur, but OPEC's relatively high price targets may limit the growth in demand for OPEC oil, and result in both lower oil production and revenues than anticipated.

Outlook to 2010 – Three Oil Price Scenarios

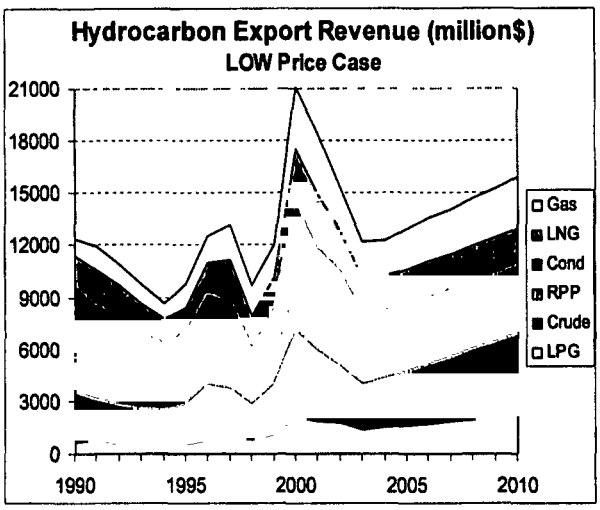
The World Bank, in conjunction with Petroleum Economics Limited, has projected Algeria hydrocarbon export revenues to 2010 under three oil price assumptions—$15/bbl, $19/bbl and $28-25/bbl ($28 to 2005 and then $25 to 2010). Algeria's crude oil production fluctuates in each scenario, based on OPEC global requirements and its current share of OPEC quota. Refined petroleum product exports are also constrained by oil production quotas and domestic demand requirements. Natural gas production and export volumes are the same under each scenario, with export revenues varying according to price. In all three cases, natural gas prices are increasingly de-linked from oil prices as a result of liberalization policies and greater competition in Europe's gas markets.

Algeria Hydrocarbon Export Projections – Three Oil Price Scenarios

			Low $15/bbl		**Mid $20/bbl**		**High $28-25/bbl**	
		2000	**2005**	**2010**	**2005**	**2010**	**2005**	**2010**
Crude Oil	$ million	4815	3017	4593	3532	4860	2818	3109
Refined Prod	$ million	3283	1667	1508	2112	1910	2112	1910
Condensate	$ million	3999	2237	2434	2833	3083	2833	3083
LPG	$ million	2118	1605	2210	2033	2799	2033	2799
Natural Gas	$ million	6879	4367	5160	5142	5898	6563	6702
Total	$ million	**23094**	**14897**	**17916**	**17656**	**20560**	**18364**	**19614**
Crude Oil	10*3 tons	21412	25034	38115	23139	31835	18459	20370
Refined Prod	10*3 tons	13551	13254	11988	13254	11988	13254	11988
Condensate	10*3 tons	15920	16608	18074	16608	18074	16608	18074
LPG	10*3 tons	7413	10854	14942	10854	14942	10854	14942
Natural Gas	mill m3	61385	69844	83220	69844	83220	69844	83220
Gov't Take*	**$ million**	**16120**	**9669**	**11929**	**11739**	**13912**	**12269**	**13203**

Government take calculated as 75% of total export revenue
Source: World Bank, Petroleum Economics Limited.

The revenue projections vary significantly, largely due to differences in oil and gas price assumptions (see table and graphs). However, revenues are also affected the change (or lack thereof) in crude oil production which is constrained by quota and the aggregate demand for OPEC oil. Crude oil revenue projections to 2005 are well below the Ministry's projections. The Ministry expects oil production to increase more than 80 percent by 2005 (from 0.8 mb/d presently to over 1.5 mb/d, in line with expected increases in capacity). However, even in the low price case, production does not quite reach 1.0 mb/d in 2005. A higher quota share of 4 percent would allow for somewhat higher production (0.175 mb/d at today's levels), but this would still leave production well below planned increases in capacity. If prices remain high, OPEC's production is likely to remain stagnant, if not decline during the period. Limited growth in demand for Algeria's oil could exert strain on Algeria's on OPEC relations regarding its quotas, as well as with foreign companies investing in the petroleum sector.


Hydrocarbon Export Revenue (million$)
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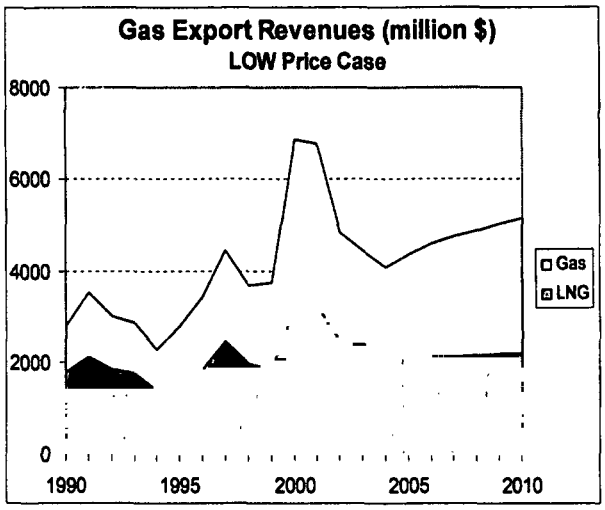
Gas Export Revenues (million $)
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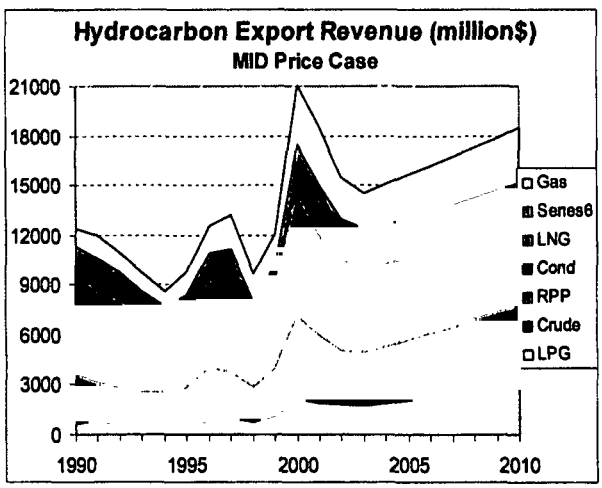
Hydrocarbon Export Revenue (million$)
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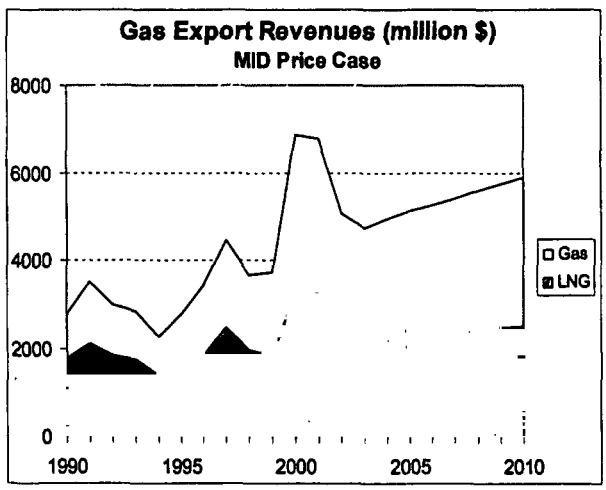
Gas Export Revenues (million $)
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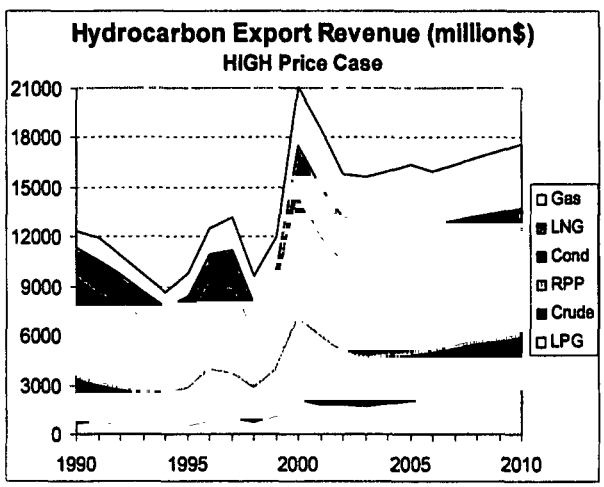
Hydrocarbon Export Revenue (million$)
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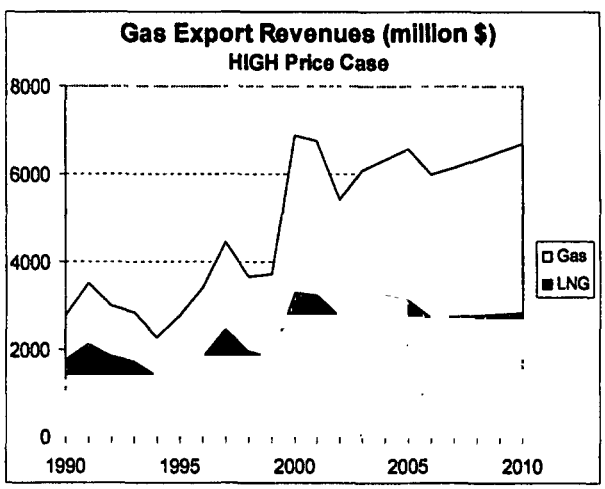
Gas Export Revenues (million $)
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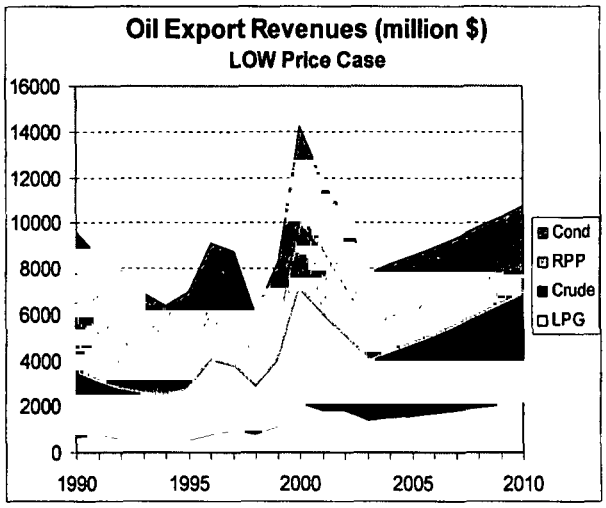
Oil Export Revenues (million $)
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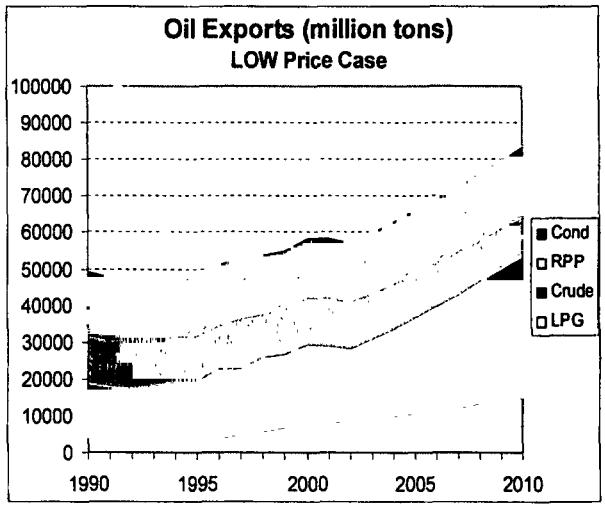
Oil Exports (million tons)
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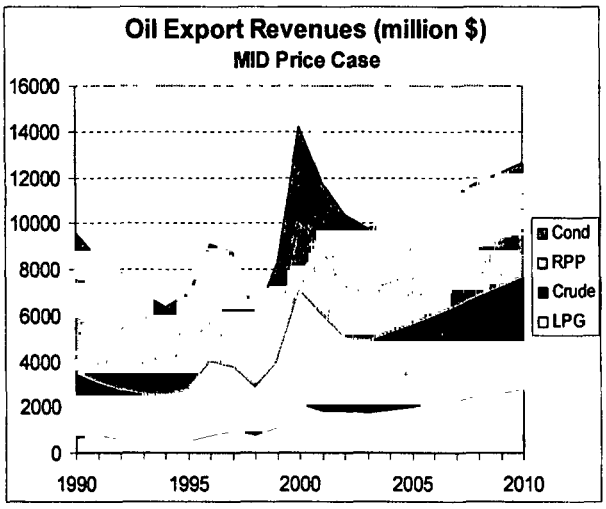
Oil Export Revenues (million $)
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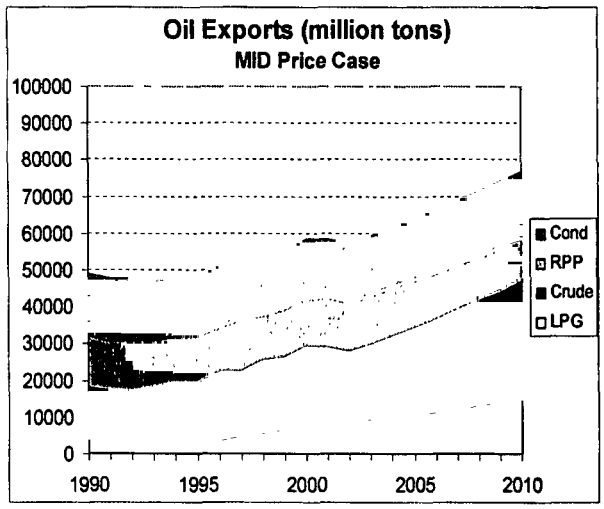
Oil Exports (million tons)
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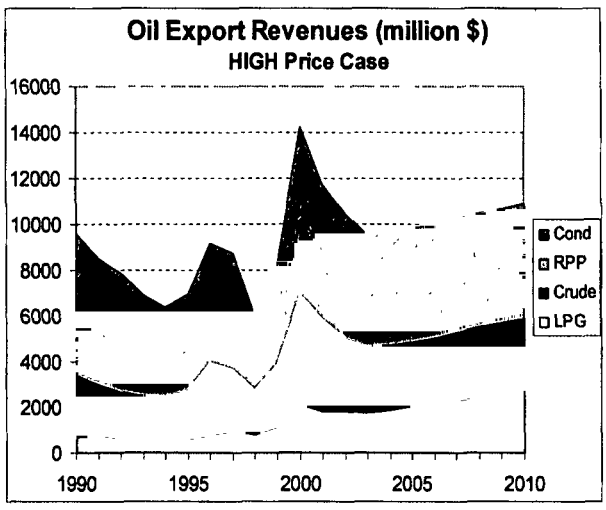
Oil Export Revenues (million $)
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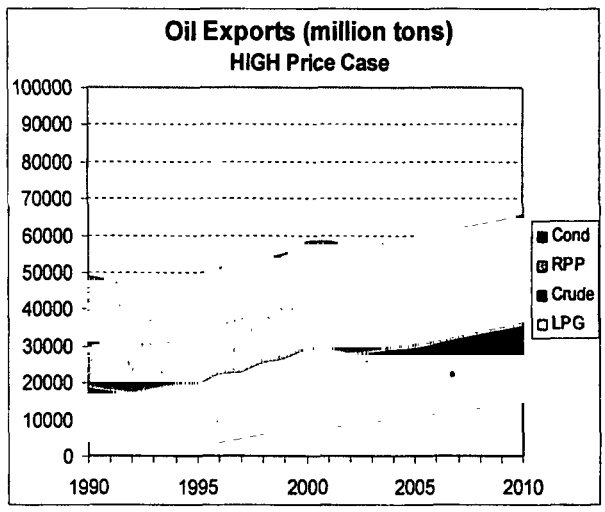
Oil Exports (million tons)
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Cond
RPP
Crude
LPG

Natural gas production is expected to increase significantly in the coming years, with new projects adding nearly 25 bcm of capacity by 2004. This will be partially offset by declines in existing capacity. Exports are expected to increase significantly, and plans are underway to expand export capacity to 85 bcm by 2010. How quickly exports rise will depend on the timing of expansion and construction of new lines to Europe. The Ministry forecast shows a rapid increase in production by 2005 but exports appear to be constrained by capacity (this needs to be clarified with the Ministry). The levels of condensate and LPGs are similar to Ministry projections, but data limitations prevent a more precise apportionment of the liquids.

Long Term Oil Production Forecasts to 2020 (external sources)
There are several risks to Algeria's (and OPEC's) long-term production volumes, partly depending on OPEC policy and the level of oil prices. Consultants, Petroleum Economics Limited, provide forecasts for world oil supply and demand to 2015, based on long term oil prices of $18-$22/bbl (see table). They project world oil demand rising at an average rate of 2 percent, and OPEC production (and that for each member on a pro-rata basis) growing by 3.5 percent. It leaves Algerian production essentially unchanged in 2005 at 0.8 mb/d in 2005, rising to only 1.0 mb/d in 2010 and 1.3 mb/d in 2015. PEL provides two alternative scenarios under long-term oil prices of $15/bbl and $25/bbl. Under the low price scenario OPEC oil production rises to 50.3 mb/d in 2015, with Algeria at 1.5 mb/d. Under the high price scenario OPEC production is only 31.7 mb/d in 2015, and Algeria's output at 1.0 mb/d (at current quota shares).

World Oil Demand and Supply (mb/d)

	2000	2005	2010	2015
Demand	76.0	83.9	92.7	102.1
Supply	76.6	84.0	92.8	102.2
Non-OPEC	45.8	51.1	52.6	49.8
OPEC Crude	28.0	29.2	35.6	46.8
of which Algeria	**0.8**	**0.8**	**1.0**	**1.3**
OPEC NGLs	2.8	3.7	4.6	5.6

Source: Petroleum Economics Limited

The US Department of Energy presents three scenarios for the world oil market, of which OPEC production and OPEC productive capacity are summarized in the table below. By 2020, forecasts of OPEC production range from 45.6 mb/d to 66.2 mb/d. There are no resource constraints on OPEC being able to produce these volumes over the forecast period. Under current OPEC quota shares, Algeria's production (which includes NGLs and condensate) would range from 1.3 to 1.9 mb/d in 2020, while its production capacity is projected to reach 2.4-2.8 mb/d (more than double today's level). The "Low Price Case" has world oil demand nearly doubling by 2020, which seems a bit unrealistic according to World Bank analysts.

Projections of OPEC Production and Capacity Three Scenarios (mb/d)					
	2000	**2005**	**2010**	**2015**	**2020**
Reference Case					
OPEC Production	30.9	35.3	42.1	49.4	57.2
OPEC Capacity	31.4	38.4	44.8	52.0	60.2
of which Algeria	**1.4**	**1.9**	**2.2**	**2.3**	**2.5**
High Price Case					
OPEC Production	30.9	31.1	34.3	39.4	45.6
OPEC Capacity	31.4	33.8	36.5	41.5	48.0
of which Algeria	***1.4***	***1.6***	***1.8***	***2.1***	***2.4***
Low Price Case					
OPEC Production	30.9	38.0	47.1	56.5	66.2
OPEC Capacity	31.4	41.3	50.1	59.5	69.6
of which Algeria	***1.4***	***1.8***	***2.3***	***2.5***	***2.8***
Production includes natural gas liquids and condensate. Oil Price Assumptions in 2020 (2000 $): Ref. $24.68; Hi $30.50; Lo $17.41.					
Source. US DOE, International Energy Outlook, March 2002.					

In summary, there are significant risks to future levels of Algeria's oil production depending upon OPEC's pricing and production policy (and other market factors), and whether Algeria remains a solid member of OPEC and maintains its current share of OPEC output. In the more distant future, there are greater uncertainties about the growth of global oil demand, particularly for transport fuels, and growing environmental concerns over hydrocarbon use and global warming. There are no resource constraints far into the distant future, and new technologies continue to lower the cost of production and shift supply curves outward. Thus crude oil prices are likely to remain extremely volatile, with economic forces exerting downward pressure on prices, while OPEC production restraint pushes prices upwards, often well above the costs of production.

European Natural Gas Forecast to 2020

Algeria has the potential to increase its natural gas exports significantly, mainly into Europe. Europe's gas demand is expected to increase significantly, mainly for power generation, and Algeria is well positioned to be the major low-cost supplier to the European market. The share of gas in total European energy demand is expected to increase from 10 percent to 30 percent by 2020, while the share of gas in power generation is expected to increase to more than one-third. Total gas demand is expected to increase at a rate of nearly 3 percent to 2020, with gas used for power generation rising by slightly more than 6 percent (see table).

In 2000, Europe consumed about 450 bcm of gas, with domestic resources supplying about nearly two-thirds, or 300 bcm. According to the IEA, European domestic gas supplies are to remain broadly unchanged by 2020, with increases in Norway offset by declines elsewhere. The latest IEA estimate puts European gas demand at 800 bcm by 2020[24], somewhat higher than the above forecast (the US DOE forecast of 725 bcm in 2020 is similar to the IEA's earlier forecast, while PEL projects 850 bcm for 2020). At 800 bcm in 2020, European gas imports could rise to about 500 bcm or 60 percent of consumption. While there is significant potential increase gas exports to Europe, the pattern of trade will depend on a number of supply side factors, e.g., comparative cost, export capacity, degree of competition, government policies, and investment risk.

Europe Gas and Energy Demand Forecasts (mtoe)

	1997	2010	2020	Growth Rate 1997-2000	Growth Rate 1997-2020
Energy Demand	1716	2019	2144	1.3	1.0
Gas Demand	344	522	650	3.3	2.8
of which Electricity	*72*	*181*	*282*	*7.4*	*6.1*
Gas Share of Total Energy (%)	20	26	30		
Gas Share Power Generation (%)	11	23	34		

Source: International Energy Agency, World Energy Outlook 2000.

Cost will be crucial, and here Algeria is highly competitive. According to the IEA, the lowest cost potential sources of incremental gas outside Europe are to be found in north Africa, notably Algeria. Expansion of the Maghreb-Europe Pipeline system could enable new gas to be delivered into Spain at just over $1.50 per million btu (mmbtu). This compares with LNG supplies which could probably be delivered to the Mediterranean from Latin America or Nigeria at about $2.50/mmbtu[25]. On balance, incremental gas imports into Europe are largely to be met by increased piped gas supplies from the main existing suppliers, Algeria and Russia, and a mixture of piped gas and LNG from other existing producers as well as emerging suppliers (such as Libya via pipeline, and Nigeria, Egypt, Trinidad and Tobago, and possibly Qatar with LNG). Venezuela LNG and spot shipments from other Middle East suppliers could emerge as spot LNG markets develop.

Algeria's gas production is expected to steadily rise, assuming a continued improvement in the investment climate, favorable upstream policies, new export capacity, and liberalization of domestic prices. Petroleum Economics Limited projects that Algerian gas production could reach 140 bcm in 2020, an increase of more than 50 percent. Depending on the level of domestic demand—the issue of large domestic subsidies is important—exports into Europe could rise significantly over the next 20 years.

Annex 3.4: Oil stabilization and savings funds: Lessons from international experience

Rationale and Types of Funds

Oil producing countries benefit greatly from their natural resources, but revenues received are extremely volatile and unpredictable. For most of the period since 1973 oil prices have been artificially supported well above the costs of production by OPEC producers, via output restraint. With a large disparity between prices and costs, prices are able to fluctuate widely—and at times are aggravated by adverse political shocks. How OPEC will be able to manage prices in future is uncertain—revenue windfalls could be large or small. And as discussed elsewhere, production volumes are also at risk.

Volatile oil revenues pose a number of difficulties to governments, notably with respect to fiscal management, budgetary planning, and exchange rate volatility. Cutting expenditures during a price downturn can be disruptive and costly, while expenditures may rise to unsustainable levels during a price upturn. Consequently governments adopt pro-cyclical fiscal policies because of the windfall tax revenue[26]. In addition, fluctuating incomes and investment are detrimental to long term growth.

It is difficult to know if a price shock is permanent or temporary, even though oil (and other commodity) prices tend to be mean reverting. OPEC has targeted several "base" or "mean" levels over the past 25 years, and is unclear how long the current official target of $22-$28/bbl will be maintained.

Oil resources are potentially exhaustible, although in practice reserves will never run out. Technology could lead to resource "obsolescence". Even in a stage of unrelenting depletion, costs would rise and a good part of the resource would be left in the ground. At a minimum, slow depletion of the resource will eventually set in, and a country should prepare for an economy after oil. Importantly, governments must decide what portion of the resources should be saved for future generations.

In response to the effects of windfall revenues, price volatility, and resource depletion, a number of oil producing countries have created revenue stabilization and savings funds. There are basically three types of funds[27]:

- Stabilization Funds
- Savings Funds
- Financing Funds (Norway fits this category)

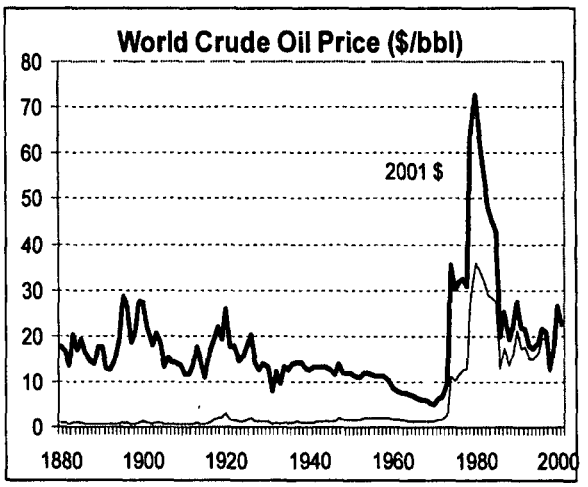
Many funds have been established in industrial and developing countries alike, and a number of new funds have been created in recent years, including one in Algeria. While the focus of funds are on *revenues*, the primary consideration for fiscal management and saving for future generations is on *prudent expenditure policy*. In principal, any financial objective attempted through a fund can be replicated without a fund. As all savings and expenditures should be undertaken through the budget, where fiscal management is most

transparent and accountable, there are legitimate questions as to why have a fund at all—especially if there are risks that the fund will do more harm than good (e.g., from being located outside the budget process). If there are conditions that a fund will induce savings and insulate revenues from spending pressures, then there may be some justification for establishing a fund. However, the over-riding principles should be:

- prudent expenditure policy;
- proper institutions and rules; and
- all transactions through the budget.

If these elements are in place, the question again arises, why have a fundl? Governments may offer supplementary reasons for establishing funds, such as improved transparency, budgeting, and governance, but these issues should be dealt with directly, rather than with a fund, because funds can potentially worsen these very conditions that are trying to be addressed.

Stabilization funds have been developed to lower the impact of volatile resource revenues on the government and the economy, by smoothing expenditures flowing to the budget, i.e., saving during a revenue windfall and dissaving during a price slump. Although a principal objective might be to enhance fiscal discipline, mainly by reducing the need to cut expenditures when revenues fall, stabilization funds do not directly control spending. In addition, stabilization funds do not remove revenue volatility and uncertainty.



Operationally, stabilization funds are difficult to design and operate. Typically a reference or "trigger" price is set that will automatically move funds in or out of the fund. The trigger may be based on historic oil prices or prevailing forecasts. Unfortunately it is difficult to specify an appropriate long-run average price or predict with any degree of confidence future prices. It is possible that under certain reference prices, revenues in the fund could rise indefinitely, or else might be quickly depleted. Even if an appropriate average historical price were chosen, price shocks may not be temporary and the size of a shock could be large (it is essentially these conditions that led to the financial collapse of a number of the international commodity agreements, although other factors also contributed to their termination[28]). Consequently price-setting rules have tended to change over time, or in some cases by-passed or abandoned. In addition there can be a tendency for prices to be selected strategically in order to generate more spending.

While resource revenues flowing to and from the budget might well be stabilized, the fund has no mechanism to limit government spending. The most critical period to restrain expenditure, and hence generate saving, is when prices and revenues are high.

Simply putting revenues into the fund does not prevent the government from borrowing or drawing on assets to finance additional expenditures. Without restraint on expenditure and borrowing, the benefit of a fund may be limited. To smooth expenditures, therefore, requires *additional fiscal policy decisions* besides the operation of a fund[29].

Savings funds are designed to generate a store of wealth for future generations. The notion of saving arose from the windfall revenues received following the first oil price shock in 1973-74. The windfall generated large trade and government surpluses in some countries, becoming very large (but temporary) in the early 1980s. The windfall also went to private industry which led federal governments to extract additional revenues from the industry (e.g., Windfall Profits Tax in the US) and also from producing provinces (e.g., National Energy Program in Canada). After the initial wave of windfall gains, it also became apparent that it was prudent to save for future generations, so that the benefits from depleting resource revenues could be extended to a larger number of citizens.

Typically in a savings fund, a certain share or fixed portion of resource revenues are deposited into the fund, regardless of oil prices or the fiscal balance. Often there will be a stabilization component to fund, allowing governments to draw revenues to finance deficits, for example when oil prices are low or during unforeseen events. A government can only save wealth if it maintains a budget surplus. However, a potential problem with the savings fund is that, like the stabilization fund, is that it does not constrain government spending or automatically lead to savings. Governments can borrow to finance additional expenditures, which essentially entails transferring borrowed funds into the account. Thus the benefit of the fund may be limited. When the fund accumulates significant assets, or during periods of high prices, government's may have difficulty resisting pressures to spend. Thus, as with the stabilization fund, additional fiscal policy rules may be required to limit spending.

There is also the problem of calculating the appropriate long-run average price in determining what portion to save for future generations. In addition to prices, how much to save also depends on the projected profiles of oil output, extraction costs, resource prices, discount rates, and returns on alternative investments. As Alan Gelb et. al. point out, these are slippery numbers, and optimal savings rates are sensitive to such assumptions[30].

Financing funds are savings funds that effectively finance the overall budget balance. The IMF authors categorize the Norwegian State Petroleum Fund as this type of fund[31]. Essentially net oil revenues are transferred to the fund, and the non-oil budget deficit is financed from the fund. The fund is essentially a government account and its rules provide little fiscal discipline. As long as the overall budget balance is in surplus, savings will accumulate. Borrowing is unlikely to occur under this arrangement, given the direct link between fiscal policy and the savings fund. (See further detail in Norway example.)

Operations of Funds

A key recommendation for any fund is that it should be integrated into the budget process. This allows the government to have unified control of fiscal policy. To do otherwise could lead to problems of financial management and separation of policy decisions, and raise public concerns about transparency, accountability and governance. Dual budgets, arising from expenditures financed by the fund outside the normal budget, are to be avoided. All expenditures should compete within the normal budget process, subject to legislative approval. Should any expenditures occur outside the budget process, it is essential that such expenditures be approved by parliament in a wholly transparent manner.

IMF authors describe three institutional arrangements for oil funds that may arise, depending on how the fund is integrated into the budget. A *virtual fund* is one which need not require a separate institution, as funds would reside in a government account. All revenues and expenditures would be incorporated into the budget. Resources from the fund would not be earmarked for specific expenditures, and the fund's assets would be administered like all government assets through the normal budget process, in a manner that is completely transparent and accountable. In essence, the funds assets are tightly controlled by the government. Again, a natural question is why have a fund (or separate account) at all. The benefit of such an account is that it can emphasize to citizens the special nature of non-renewable resources, and that it is prudent to save a portion for future generations. The importance of this should not be understated, because achieving political consensus is major obstacle for creating and maintaining a savings program—especially in developing countries where demands are high for current spending.

A second approach would allow resources in the fund to be earmarked for certain expenditures. In such cases, all revenues moving in and out of the fund should be transferred through the budget, and saving and dissaving determined in the normal budget process. One drawback of earmarking is that resources and expenditures might be placed outside the budget process, and this could lead to the misuse of funds.

The third approach is to allow a fund to operate outside the budget process and undertake off-budget expenditures. It may even receive funds from non-budget sources. The rationale for such a fund is that it keeps resources away from a system that is either inefficient or corrupt, and prevents wasteful expenditures. It is often the justification for establishing such funds in oil producing countries that are in transition, or those about to export oil for the first time. This approach raises a number of concerns with respect to transparency, accountability, and governance, as expenditures could be taken without legislative approval. It could even result in governments spending too little in the normal budget relative to the needs of the country. An obvious question is why a separate system of expenditures outside the budget process would operate any more efficiently, if the overall political system and institutions are poor. It is recommended that if off-budget expenditures are permitted, such expenditures should be approved by parliament and executed by the treasury[32].

Managing Fund Assets

Over time, accumulated assets in a fund can become very large, and an asset-management strategy will need to be devised, depending on the nature of the fund. A stabilization fund that needs to draw on assets at short notice may hold a different type of asset (e.g., risk-free bonds) than a long-term savings fund that may hold a significant portion in equities. In any case the normal investment guidelines on risk, liquidity and returns will be applied according to objectives of the fund. Asset-management should reflect the overall portfolio of government assets, and its short-term operations should coordinate with the government's debt management and cash flow operations.

It may be advantageous to invest the fund's assets abroad to prevent resource revenue volatility being transmitted to the domestic economy, and to prevent the non-resource tradable sector from becoming less competitive through real exchange rate appreciation. In principle, the fund should not invest in the government's domestic or foreign liabilities, nor should it be allowed to lend or borrow. In addition, the government should not use the fund as collateral for borrowing.

The government may want to use the fund's resources to invest in badly needed infrastructure, with the intent of promoting growth in the non-resource tradable sectors. This could be accomplished with resources from a savings fund, as stabilization funds require liquid assets. There may be political reasons of why it is difficult to place assets—particularly off-budget assets—abroad. However, if the assets are invested on domestic projects, problems can arise, such as excessive spending on poor or unproductive projects. The fund could become prone to abuse, with easily available resources creating incentives for rent seeking.

All objectives, rules, management and operations of the fund should be transparent and shielded from political manipulation under law. Mechanisms should be in place to prevent misuse of funds. This will help attain public support for the fund's objectives and operation. Independent auditing (financial and performance) and regular reporting of all operations (including inflows, outflows, and asset allocation) will further enhance public confidence and support of the over-riding principles of saving. Reports should be officially submitted to parliament for approval.

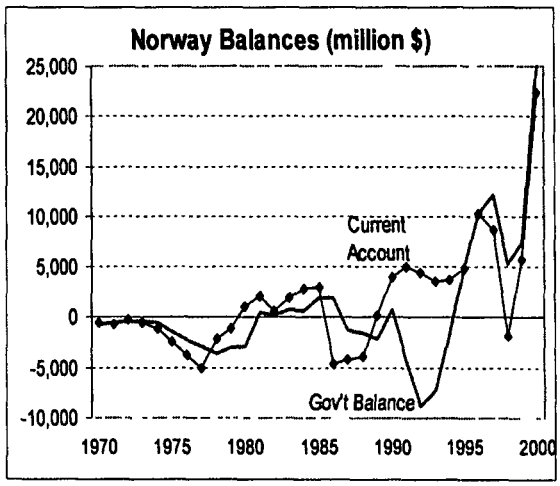
Management of the fund's assets could be assigned in a variety of ways, ranging from the ministry of finance or central bank to a board of government officials or independent trustees, the latter accountable to legislative authorities. Private fund-managers could handle the actual management of the fund's assets, in accordance with normal government procurement guidelines. The management structure should have clear divisions of responsibility and accountability, answerable to parliament. Rules and objectives of the fund should be clear and well-publicized, so that performance of the fund can be regularly assessed. Investment guidelines in terms of risk, asset classification, currency denomination, etc., should also be clearly defined and well publicized.

Country Experiences

A number of oil producing countries and states have established funds since the 1973, when revenue windfalls from oil began. More recently, a number of new funds have been created, e.g., in established oil producing countries (Iran), countries in transition (Azerbaijan and Kazakhstan), and countries about to commence oil development and production (Chad). Oil funds in the industrial countries, e.g., Alaska U.S., Alberta Canada, and Norway, have been considered among the more successful funds, although not without significant debate, and are discussed in some detail below. Use of oil funds among developing countries vary widely, as do characteristics of oil producing countries with respect to reserves, production, populations, economies, political systems, and the stage of oil and economic development. Consequently the objectives and experiences vary dramatically, and comparisons are rather sketchy.

Norwegian Government Petroleum Fund

The Norwegian Government Petroleum Fund (NGPF) was created in 1990, but the first transfer to the fund was not until 1996 for fiscal year 1995, when the budget returned to surplus. Since then the fund has grown to around $80 billion (end-2001) or about 45 percent of GDP. The origins of the fund were based on two important considerations. First, oil revenues are extremely volatile, thus there was a need to decouple government spending from oil revenues in the short term. Second, rising pension expenditures and declining oil income in future decades required a mechanism to soften the impact on public finances. In addition, several policy measures were required, specifically to encourage people of working age to remain in the labor force[33].



Justification for the fund was linked to future pension expenditures, and this was a key factor in obtaining public support for the fund. However, the NGPF is not earmarked for pensions or any other purpose. Money is accumulated in the fund only if there is a budget surplus. By linking fund allocations to actual surpluses means that accumulations in the fund reflect actual savings. Earnings on the fund's investments also accumulate in the fund. The fund's expenditure consists an annual transfer to the Treasury to cover the non-oil budget deficit. Effectively the fund finances the overall budget balance—an overall surplus is transferred to the fund, and an overall deficit is financed by the fund.

The NGPF fund is effectively a government account rather than a fund, and is integrated into the overall fiscal balance. It does not have specific rules for transfer of resources in and out of the fund, allowing complete flexibility in its operation. Consequently there is are no legal obligations to save. Savings occurs largely because of prudent expenditure

policies. The fund does little to affect spending decisions or deal directly with budget problems resulting from volatile oil prices. Despite a lack of restrictions, the fund has been successful in Norway because of sound macroeconomic and fiscal polices. Oil revenues are a much smaller share of total revenues (typically less than 15 percent) compared with other oil producers, thus the fiscal challenges from volatile oil prices are substantially less.

According to the Petroleum Fund Law, the Ministry of Finance is responsible for the Petroleum Fund. The operational management of the fund is handled by the Norges Bank, which in turn selects external managers to handle investments for the fund. There are a number of guidelines with regard to selection of fund mangers, allocating risks, managing costs, etc. The primary goal of the Norges Bank management of the Petroleum Fund is to outperform the benchmark portfolio defined by the Ministry of Finance. The Bank delivers detailed annual reports on management of the fund, and quarterly reports to the Ministry of Finance. Norges Bank also reports to an independent company hired by the Ministry of Finance to calculate the fund's returns, and analyze the difference between actual returns and benchmark returns. These reports are made public and published on the internet. In addition, auditing of the fund and its management are undertaken by the Office of the Auditor General, which reports directly to Parliament, ensuring parliamentary control of the Petroleum Fund's operations.

Investment guidelines dictate that all investments are abroad, with an equity portion of 30-50 percent. Regional distribution is set at Europe 40-60 percent; Americas 20-40 percent; and Oceania 10-30 percent. Maximum ownership in any one company is 3 percent, and the fixed income portfolio is to have a duration of 3-7 years. Currently, investments in the fund are 40 percent equities and 60 percent bonds, with the equity regional distribution about mid-way in all three regions. The bond portfolio is tilted toward Europe and the Americas.

The outlook for the Petroleum fund, according to the Ministry of Finance, is for the fund to rise from around $100 billion or around 55 percent GDP at end-2002 to 128 percent of GDP by end-2010[34]. It is projected that the Petroleum Fund will stabilize at around 180 percent of GDP beyond 2025[35].

Alaska and Alberta

The US State of Alaska and Canadian Province of Alberta share many geographic and resource characteristics. Both governments established oil funds in 1976 to save for future generations. However, both followed different paths in terms of objectives, structure, management and results[36].

The Alaska Permanent Fund (APF)[37] was established as a trust with the funds assets managed by an independent corporation, the Alaskan Permanent Fund Corporation (APFC). Thus the savings and investment function is separate from the spending function. The Fund must follow prudent investment rules and earn a 4 percent real rate of return over time. The APF is made up of two parts: Principal and Earnings Reserve. The Principal is not to be spent (reconfirmed in a state-wide vote in 1999 following

budget difficulties) and is to be preserved in real terms. It includes 50 percent of all mineral royalties, and transfers from the Earnings Reserve. The Earnings Reserve is an accumulation of income not allocated to the Principal. Once a year, appropriations are made from the Earning Reserve: first, to pay dividends to every citizen of the state ($1850 in 2001); and second, to provide inflation proofing for the fund and transfer to the Principal. The state is debating the issue of appropriation, as well as other policies (e.g., zero income, no sales tax, raising fuel taxes) because of budget deficits. The recent rise in oil prices has provided a cushion of more time for discussion.

The Alberta Heritage Savings and Trust Fund (AHSTF)[38] was established with four objectives: 1) a savings account to offset declining resource revenue, 2) leveraging opportunities for the government, 3) improve the quality of life for Albertans, and 4) help diversify the economy. The fund has been under control of the Alberta Treasury, and has been primarily used as a tool of public policy. It had three investment divisions, expanding to five in 1980, investing in various projects and lending to other provinces. After an initial deposit of $1.5 billion into the fund, 30 percent of non-renewable resource revenues went to the fund. This was halved in 1984 to 15 percent, and payments stopped after 1987, effectively ending its saving function. The AHSTF peaked at just over C$12 billion in 1987 and has been valued at about C$12 billion ever since, as all earnings were taken by the government into general revenue. In 1997 the government made fundamental changes the AHSTF, creating two new portfolios: the Transition Portfolio (which holds all old assets of the fund), and the Endowment Portfolio (which is to receive a minimum of $1.2 billion of assets annually from the Transitional). The Endowment Portfolio will operate more like a conventional trust with 35-65 percent fixed income and 35-65 percent equities. It will now become inflation proofed and will be run by an Oversight Committee, comprised mainly of legislative representatives.

The funds have had different financial results. The APF has grown to over $25 billion and has earned $25 billion during its first 25 years, for a total return of 10.9 percent as June 30, 2001 for the previous 17.5 years[39]. Meanwhile the AHSTF stood at C$12.5 billion in 2001, virtually the same as in 1987, and generated over C$22 billion income during its first 24 years for a nominal return of nearly 9.5 percent[40].

The Alaska and Alberta funds have significant differences and performance histories. Alaska's fund is operated at arms' length from the government by an independent corporation and pays funds directly to the citizens. The size of the fund has grown significantly and earned rates of return well in excess of the 4 percent real target. Alberta's fund, until recently, has been the responsibility of the Treasurer, and has been a vehicle for saving and for government economic policy. The fund has not grown in 15 years, and is only beginning to be managed like an endowment with inflation proofing. Even with recent changes, the government of Alberta still has large control of the fund, and has the ability to change investment policies or the structure of the fund itself.

Developing Country Experiences

A number of developing countries have developed oil (or mineral) funds, a few only recently established, and have met with various degrees of success—Algeria, Azerbaijan,

Chad, Chile, East Timor, Equatorial Guinea, Iran, Kazakhstan, Kuwait, Nigeria, Papua New Guinea, Oman, and Venezuela. Below are details on a few of the funds, largely taken from the paper by Fasano[41].

Kuwait

Kuwait established the General Reserve Fund (GRF) in 1960, which was to consist of all of the government's foreign assets and domestic equity investments. In 1976, the Reserve Fund for Future Generations (RFFG) was created as a long-term savings fund. This fund was to contain 50 percent of the GRF assets at the time, and 10 percent of annual oil and non-oil revenues, plus income from the fund's assets. Most of the RFFG assets are in foreign assets, but no information is made public by law. Undoubtedly, the RFFG has accumulated large assets over time. Because of large surpluses and low population, it should be able to provide a significant wealth assets for future generations. The fund apparently has more stricter rules about transfers in and out of the fund than the GRF, but its resources were reportedly used to finance expenses resulting from the Iraqi invasion and Gulf war in 1990-91. The GRF has a stabilization component, and provides financing for short-term and other needs. In 1982 the Kuwait Investment Authority was formed to improve management of the country's assets, and replaced the Ministry of Finance which had handled investment operations.

Oil funds in Kuwait have been successful because of prudent expenditure policies, large surpluses, and a relatively small population. Investment income from funds are the second largest source of government revenue after oil, and is reported to account for 35 percent of total revenue in recent years[42].

Oman

Oman created the State General Reserve Fund (SGRF) in 1980 to save in anticipation of depleting oil reserves. However the objectives of the fund have gone through several transformations, and the fund has often been used for budget purposes. Initially, 15 percent of oil revenues were to be deposited into the fund, but this was reduced to 5 percent in 1986 when oil prices collapsed. In 1989, Oman directed that oil revenues above $15/bbl would be placed in the fund.

In 1990, the Contingency Fund was established to stabilize budgetary oil revenues, and it received budgeted oil revenues that were excess to those transferred to the SGRF. This fund was replaced by the Oil Fund in 1993, which was created to finance oil sector investments. The flow of oil revenues was then altered, with revenues up to $15/bbl being transferred to the budget, the next $2/bbl to the SGRF, the next $0.5/bbl to the Oil Fund, and the remainder above $17.50/bbl to the budget. With this reallocation, the SGRF's assets have declined since 1992, reflecting a greater share of revenues used to finance budget deficits[43]. Since inception, the SGRF has made payments totaling US$14.5 billion towards financing budget deficits[44]. Most of the fund's assets are invested abroad, and are managed by a controlling body, the Financial Affairs and Energy Resources Council. Two sub-funds invest in separate classes of investments—one in short-term, low-volatility assets, and the other in long-term, higher-return assets. The fund is subject to audit and performance review, but the results are not made public.

Oman's experience with oil funds has resulted in frequent changes of rules and objectives. Because it allows discretionary withdrawals to finance budget deficits, the government has not been able to build savings as initially intended. Consequently it has been mostly used as a stabilization vehicle. The experience reflects the fact that funds will not result in saving, in and of themselves, and that prudent expenditure policies are required to save resource revenues. Non-transparency of operations could weaken the discipline necessary to increase savings.

Venezuela

Venezuela established a Macroeconomic Stabilization Fund (MSF) in 1998, to insulate the budget and the economy from changes in oil prices. Initial contributions into the fund were to be oil revenues above an average reference value of the past five years. Withdrawals from the fund could be made if oil revenues in a given year were below the reference value. Withdrawals could also be made if total resources in the fund exceed 80 percent of the average value of petroleum exports during the preceding five years, but these funds were earmarked for debt repayment and capital expenditure by regional governments.

In 1999, the rules were modified significantly, . Transfers in and out of the fund were to be based on an oil export price of 9/bbl. It contained a provision that only 50 percent of the excess value need be transferred to the fund. It also allowed the President of the Republic to use the Fund's excess income even before it had actually reached the prescribed limit.

In October 2001, the law was further modified to prevent contributions to the fund between the fourth quarter of 2001 and the fourth quarter of 2002. Between 2001 and 2007, contributions will be based on a percentage of petroleum-derived revenues starting at 6 percent and rising to 10 percent in 2007. In 2008 and beyond, rules set out in the original framework would be followed. The latest changes free up resources that would otherwise be going to the fund.

Venezuela's brief experience with its MSF has encompassed several substantial rule changes, and has severely weakened the stabilization objectives. Transfers to the fund have been temporarily cut and the new rules allow greater discretion of withdrawals by the President of the Republic. One study points out "the ironic instability of the stabilization fund's legal framework"[45]. While the fund had been able to build revenues earlier on, it did so only through government borrowing as the overall fiscal position remained in deficit. In the coming few years, deposits into the fund will bear little relation to withdrawals, as both could occur simultaneously.

Summary. The experiences to date are mixed, reflecting a variety of objectives, adherence to operational rules, the institutional set-up, and soundness of overall fiscal policy[46]. In some cases the funds are just beginning, and in the others the data and rules lack transparency. Savings funds in Alaska, Kuwait and Norway have accumulated large assets for future generations. In a number of cases stabilization funds have contributed to

improved fiscal policy by constraining expenditures and resisting spending pressures when revenues are high, e.g., Norway (and Chile with copper). Investing in foreign assets may have contributed to reduced pressure on real exchange rate appreciation, e.g., Norway. In some countries, stabilization funds have been much less successful, partly because of frequent changes to the rules and objectives. Most funds allow discretionary withdrawals, and many do not seem to have constrained government spending or the non-resource deficit[47]. Consequently integration of the fund into the overall fiscal policy framework has been difficult. In some countries where volatile resource revenues are large, such as Venezuela, funds may be difficult to operate.

As has been stated often, stabilization and savings funds are not a substitute for sound fiscal management. Consequently, success or failure of the fund can be attributed as much to fiscal discipline as to the fund's management. Stabilization funds have been more successful in countries with strong fiscal discipline and macroeconomic management[48].

Risk Management Markets

There are alternatives to stabilization funds to deal with oil price volatility and uncertainty[49]. Even with stabilization funds, governments are still vulnerable to oil price fluctuations. Risk management markets exist to allow commodity producers (and consumers) to lock-in future prices, in principle from a few months to several years. For governments using these instruments, thus makes revenue streams more stable and predictable, and can lead to a more stable macroeconomic environment—especially for country's heavily dependent on oil export revenues. It can help reduce sharp fluctuations in expenditures and help improve government planning. There are a number of other potential benefits, e.g., improving creditworthiness, and smoothing fiscal adjustments to permanent price shocks. However, the use of hedging instruments does not affect expenditures and does not provide saving for future generations. And like funds, the instruments are not a substitute for sound fiscal policy.

Hedging and derivative instruments are available on regulated exchanges and in over-the-counter markets. They can effectively be used by both companies and governments to reduce oil price volatility and uncertainty. There are risk management markets for crude oil, various petroleum products, and natural gas, of which all can be attractive to Algeria given its diverse hydrocarbon export mix. Below is a brief description of the basic instruments with some reference to crude oil, although new instruments, strategies, and commodity-specific contracts are constantly being developed.

Exchange Traded Instruments

The basic exchange-traded instruments are futures and options, although there are numerous strategies involving various combinations of these instruments (and others), depending on the risk-reward profile of participants. Contracts exist for various grades of crude oil, several petroleum products, natural gas, coal, electricity and LPGs, and new contracts are always being developed[50]. Markets also exist for metals and agriculture products.

A futures contract is a legally binding obligation between buyer and seller, whereby the buyer is obligated to take future delivery and the seller is obligated to provide future delivery of a fixed amount of a commodity at a pre-determined price, location, and time. Futures contracts are most often liquidated prior to the delivery date and are generally used as a financial management and investment tool, rather than to exchange physical commodities.

Options contracts give the *purchaser* of an option the right, but not the obligation, to either purchase or sell the underlying futures contract at a specified price within a specified period of time, in exchange for a one-time premium payment. The contract obligates the *writer* of the option, the one who receives payment, to meet these obligations. In essence, options can be thought of as *insurance* to guarantee a price floor (through purchase of a put option) or guarantee a price ceiling (purchase of a call option). As such, purchasers of options can still benefit if prices move favorably in their direction, in which case the option expires (no "insurance" is paid). If options are not exercised, the cost to the purchaser of the option is only the (insurance) premium. Writers of options have greater risk in that they are obligated to provide the underlying futures contracts if the options are exercised.

The purchaser of a put option has the right to sell the underlying futures contract at a specified price. Oil producers might buy put options to lock-in a price floor for its crude. If oil prices fall below the floor price (known as the strike price), the oil producer can exercise the option and obtain the floor price. If prices move higher, the oil producer lets the option expire and sells its physical crude at the higher price. Similarly, the purchaser of a call option has the right to purchase the underlying futures contract at a specified price. A refiner might buy call options to lock-in a price ceiling for its crude purchase. If prices move above the established ceiling the refiner can exercise the option and receive the ceiling price. If prices move lower, the refiner will let the option expire and purchase its crude at the lower market price. A major concern for purchasers of options is that they can be expensive.

Over-the-Counter Instruments

Over-the-counter refers to derivative transactions trading outside the realm of regulated exchanges. Transactions are conducted through banks or brokerage institutions, or principle-to-principle in the over-the-counter market.

Forward contracts are supply contracts between buyer and seller whereby the seller is obligated to provide delivery and the purchaser is obligated to take delivery at a specified price and date. Payment is due at the time of, or following, delivery of the commodity.

Swaps contracts are custom-tailored, individually-negotiated, transactions designed to manage financial risk, usually for periods of one to twelve years, although in principle it can be longer. Swaps are conducted between two counter-parties, or through a third party (e.g., bank or brokerage house). Swap transactions allow parties to exchange risk, and include interest rate swaps, currency swaps, or price swaps. In the a basic price swap,

parties exchange fixed for floating prices. Parties will exchange payments based on changes in the commodity price while fixing the price they effectively pay for the physical commodity. There are other combinations of instruments, e.g., *swaptions* are options to buy or sell swaps, and new strategies are constantly being devised. A major concern for over-the-counter participants is counter-party risk.

Country Experiences and Risks

There have been a number of examples of developing country oil producers using hedging instruments to lock-in prices and reduce volatility. One of the best known examples is the reported transactions by Mexico during the Gulf crisis in late 1990 and early 1991 to hedge about 100 million barrels of oil and lock-in prices before prices slumped at the outbreak of war.

However, there are many oil producing countries that do not hedge their price risk, and there are several reasons why this is so. The most important constraint appears to be political. Any financial gains can be deemed speculation, while the forfeiting of higher prices could be costly politically. Even purchasing insurance (i.e., options) can be deemed wasteful. This occurred in Ecuador in 1993 when the government was criticized for purchasing put options for $12 million which, when prices rose, were not exercised[51].

Liquidity in risk markets is limited, especially for more distant periods, and large oil exporters are constrained by of the volume of their production. However, smaller oil exporters could participate, as could medium-sized oil exporters like Algeria, if they chose to hedge only a portion of their exports. The Mexico case shows that even fairly large producers can effectively make use of these markets. OPEC producers are additionally constrained because of their goal to target higher prices. Selling large volumes forward would depress the forward price curve, and counteract their efforts to lift prices. It could also send mixed signals to the market, and fuel additional speculative pressures on prices. This may be of a concern to Algeria as an OPEC member, but it is useful to know that other options are available to deal with oil price volatility.

There are a number of other risks in the use of these instruments, e.g., creditworthiness, institutional capacity, and basis risk (see Daniel). Operationally, the costs and risks can be significant. It requires building up the institutional and intellectual capacity, and creating a framework that separates transactions and accounting functions, and ensures proper reporting, monitoring, auditing, evaluation, and internal control procedures. A number of costly, well-publicized "rogue-trader" episodes have added to the political concerns of hedging, but with proper safeguards and guidelines, a viable hedging program can be developed.

Many strategies and options exist. Countries need not hedge all of their output, as eliminating price volatility for a portion of its revenue can also be helpful in planning and budgeting. As an example of the variety of strategies that can be developed, one study recommended complementing an oil stabilization fund in Venezuela with risk management instruments[52]. There a number of organizations, institutions, and

investment banks that help educate potential users of risk management instruments. The International Task Force on Commodity Risk Management, of which the secretariat is housed in the World Bank, is advising developing countries on commodity risk management issues, although mainly for agriculture exports[53]. In principal, however, this could expand to energy market participants.

Annex 3.5: Trends in Algeria's foreign and domestic public debt

Trends in Algeria's debt indicators, compared to other middle-income and oil-producing countries are shown in Table A3.1. Table A3.2 displays the composition of external debt.

Table 1: Comparison of debt burden indicators

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
					EXTERNAL DEBT/GDP (%)						
Lower-middle income countries											
Algeria	45	62	56	52	70	78	71	65	65	59	47
Bolivia	88	76	77	75	82	79	70	66	67	67	70
Bulgaria	53	107	114	112	100	78	101	96	79	79	84
Colombia	43	41	35	34	27	27	30	30	34	41	42
Jordan	203	228	146	135	122	118	114	111	106	110	99
Kazakhstan			0	7	14	19	14	18	27	36	37
Morocco	95	79	78	80	73	69	60	60	57	54	54
Peru	76	87	56	68	59	58	52	49	52	56	53
Philippines	69	71	62	66	61	51	48	55	74	70	67
Tunisia	63	63	55	60	62	60	58	59	55	57	55
Oil exporters											
Angola	84	74	174	200	275	226	139	128	172	178	115
Iran, Islamic Rep	7	..		42	34	25	16	12	14	10	8
Nigeria	117	123	89	144	140	121	89	79	94	84	83
Oman	26	28	25	24	50	48	40	40	42	.	..
Venezuela, RB	68	64	62	63	63	46	49	40	40	37	32
					EXTERNAL DEBT/EXPORTS (%)						
Lower-middle income countries											
Algeria	201	217	211	223	284	272	227	194	255	199	110
Bolivia	429	431	535	475	406	417	387	331	363	360	340
Bulgaria	154	280	230	244	185	148	155	150	155	162	137
Colombia	181	166	167	173	178	183	199	202	225	217	188
Jordan	266	313	216	192	186	167	151	148	156	162	140
Kazakhstan	.	.	1	41	66	62	42	52	88	87	61
Morocco	294	246	230	234	231	201	183	174	169	151	139
Peru	456	450	412	486	410	391	340	300	332	321	284
Philippines	230	219	187	187	161	114	100	93	111	112	101
Tunisia	131	145	129	138	126	123	127	126	117	123	113
Oil exporters											
Angola	215	248	252	351	351	295	193	187	299	207	127
Iran, Islamic Rep	45	58	78	122	113	114	70	59	92	46	26
Nigeria	226	250	222	258	317	257	175	157	258	190	147
Oman	46	54	48	46	97	90	78	75	102	89	53
Venezuela, RB	155	184	221	212	191	157	129	131	179	158	100
					DEBT SERVICE/EXPORTS (%)						
Lower-middle income countries											
Algeria	63	70	73	78	48	35	28	28	43	37	20
Bolivia	39	35	36	37	29	29	31	30	29	29	39
Bulgaria	19	7	9	7	13	16	19	15	21	19	16
Colombia	41	36	39	34	45	32	37	29	31	41	29
Jordan	20	24	20	15	14	13	19	16	16	10	11
Kazakhstan	.	.	0	0	2	4	5	6	14	19	17
Morocco	22	27	41	36	38	33	28	28	23	24	26
Peru	11	25	20	57	18	16	34	38	27	46	43
Philippines	27	23	24	26	19	16	13	9	11	14	14
Tunisia	24	24	20	21	19	17	16	16	15	16	20
Oil exporters											
Angola	8	11	6	5	8	12	18	19	30	19	15
Iran, Islamic Rep	3	4	5	9	16	30	28	31	20	25	11
Nigeria	23	22	29	13	18	14	14	8	11	7	4
Oman	12	11	9	10	9	15	19	11	19	13	7
Venezuela, RB	23	18	19	22	19	23	18	32	28	24	15

Table 2: Composition of external debt

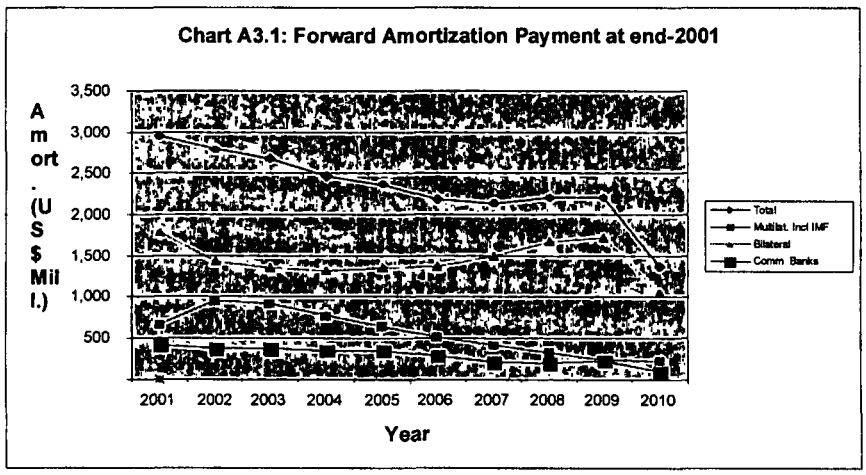
EXTERNAL DEBT OUTSTANDING (in millions)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
MULTILATERAL	2,701	3,658	3,560	3,371	4,503	5,393	6,116	5,870	6,403	6,148	5,848	5,420
Of which												
African Dev Bank and Fund	113	309	399	479	562	590	624	854	925	952	963	978
IBRD	1,208	1,413	1,474	1,512	1,709	2,049	1,939	1,795	1,676	1,540	1,425	1,329
IMF	670	995	795	471	1,159	1,478	2,031	2,018	2,011	1,906	1,718	1,518
BILATERAL	16,914	16,846	16,130	16,431	19,654	22,208	22,353	20,601	20,143	18,048	16,245	14,446
Of which												
FRANCE	4,365	4,176	3,113	2,778	3,824	4,870	5,092	4,374	4,268	3,457	3,123	2,716
GERMANY, FED.REP. OF	1,650	1,651	1,384	1,113	1,521	1,792	1,667	1,465	1,489	1,209	1,112	1,052
ITALY	1,771	2,045	2,638	3,622	3,523	3,829	4,051	3,979	3,753	3,157	2,643	2,285
JAPAN	1,461	1,510	1,525	1,514	1,837	2,094	1,969	1,736	1,812	2,259	2,107	1,620
SPAIN	578	735	974	1,190	1,625	1,766	1,811	1,809	1,816	1,743	1,667	1,583
UNITED STATES	1,799	1,727	1,852	1,832	2,067	2,166	2,269	2,306	2,149	2,015	1,923	2,023
FINANCIAL INSTITUTIONS	6,051	5,023	5,319	4,876	4,904	4,909	4,622	4,260	3,947	3,611	2,960	2,394
SHORT-TERM DEBT	791	1,239	793	700	636	258	328	162	186	195	222	199
TOTAL EXTERNAL DEBT	26,457	26,767	25,801	25,378	29,697	32,768	33,419	30,893	30,678	28,002	25,275	22,459

All of the $22.5 billion of external debt at end-2001 represents borrowing by the public sector. The composition of debt indicates a heavy reliance on official sources of financing, with obligations to official bilateral and multilateral creditors accounting for 88 percent of the stock of debt (Table 2).[54] At around $14.45 billion, bilateral claims are the largest category of debt. France is the largest bilateral creditor, accounting for around 19 percent of liabilities under this category, closely followed by Italy and the United States. Bilateral claims include direct lending by bilateral agencies, suppliers credits and export credits. Multilateral creditors account for a quarter ($5.42 billion) of the country's outstanding external obligations. Multilateral claims, in turn, are dominated by IBRD loans and loans from the African Development Bank.

Despite the heavy reliance on official financing, Algeria's borrowing has been largely on market terms. Borrowing from multilaterals like the World Bank and the African Development Bank has been from the "hard windows," i.e. on nonconcessional terms. The average terms for multilateral borrowing in 2001 were 4.1 percent interest with 4 years grace and 15.5 years maturity. Borrowing from bilaterals has typically been nonconcessional: average terms on new bilateral funds - mostly export credits - in 2001 were 5.2 percent interest with 0.8 years grace and 12.8 years maturity. The grant element on these credits is well below 20 percent.[55]

Another indicator of external vulnerability is the forward payment profile. Amortization payments on debt outstanding at end-2001 slowly decline during 2002-2009, before falling off sharply in 2010 and then again in 2012 (Chart 1). Of the long-term debt outstanding at end-2001, about 12 percent is due this year and the next. Thus, nearly a quarter of long-term debt obligations are due within two years. Over a third of these

payments are to multilaterals. Given the comfortable reserve situation, the amortization profile is not overly burdensome. Nevertheless, active debt management could help improve the country's debt maturity profile.



While external debt has steadily fallen, domestic debt has generally trended upwards. Domestic debt has more than doubled since 1995, and it stood at 999.4 billion Algerian Dinars at end-2001 (Table 3). The rapid rise in public debt has been due to the repeated bailouts of public banks in the 1990s and the 1997/98 restructuring of public enterprises - government issued securities to public banks for bank claims on public enterprises. Thus a large part of banks' assets are made up of Treasury securities. At 23 percent (at end-2001), the size of public domestic debt relative to GDP is substantial. Consequently, Algeria's total public debt - external and domestic – relative to GDP stands at over 64 percent. Moreover, further restructuring of banks and enterprises could result in contingent liabilities, explicit and implicit, becoming on-balance sheet liabilities, adding to the debt burden. Therefore, effective debt management requires the careful monitoring of contingent liabilities, and evaluation of the risk to the government's balance sheet arising from these liabilities.

The maturity profile of public domestic debt is relatively long. Amortization payments in 2002 are $1.4 billion or 11 percent of domestic debt obligations at end-2001 and an additional 20 percent is due between 2003-05 (Table 4). As capital markets (which are at an early stage) develop, the tradability of government securities will increase, and through active debt management the government could extend the maturity profile of its domestic debt.

Table 3: Size of public domestic debt

	PUBLIC DOMESTIC DEBT	
	bill of AD	bill of US$
1990	216.4	17.8
1991	210.9	9.9
1992	381.8	16.8
1993	556.1	23.1
1994	497.7	11.6
1995	438.7	8.4
1996	638.4	11.4
1997	578.0	9.9
1998	616.2	10.2
1999	1,059.6	15.3
2000	1,022.9	13.6
2001	999.4	12.8

Table 4 Debt service on domestic debt

Forward debt service payments on domestic debt
(as of end-2001 and in millions of US$)

	Principal	Interest	Total debt service
2002	1420	757	2177
2003	723	618	1342
2004	665	568	1233
2005	1148	621	1768

Annex 3.6: Rules for long-term fiscal sustainability with an exhaustible hydrocarbon revenue stream

Sound long-term management of an exhaustible revenue stream of hydrocarbon revenues would call for making expenditure decisions over time based on a *"permanent income stream"*, rather than on actual revenues. Linking current expenditures to that "permanent income stream" (by saving surplus revenues for future expenditures) would ensure that the future generations would take advantage of the benefits of hydrocarbon resources as well (Alier and Kaufman, 1999; Engel and Valdes, 2000; Liuksila and others, 1993). At the same time, a sound fiscal policy should ensure long-term fiscal sustainability—or intertemporal solvency of the government. Fiscal accounts should make enough space to generate primary fiscal surpluses in the future to pay down existing debt (Agenor and Montiel, 1996).

Based on the above considerations, a fiscal rule is derived to help meet the two parallel goals:

- Saving for future purposes;
- Securing long-term fiscal sustainability

The permanent hydrocarbon revenue stream

The net present value (NPV_0) of the hydrocarbon revenue stream consistent with the extraction horizon (N) of the depleting reserves is:

$$NPV_0 = \sum_{t=0}^{N} \frac{Z_t}{(1+r)^t}$$

where, Z_t is the projected value of the hydrocarbon revenue stream based on a discount factor r, and on the projected extraction volume and the path for the real price of hydrocarbons (as a ratio to the GDP deflator).

The *permanent hydrocarbon income stream* ($\overline{Z}_0$) is the annuity over an horizon stretching *beyond N,* whose present value is equal to that of the projected hydrocarbon revenue stream (NPV_0). Assuming an infinite time horizon, the permanent hydrocarbon revenue is given by:

$$\sum_{t=0}^{\infty} \frac{\overline{Z}_0}{(1+r)^t} = \frac{\overline{Z}_0}{r} = NPV_0 \qquad \text{so that,} \qquad \overline{Z}_0 = r\, NPV_0$$

A policy aimed at saving part of the exhaustible hydrocarbon revenue stream to support the living standards of future generations would consist of depositing each year in a

contingency fund the surplus of hydrocarbon revenues over the permanent hydrocarbon revenue stream. To meet the first goal above, savings could be used to pay down debt, or to finance future expenditures.

Annual savings = $S_t = Z_t - \bar{Z}_0$

Long-term fiscal sustainability

With savings for future purposes deposited in a contingency fund, the government's annual budget constraint would be given by (lower case letters denote ratios to GDP):

$$\Delta b_t = \frac{(r-\gamma)}{(1+\gamma)} b_{t-1} + g_t - \tau_t - \bar{z}_t$$

where,
b_t = public debt as a share of GDP;
τ_t = non-hydrocarbon fiscal revenues in per cent of GDP;
g_t = primary public expenditures in per cent of GDP (current and capital expenditures);
$\bar{z}_t$ = permanent hydrocarbon revenue in per cent of GDP as estimated at t.
γ = projected long-term GDP growth rate

Or, with $\sigma_t = \tau_t - g_t$ denoting the primary non-hydrocarbon fiscal deficit in per cent of GDP:

$$\Delta b_t = \frac{(r-\gamma)}{(1+\gamma)} b_{t-1} - \sigma_t - \bar{z}_t$$

Maintaining long-term fiscal sustainability is the second goal pursued by the government. Given the initial debt ratio (b_0); the permanent hydrocarbon revenue stream as a ratio to GDP ($\bar{z}_0$); the projected non-hydrocarbon primary fiscal deficits (σ_t); and the projected long-term real interest rate and GDP growth rate—securing long-term fiscal sustainability would call for a path of primary fiscal surpluses ($\bar{z}_0 + \sigma_t$) such that:

$$b_0 \leq \sum_{t=0}^{\infty} \frac{\bar{z}_0 + \sigma_t}{(1+r-\gamma)^t} \quad ; \text{ with } r\text{-}\gamma > 0$$

An option would be a fiscal policy rule that requires a *constant* non-hydrocarbon primary deficit in per cent of GDP ($\sigma_t = \tau_t - g_t = \lambda$). Securing long-term fiscal sustainability would then involve a rule that meets the following criterion:

$$b_0 \leq \frac{\bar{z}_0 + \lambda}{r-\gamma} \quad \text{or, equivalently,} \quad \boxed{-\lambda + (r-\gamma) b_0 \leq \bar{z}_0}$$

According to that rule, *the permanent hydrocarbon income should at least cover the excess of government primary expenditures over non-hydrocarbon fiscal revenues, including an adjustment that ensures a constant debt-to-output ratio, given the difference between the long-term real interest rate and growth rates.*

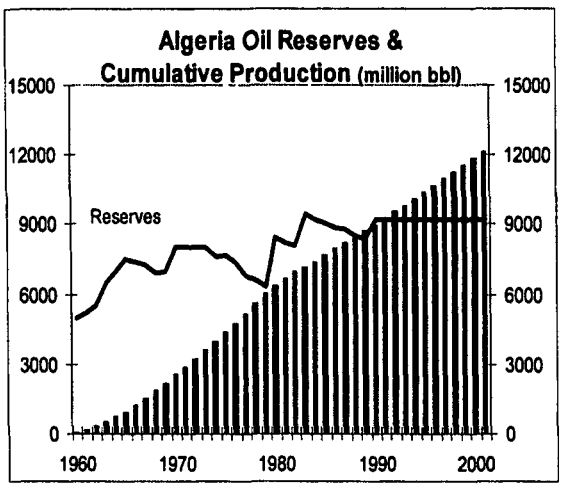
A variant of the fiscal rule could replicate the "golden rule" for debt finance, by targeting the current primary non hydrocarbon deficit (i.e., excluding capital expenditures). The rule could also provide for cyclical changes in the deficit by targeting the structural non-hydrocarbon primary deficit, or by adopting an enforcement time horizon stretching over the medium term.

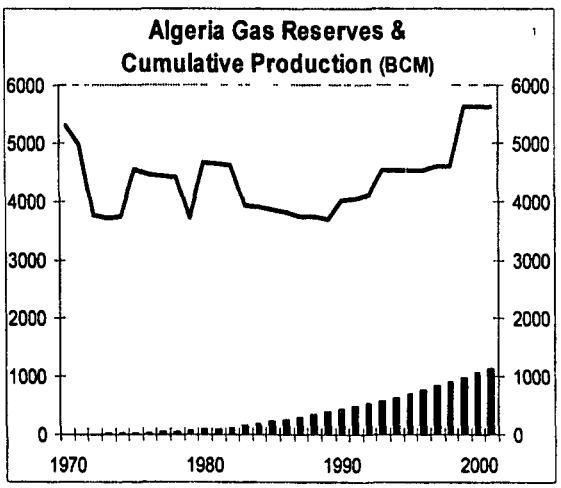
Annex 3.7: Assessing the Net Present Value of Algeria's Hydrocarbon revenues

Estimates of a country's "permanent income" from hydrocarbon production rely on a calculation of the Net Present value of the hydrocarbon revenue stream (see Annex 3.X). This is based on estimates of remaining recoverable reserves, and a production profile of the "fixed", depleting resource over a long period.

- *Methodology of estimation*

Algeria's reserve estimates and profiles of cumulative production to date differ for oil and gas. Cumulative oil production appears relatively more advanced relative to gas, despite significant crude oil production restraint. Market access is often easier for oil than for gas, which may partly explain the difference. Relative to reserves (Oil and Gas Journal estimates), it suggests that gas production has greater longevity than for oil—even with the Ministry's lower estimate of around 3100 bcm of gas reserves. The collection of gas reserve estimates vary far more widely than for oil, with ultimate gas reserves being far higher for gas than for oil. However, this not rule out that oil reserves may be much higher in future.





An attempt by Aissaoui to estimate Algeria's hydrocarbon rents from *exports* to 2045 is based on current hydrocarbon reserves of 52 billion barrels of oil equivalent (boe), under three oil price scenarios (ranging from $15/bbl to $25/bbl) and two discount rates of 5 and 10 percent[56] (see table). Two relatively similar production profiles of total hydrocarbon production were simulated (one having a higher but shorter mid-term peak). The ratio of gas in the export mix is maintained at the present ratio of 50 percent of volume. One third of production is required for domestic use, and exports fall to zero in 2045 following steep production declines of 15-25 percent per year. Production in 2045 is used solely to meet domestic demand. Production costs are assumed at $5/boe and the government/industry split of net revenue after cost is 60:40. In the central price case of

$20/bbl, the net present value (NPV) of the government share of rent varies between $75 and $130 billion. The simulations were more sensitive to the discounting factor and oil prices than the two production profiles, which were relatively similar. According to Aissaoui, assuming Algeria's population more than doubles to 70 million people in 2045, in order to maintain the present value of rent per capita at its 1999 level of $280, Algeria would need a much higher price than the average $19/bbl of Saharan Blend during the past decade.

Net Present Value of Government Take (Net Rent) Assuming Alternative Oil Prices ($2000) 2000-2045						
Price of Saharan Blend ($/b)	15.0		20.0		25.0	
Average price of Export mix ($/boe)	11.3		15.0		18.8	
Discounting Factor (%)	5	10	5	10	5	10
Present Value of rent (Million $)	85	50	130	75	175	100
PV of rent as % of GDP in 2000	170	100	260	150	350	290
Present Value of rent per capita ($/cap)	2080	1255	3270	1970	4450	2685

Source: Aissaoui, Ali. *Algeria The Political Economy of Oil and Gas,* 2001.

In addition to the usual uncertainty of the main assumptions, the mix of gas, oil and other liquids into barrels of oil equivalent pose a number of difficulties[57]. First, the usual assumption of 1 barrel of oil equals 6000 cubic feet of gas is not a scientific constant. Oil and gas are separate commodities whose in situ values (based on asset sales) vary widely[58], as do above ground ex-situ market values. The chemical composition of crude oil, gases and other liquids varies by deposit (no constant equivalence among fuels) and the market prices of these fuels can vary greatly over time. Algeria has a relatively complex mix of exports which include crude oil, refined products, condensate, LPGs, natural gas and LNG, and this further-complicates the boe issue. In addition, crude oil prices are inflated by oligopoly behavior (and affect Algeria's crude oil volumes) while natural gas prices and volumes are more competitively determined, with prices becoming increasingly de-lined from oil for both LNG and piped gas into the European market. This further complicates rationalizing boe prices.

We attempted a simple calculation of the NPV of government revues from Algeria's crude oil and natural gas production over the next fifty years, based on various assumptions of reserves and oil and gas prices. Government take was assumed at 63.35 percent of total production value, based on calculations provided by the government. There was no attempt to look at export revenues only, because if resources are priced at international levels, it does not matter (for this calculation) whether the resources are for export or domestic use. Real oil prices per barrel are set at $15, $20, and $25, and the discount rate is 4 percent. Gas prices are increasingly de-linked from oil and reflect more competitive markets in all three scenarios. Oil reserves in low case are set at the current estimate of recoverable reserves of 11 Bbbl. Two higher scenarios of 16 Bbbl and 20 Bbbl were chosen, based on reasonable expansion of recoverable reserves. For gas, the low case was set at 4000 bcm, some 27 percent above the Ministry's current

estimate of recoverable reserves and more in line with other current estimates. Mid-case reserves are 6000 bcm, near the US DOE reported assessment, and high-case reserves are 9000 bcm, near the upper estimate provided by Petroleum Economics Limited. The range of estimates is plausible, and indicates that additional reserves will be discovered under favorable investment and market conditions. Condensate and LPGs are not included, but could roughly add one-quarter to the value of oil revenues based current reserves estimates.

NPV of Government Hydrocarbon Income to 2050
(2001$ million)

Oil Reserves/Prices	$15	$20	$25
11 Bbbl	58,945	77,862	97,333
16 Bbbl	82,308	109,012	136,276
20 Bbbl	92,078	122,038	152,561
Gas Reserves/Prices	$62	$77	$92
4000 Bcm	82,429	102,372	122,314
6000 Bcm	107,755	133,824	159,894
9000 Bcm	139,310	173,014	206,718
Total			
Low	141,374	180,234	219,647
Mid	190,063	242,837	296,170
High	231,388	295,052	359,279

Oil prices constant 2001 $ per barrel.
Gas prices constant 2001 $ per thousand cubic meters.
Discount rate 4 percent.
Government take = 63.35 percent of total production revenue

Source: World Bank

The results depend heavily on reserve estimates and production profiles, and are highly sensitive to oil prices and discount rates (effects of the latter not shown). The mid-case results show NPV of government revenues of $243 billion, in constant 2001 dollars. Gas revenues are 23 percent higher than for oil, and are consistent with the gas sector being less-developed relative to oil, and with the number of estimates suggesting much higher volumes of recoverable gas reserves. Total revenues across cases range from $141 billion to $359 billion. This is significantly above Aissaoui's range of government *export* rents of $50-$175 billion. Aissaoui uses a single estimate of *total* oil and gas reserves of 52 boe, of which 34 boe are available for export. The corresponding value for crude oil and gas production excluding NGLs) in our estimates range from about 36 boe to 77 boe, which encompasses Aissaoui's estimate.

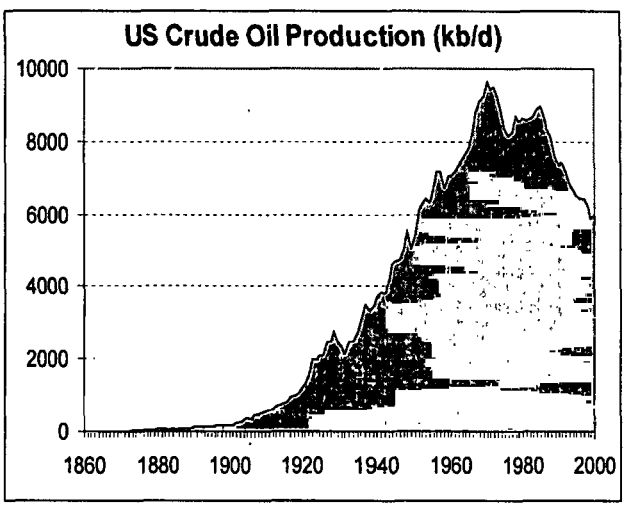
If one assumes that gas and oil production are equal, then doubling the mid-case oil results yields total revenues of $218 billion. If gas is used as the base, the mid-case would generate $268 billion. While these are within the overall range of estimates,

combining gas and oil into boe has several problems (discussed elsewhere), and the assumptions of equal growth for oil and gas reserves have little underpinning—certainly for Algeria where estimates of future gas reserves are far higher than for oil.

An attempt was also made to calculate net revenues after cost, assuming oil development and production costs of $5 per barrel, and corresponding gas costs of $0.75 per million btu. Assuming 89 percent government take after cost (as provided by the Ministry), mid-case revenues are $259 billion, which are 7 percent higher than the above estimate—suggesting that that development and operating costs are over-stated. Using Aissaoui's assumption of government take of 60 percent of net revenue, yields a much lower level of revenues of $175 billion, indicating the sensitivity of key assumptions.

- *Sources of uncertainty*

The results are surrounded with considerable uncertainty and should be used with caution for a number of reasons. Remaining recoverable reserves are unknown and unknowable[59]. Estimates at any single point in time reflect what is then known, and does not depict ultimate recovery, which again is unknowable. For the oil industry, reserves are an inventory (a flow) which are constantly being consumed and replaced. Thus it is common to have a reasonably steady reserve-to-production ratio (R/P) of some 10-15 years (in OPEC countries it is much higher but the same investment rules for development apply). In the US, which has been heavily explored and developed, reserves in 1950 were 25 billion barrels; but over the 1950-1994 period the industry extracted over five times that amount and it still had nearly 24 billion barrels on the shelf[60]. Importantly, the US R/P ratio stood around 10 years over the entire period. Thus, taking a reserve estimate as *fixed or ultimate* at any point in time, even in a mature producing country like the US, can generate very misleading results. Global reserves and production have tended to grow over time, the result of increasing investment, knowledge, and new technology. In the history of the conventional oil industry that is approaching 150 years, the current level of global reserves of 1 trillion barrels exceeds the total amount of oil that has been produced by around 100 billion barrels. That is, to date the industry has replaced more than the world has consumed. Moreover, costs have generally declined, shifting supply curves to the right in many regions[61]. It indicates that until now, increasing knowledge has greatly overwhelmed the effect of diminishing returns.



Natural gas reserves are even more uncertain because gas resources are much less developed than for oil, partly reflecting the greater difficulty of getting gas to market. The first attempt to compile a global inventory of gas reserves was not completed until the early 1960s by the Oil and Gas Journal. For 2000, the global R/P ratio for gas

was 61 years (versus 40 years for oil)[62], and for many countries it exceeds 100 years. In Iran and Qatar, the 2nd and 3rd largest holders of gas reserves after Russia, R/P ratios are nearly 400 years. For Algeria, according to BP figures, its gas R/P ratio is a relatively large 50 years.

The production profiles chosen are quite arbitrary and have been squeezed into fifty years (see graphs). In most cases production declines at rate of 10 percent in later years in order to exhaust the reserves, but this appears unrealistic for total production (although it may be more reflective for a specific pool). Declines in total production generally have very long tails because reserves continue to be added from new or existing pools. Even in very mature areas, it is possible to add reserves and mitigate a sharp fall-off in output (e.g., in the US, where production has declined on average by 1.6 percent per year since 1970 (see graph), and new reserves continued to be added).

- *Projected profiles of hydrocarbon production*

With relatively low reserve assumptions, production profiles peak at relatively low levels and easily fall toward zero by 2050. For the higher reserve assumptions, production must bulge upward and decline rapidly to fit the fifty-year period—an apparent problem for the high-case gas scenario. (Note that production does not fall to zero in 2050 in any of the cases, partly because production declines over a very long period. In the scenarios, however, reserve levels under consideration are completely extracted by 2050.)

Looking at the low case oil reserves, the production profile does not appear reasonable, as crude oil output only gets up to 1.1 mb/d, below its former constrained peak, and far below the country's current investment plans to raise capacity above 1.5 mb/d over the next few years. This suggests that ultimate recoverable reserves are much higher. In mid- and high-case scenarios, production rises to a reasonable 1.6 mb/d and 1.7 mb/d, respectively, but is forced to fall sharply by 2050, raising questions of these reserve/production assumptions as well.

In the low-case gas production profile, gas output rises at a 3 percent rate and plateaus at 125 bcm, allowing gas exports to reach 85 bcm by 2010 as currently planned. However, gas exports would soon decline due to production constraint and rising domestic demand. This seems far too conservative to assume that exports will be capped within a decade or so. In the 2nd scenario, production rises at 4 percent to reach 175 bcm by 2020. Exports would peak at 120 bcm at that time. It suggests export capacity increasing at the about the same rate as the current plans to reach 85 bcm by 2010. This is not an unreasonable scenario, however with production leveling off at 175 bcm, exports immediately start declining due to rising domestic consumption.

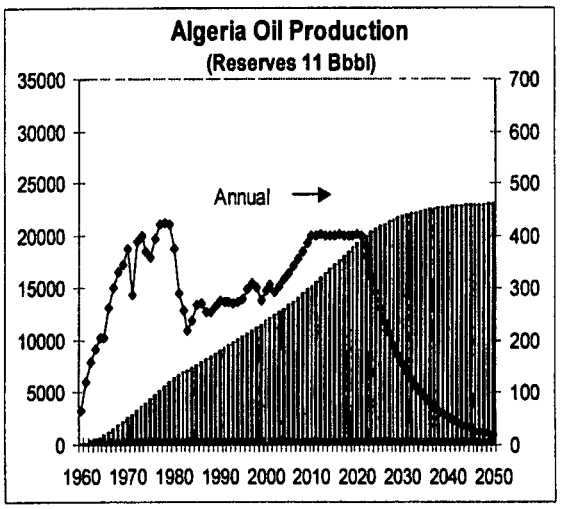
The high case requires production to increase by 5 percent and plateau at 280 bcm just beyond 2025. This rate of growth may not appear unreasonable, given that capacity to date has been built at rates of more than 10 percent. However, on a volume basis current capacity is still below 100 bcm. The high-case scenario must add more than three times that capacity by around 2025, which may be extreme. Moreover, export capacity would

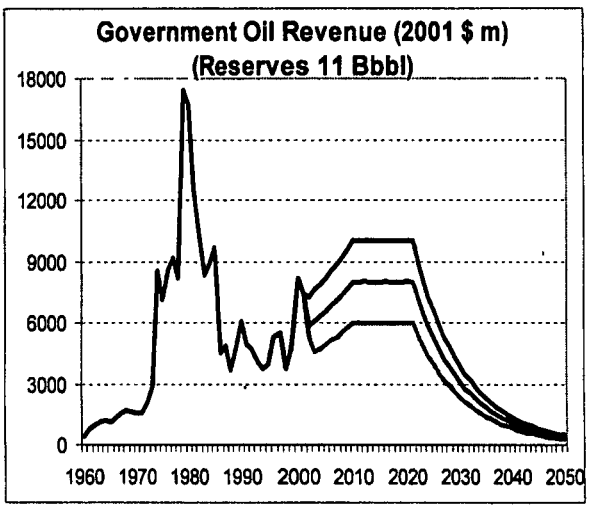
have to expand to around 200 bcm at that time, which could be even more extreme. This indicates that if reserves are indeed this magnitude (or higher according to Petroleum Economics Limited), a reasonable production profile would extend beyond 2050 and probably not rise as rapidly in the nearer term.

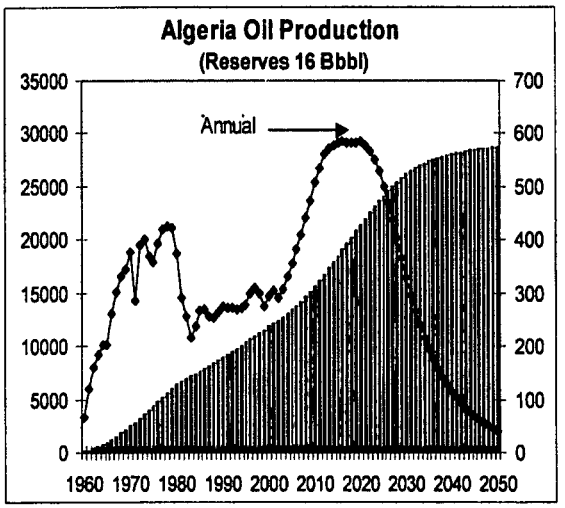
For government revenues, domestic subsidies will result in lower government revenue than indicated, particularly for gas. Government revenues are calculated at 63.35% of total production, which assumes domestic consumption priced at international levels. The government plans to slowly liberalize gas prices by 2010. If the government were to collect zero rent from gas consumed domestically to 2010, the NPV of government take for the 2002-2010 period would be lower by about 30 percent (the share of gas consumption of total output), or by about 10 percent overall for 2002-2050.

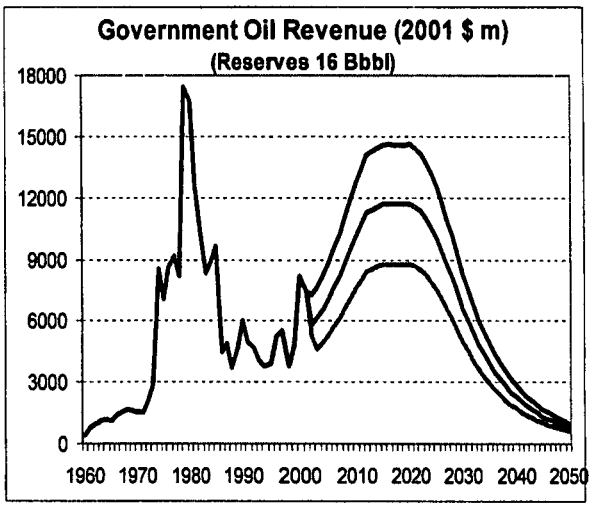
The level of oil and gas prices affect government revenues significantly. The range of real oil prices $15 to $25 might appear reasonable, assuming continued oligopoly power by oil producers. However, prices have fallen outside this band as recently as 2000 above the range, and 1998 below. Sustained real oil prices above $25 are thought unlikely given the difficulty of artificially sustaining prices well above the costs of production indefinitely—despite recent price levels. Thus while OPEC might consider $25 oil prices "the new middle ground", it is considered a high case on economic grounds (see discussion elsewhere). The low price scenario might appear reasonable as a price floor, but nominal prices in 2010 would be $18/bbl. This compares with average nominal prices of about the same level since 1986. It is not unreasonable to think that prices could fall below this level by 2010. There are also risks to natural gas prices over the forecast period. In the absence of a producer cartel, prices increasingly will be de-linked from oil and should more closely reflect supply costs relative to oil. Nevertheless price levels will remain uncertain.

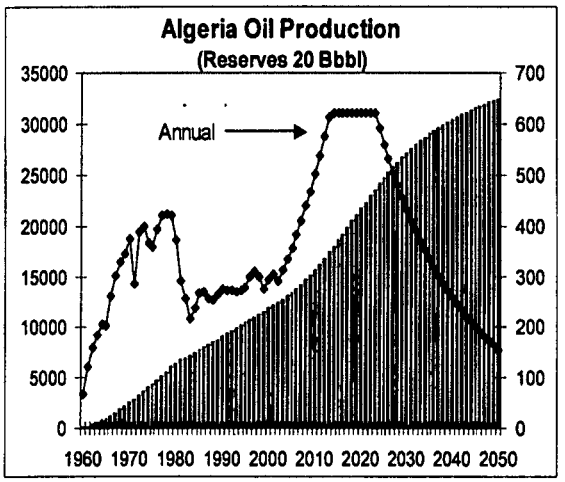
The level of government take appears accurate, but if one attempts to fine-tune the calculations by looking at development and production costs, it would need to model the supply side in greater detail and more closely assess royalties, taxes, and other charges. Costs will not remain static, perhaps declining the nearer term from advances in technology, and perhaps rising in later year as "permanent" depletion sets in. The timing of these transition is highly uncertain.

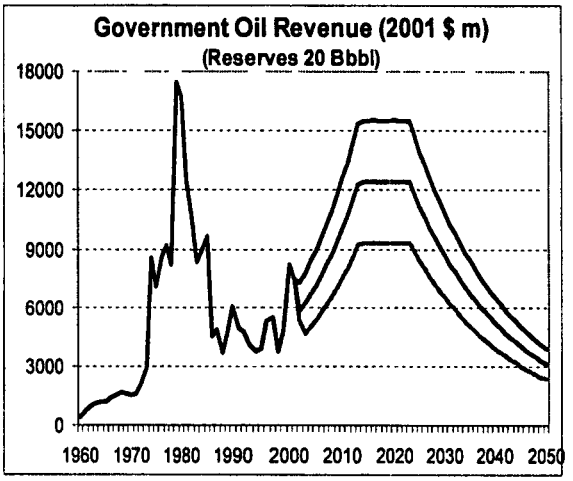

Algeria Oil Production
(Reserves 11 Bbbl)
Annual
35000
30000
25000
20000
15000
10000
5000
0
700
600
500
400
300
200
100
0
1960 1970 1980 1990 2000 2010 2020 2030 2040 2050

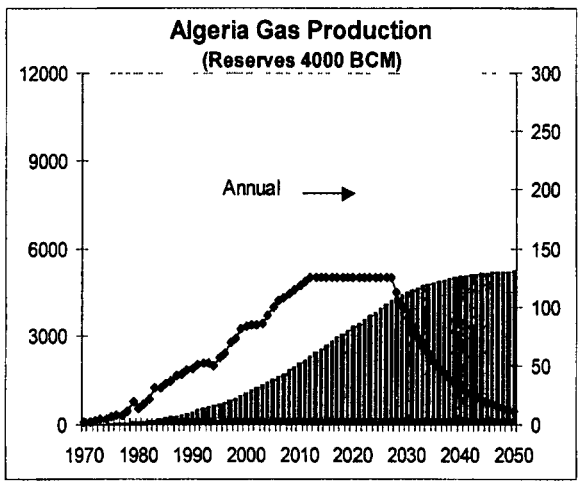

Government Oil Revenue (2001 $ m)
(Reserves 11 Bbbl)
18000
15000
12000
9000
6000
3000
0
1960 1970 1980 1990 2000 2010 2020 2030 2040 2050

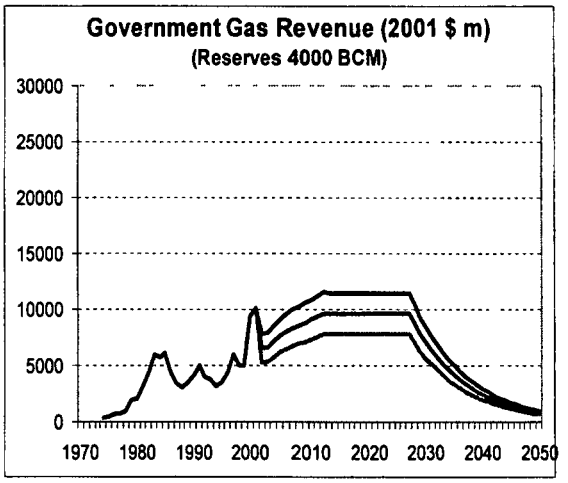

Algeria Oil Production
(Reserves 16 Bbbl)
Annual
35000
30000
25000
20000
15000
10000
5000
0
700
600
500
400
300
200
100
0
1960 1970 1980 1990 2000 2010 2020 2030 2040 2050

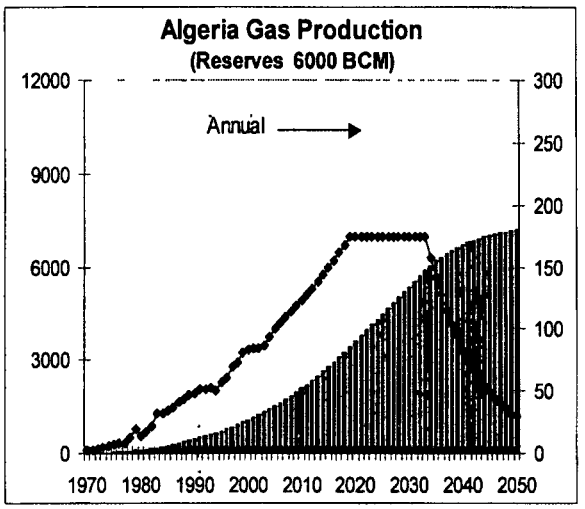

Government Oil Revenue (2001 $ m)
(Reserves 16 Bbbl)
18000
15000
12000
9000
6000
3000
0
1960 1970 1980 1990 2000 2010 2020 2030 2040 2050

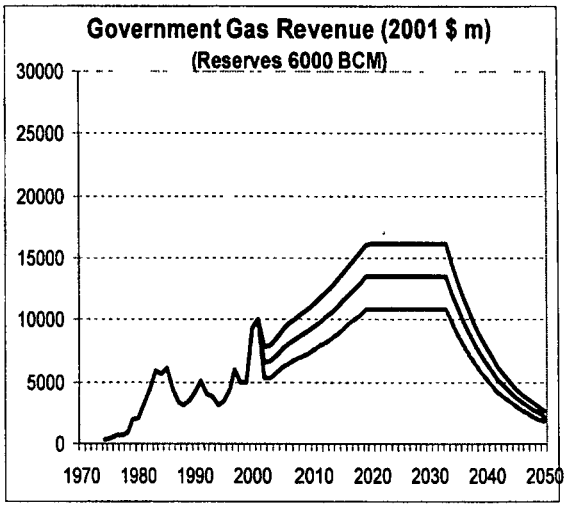

Algeria Oil Production
(Reserves 20 Bbbl)
Annual
35000
30000
25000
20000
15000
10000
5000
0
700
600
500
400
300
200
100
0
1960 1970 1980 1990 2000 2010 2020 2030 2040 2050

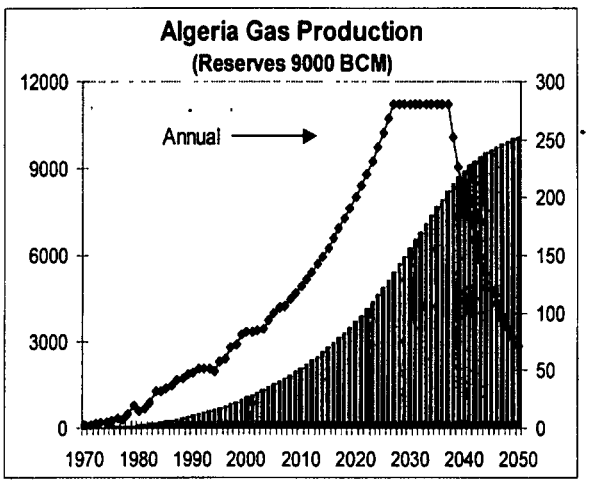

Government Oil Revenue (2001 $ m)
(Reserves 20 Bbbl)
18000
15000
12000
9000
6000
3000
0
1960 1970 1980 1990 2000 2010 2020 2030 2040 2050

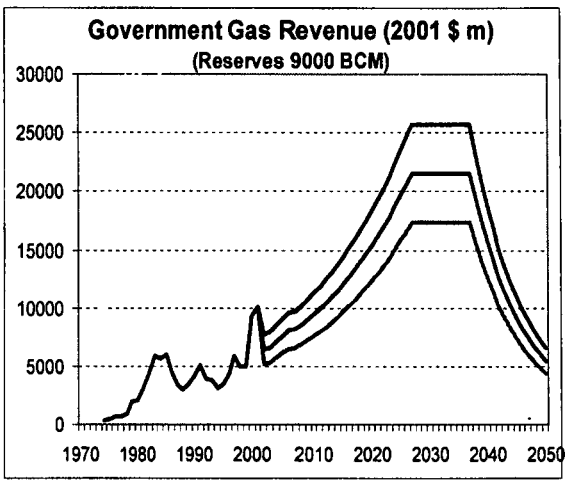

Algeria Gas Production
(Reserves 4000 BCM)
Annual
12000
9000
6000
3000
0
300
250
200
150
100
50
0
1970 1980 1990 2000 2010 2020 2030 2040 2050


Government Gas Revenue (2001 $ m)
(Reserves 4000 BCM)
30000
25000
20000
15000
10000
5000
0
1970 1980 1990 2000 2010 2020 2030 2040 2050

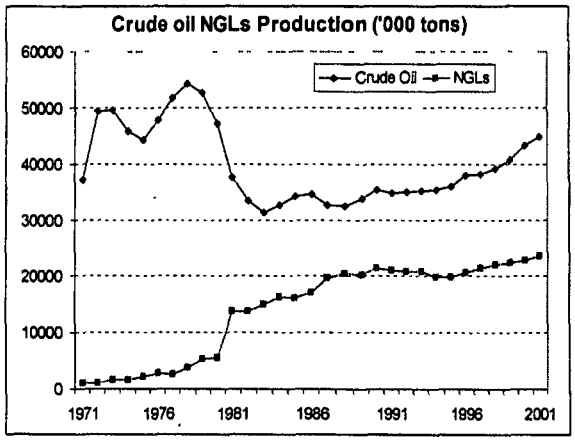

Algeria Gas Production
(Reserves 6000 BCM)
Annual
12000
9000
6000
3000
0
300
250
200
150
100
50
0
1970 1980 1990 2000 2010 2020 2030 2040 2050


Government Gas Revenue (2001 $ m)
(Reserves 6000 BCM)
30000
25000
20000
15000
10000
5000
0
1970 1980 1990 2000 2010 2020 2030 2040 2050


Algeria Gas Production
(Reserves 9000 BCM)
Annual
12000
9000
6000
3000
0
300
250
200
150
100
50
0
1970 1980 1990 2000 2010 2020 2030 2040 2050


Government Gas Revenue (2001 $ m)
(Reserves 9000 BCM)
30000
25000
20000
15000
10000
5000
0
1970 1980 1990 2000 2010 2020 2030 2040 2050

The discount rate of 4 percent is an appropriate level in general. However, whether the demand for oil will continue to rise over the forecast period is highly uncertain, given uncertainties of new technologies, environmental considerations, and policies of both oil consumer and producers (e.g., persistent cartel behavior). It could be argued that a higher discount factor may be more appropriate.



Finally, this exercise only looked at crude oil and natural gas, and excluded condensate and LPG (sometimes referred to as NGLs), in part to focus on crude oil which is under OPEC quota, and because of more limited data for these resources. However, these liquids would have to be included in any "permanent income" calculations, as they are a significant source of revenue. Currently, NGLs are about 40 percent of total liquids production, although crude oil production is constrained (see graph—IEA data). As shown earlier, the Ministry projects that NGLs will be about one-quarter of total liquids production in 2005 when crude oil production is near expected capacity at that time (however NGL export revenues will be 40 percent of total liquids export revenues). Current reserves of NGLs are some 50-60 percent that for crude oil, according to the Ministry and Petroleum Economics Limited. However, there is no indication of how crude oil and NGL reserves might grow in future or what ultimate reserves for each might be. NGLs have similar pricing, cost and tax structures, and could be lumped together with crude oil without too much distortion, given the simplicity of these calculations. A conservative estimate would suggest that the NPV of government revenue from NGLs might add at least 25 percent to the crude oil calculations above.

- *Additional elements of uncertainty over long term hydrocarbon revenues*

It is difficult to judge future long-term revenues for Algeria's oil and gas exports, in part due to the uncertainty of international prices and its export volumes. It is important to stress that *both* elements are at risk. At present, the level of oil prices are broadly determined by OPEC production restraint. However, its ability to sustain high prices is in considerable doubt, leaving prices volatile and unstable. Algeria's oil production is restricted by OPEC quota, and the organization's high-price policy limits the demand for its oil. Consequently a large amount of productive capacity remains shut in, and a significant portion of new capacity, which is expected to increase rapidly, runs a high risk of shut in as well. Gas export prices to Europe, as well for LNG, are tied to oil prices, but this will change as Europe continues to liberalize its gas markets. Increasing competition is likely to result in lower gas prices. Gas export volumes are not policy-constrained as for oil, and strong growth in European gas demand is expected to result in higher gas exports to Europe.

Oil Prices
If OPEC continues to restrain output to keep prices significantly above the costs of production, oil prices will remain extremely volatile and inherently unstable. High prices will dampen the demand for OPEC oil, which could impinge on its market share and ultimately on it pricing power. An optimum OPEC strategy might be to select a price that is reasonably high, yet allows the demand for OPEC oil to grow moderately. Whether OPEC will choose, or can indeed maintain, such a path is uncertain. In the long term, OPEC faces the possibility of a structural shift in oil demand (e.g., major advance in non-oil transport, or from environmental pressures), in which case an optimum growth path would prove more difficult. But even without such shifts, the ability of OPEC to manage prices effectively is questionable. The group might choose to simply fixate on prices and let its production stagnate. Or its market power may erode from supply competition from within, resulting in much lower prices.

In most commodity markets, prices are not artificially determined. The World Bank projects that real prices for most commodities will continue their long-term decline, as new technologies help lower the costs of production and shift supply curves outwards—even though periods of fluctuating demand will affect the levels of inventories and contribute to cyclical price patterns. In the long term, the level of demand generally determines the volumes supplied, and prices broadly follow the costs of production. However, interventions in the market which distort prices, e.g. OPEC production restraint, unleash powerful economic forces that, in the long run, render such interventions unsustainable.

Oil Production
As a member of OPEC, Algeria's production volumes are at risk, as high prices limit current and future production levels. Current output is being constrained to support higher prices, thus to sustain high prices requires output to remain constrained (depending on the level of prices, production could somewhat stagnate). If countries develop productive capacity faster than the growth in demand, surplus capacity will develop. This is likely to occur in Algeria given its aggressive investment plans. If the rapid increase in investment is from foreign companies, tensions could develop if foreign companies cannot recoup their investments—even though terms relating to OPEC quotas are spelled out at the onset. Undoubtedly the government and companies feel that increasing world demand (plus a somewhat higher OPEC quota) will allow production to increase in a timely fashion. However OPEC's high-price policy will thwart demand growth, may result in large volumes of shut-in resources. Either investment might have to slow to reduce surplus capacity, or supply competition from within the organization may put considerable strain on the organization's ability to sustain high prices.

Algeria's developed productive capacity will depend, in addition to level of demand, on its resource endowment, level of investment, and government policies. At present there is potential to significantly increase productive capacity, limited only by the level of investment. For the distant future, physical reserves play an important role, but it is difficult to judge the size of ultimate recoverable reserves. Certainly it will be higher

than today's estimate of 11 Bbbl of recoverable reserves. But what the status of reserves and production might be in, say 2050, is difficult to judge.

Natural Gas Prices and Volumes

Algeria faces risks of lower gas prices and less contract security in future, although growing demand for its gas is highly favorable. .Natural gas prices are often directly linked to oil prices through long-term contract, thus any risk to oil prices is a risk to gas prices. However, gas (and other energy) market are being liberalized around the world, and increasingly gas prices will be determined by gas-on-gas competition—as in North America. Naturally gas and oil prices will continue to compete for the same user in some markets, but increasingly gas prices will be "de-linked" from oil prices—including for LNG. Where markets have been liberalized, gas prices have generally fallen. This is expected to occur in Europe where gas and power markets are being liberalized. As spot markets develop—including for LNG—there will be a tendency to move away from long term contracts, now the norm for LNG and gas imported into Europe. Thus there will less "demand security" in future as markets become more competitive. That aside, Algeria's gas export volumes will be under less risk than oil, given no quota constraint and the fact that European gas demand is expected to grow strongly in the coming years. One upside risk to prices would be if gas exporters formed a quasi-cartel similar to that of OPEC. However, as for oil, higher prices would require it to trade-off a portion of its production.

Annex 3.8: The role of institutional reforms: transparency, fiscal frameworks and fiscal rules

- *The role of enhanced transparency*

Institutional reform in the fiscal area goes beyond establishing the appropriate institutional arrangements for debt management, tax administration, and expenditure management. There is an internationally widespread need to put in place and implement legal frameworks that cover the financial operations of government at all levels to ensure the rule of law applies to every government financial transaction (IMF, 1998). The new institutional arrangements and the overall legal framework will be ineffective if they are not characterized by accountability and transparency at all stages. To improve accountability, internal and external ex post audits and budget evaluation need to be developed. More transparency requires governments to move away from a tradition of secrecy and to replace old data systems not apt anymore to current fiscal and budgeting standards.

In this vein, an international consensus has been built in the recent past around the need to increase transparency in government operations. Fiscal transparency can be defined as openness toward the public at large about government structure and functions, fiscal policy intentions, public sector accounts, and projections. Transparency is necessary for sound government finances, good governance, and overall fiscal integrity. Fiscal transparency is a foundation for a stable and predictable government financial situation, as it helps economic agents and markets to accurately assess the government's present and future financial position and plan economic strategies accordingly.
Modern fiscal practice suggests that better fiscal transparency can greatly enhance the soundness of the fiscal stance:

- Fiscal transparency is a precondition for sound economic policy. A clear budget made available to the public at large in a timely fashion helps markets evaluate the government's intentions and thereby impose a constructive discipline on the government. Transparent public financial accounting systems make it possible for the market to determine what the government has actually done and to compare budgeted and actual financial operations.

- Transparency increases the political risk of unsustainable policies, whereas nontransparent practices can result in fiscal profligacy going undetected longer than it otherwise would. Fiscal transparency can also foster the confidence of the population in its government.

- Nontransparent fiscal practices tend to be destabilizing, to create allocative distortions, and to exacerbate inequities. These adverse repercussions may not be apparent in the near term, but they may surface later in the form of a severe financial crisis, requiring much costlier remedial action. For instance, nontransparent tax concessions, quasi-fiscal subsidies, and off-budget spending all

contribute to fiscal imbalances. The destabilizing consequences of an accumulation of payment arrears and of un-funded contingent liabilities are usually felt with longer lags. More immediately, governments that do not disclose sufficient information to financial markets may incur increased risk premia over time.

In government operations, transparency is critical in the budget process, tax policy and administration, and debt-financing operations. The tasks involved at each stage of the budget process are usually specified in some detail in the budget framework law or, less frequently, are based on past conventions and rulings. The draft budget document, preferably incorporating broad fiscal targets and strategy in a multiyear context, and its subsequent legislative debate and approval should normally be open and the outcome published. At the execution stage, the government should periodically inform both the public and the legislature about the budgetary outcome and how it compares with the objectives. A further test of transparency in budget execution and control involves open public procurement, contracting, and employment practices. Adequate information is also necessary for conducting both financial and performance audits, and the results of such audits should be made public.

Transparency in tax treatment entails a well-defined, clearly disseminated, statutory basis for taxation, as well as clear and simple administration. Discretionary tax relief provided to particular individuals or enterprises impairs the transparency and credibility of the tax system.

Transparency in government financing operations has been enhanced by financial deregulation. This requires to rely on open, market-based financing, which requires provision of adequate data to market participants on the timing of the tenders, security issues, coupons offered, prices, and bids and offers accepted. Moreover, governments wishing to access international and domestic financial markets must furnish rating agencies, underwriters, and supervisory agencies with considerable data on the magnitude, terms and holders of the public debt and on the government's debt-service capacity.

Well established practices indicate that the expenditure side of the budget preparation process should cover all government expenditures, ensure consistency of budgeted expenditures with realistic macroeconomic and revenue forecasts, and prioritize spending. In many countries, extra-budgetary funds still account for a large share of government expenditure. Expenditure allocation is often based largely on renewal of appropriations from previous budgets, rather than on explicit prioritization, leading sometimes to disorderly expenditure compression during budget execution.

Within the central government, extra budgetary operations can, in principle, be an efficient means of pursuing certain tasks for which the spending obligation transcends the annual budget appropriation process. Cases in point are public pension and commodity stabilization schemes. By contrast, extra-budgetary funds have been created in many countries mainly to avoid legislative scrutiny. Sometimes, funds originally established for

valid reasons have in some instances become highly dysfunctional. In other instances, reserves accumulated in commodity stabilization funds –or reserve funds established from the sale of nonrenewable resources- have been diverted to finance consumer subsidies or prestige projects. An important task facing government is to ensure that adequate and timely information is provided on such activities.

Also, despite the strengthening of the role of the legislature in the budget preparation process, because budgets have become subject to approval by parliament, budget adoption procedures need further strengthening. Steps that could improve interaction between parliament and government during budget adoption include limiting legislative budget initiatives, and enhancing the analytical expertise of parliament.

But sound expenditure management does not end with budget preparation. The budget must also be implemented according to schedule, following the approved appropriations, with transparent and efficient adjustments to new developments throughout the year. Moreover, after budget execution, an external audit or evaluation stage is advisable.

Transparent information in the relations between the government and the state-owned enterprises is also essential to be well documented in publicly available reports. Equally, information on the cost of quasi-fiscal activities conducted by public financial institutions – through multiple exchange rates, preferential credits, and guarantees- should be provided preferably in annual budget documents. Information should also be available on the fiscal costs of restructuring state-owned financial institutions and non-financial enterprises. Privatization of such entities must be conducted with as much openness as permitted by sound marketing considerations.

A medium-term strategy for fiscal reform must involve assessments of the efficiency, as well as the sustainability, of overall government spending. In addition, many countries need to achieve a better spending mix. A distinctive feature of the functional composition of government spending is the high share of social expenditures, including social security and safety nets, and spending on health and education. Further reforms are still needed in key areas of social spending. Spending on social security and safety nets needs to be made more cost-effective by improved design and targeting of the programs. In the health and education sectors, inefficiencies owing to overstaffing and excess physical capacity need to be addressed. However, there is no contradiction between streamlining spending on social programs and improving their quality and scope.

In addition, it is necessary to compile and disclose information on commitments and contingent liabilities. Examples of these liabilities are guarantees for credits extended by financial institutions and for deposits in those institutions, many of which are not quantifiable because they are contingent on the realization of the insured occurrence. Estimates of the obligations to future beneficiaries of social insurance for old-age, unemployment, and health care programs that would not appear affordable at current tax and contribution rates may prove useful. They provide a measure of the magnitude of the policy changes that may be required to achieve fiscal sustainability.

Fiscal transparency may impose up-front costs as the technical capacity and institutions are put in place to establish a centralized information system, to develop reliable forecasting tools, to implement appropriate accounting techniques, and to simplify regulatory practices or make their cost visible. Moreover, there are recurrent, albeit often declining costs in maintaining these practices and disseminating the generated information. The costs of transforming a culture of secrecy into one of transparency may be at last as large. Notwithstanding the general presumption that fiscal transparency is desirable, temporary departures from transparency may be justified. For example, when the premature announcement of policy measures, such as the introduction of new taxes or subsidies, would weaken their effectiveness or confer unintended windfall gains on some groups.

- *The scope for institutional reforms, fiscal transparency, and fiscal policy rules*

Reductions in fiscal deficits do not always guarantee a significant and enduring strengthening of public finances. While some attempts at fiscal consolidation result in a persistent improvement in the fiscal balance and a sizeable reduction of the public debt, others are soon reversed. Recent economic analysis suggest that, in advanced economies, a fiscal improvement is more likely to be successful when based on cuts in expenditure, especially reductions in the wage bill (via lower public employment) and in transfers (such as pensions), and when undertaken by countries with high levels of debt (IMF, 2001).

But successful consolidations are defined over a relatively short period and can be reversed over time. This highlights the importance of other factors than just the composition of fiscal adjustment. In particular, sound fiscal frameworks may help reinforce political commitment to fiscal restraint in the face of pressures for expansion.

Institutional reforms for better management of fiscal policy aim primarily at achieving and maintaining fiscal consolidation, while continuing to leave room for fiscal policy to dampen the business cycle through automatic stabilizers and, if necessary, policy actions. Recent institutional reforms can be classified into three groups:

(i) Formal deficit and debt rules, such as, in the euro area, the bound by the Stability and Growth Pact to limit the deficit to 3 percent of GDP, or the golden rule in the UK of borrowing only to finance capital spending, accompanied by the sustainable investment rule, which limits net debt to 40 percent of GDP over the cycle.

(ii) Expenditure limits (US, Sweden, Finland, the Netherlands), supported by procedural requirements, whereby proposals resulting in overruns in certain expenditure areas must be accompanied by offsetting expenditure cuts elsewhere or by revenue increases. Canada has also instituted a rigorous expenditure review process.

(iii) Transparency. New Zealand pioneered an approach to fiscal management that places primary and explicit emphasis on transparency (generally defined as being open to the public about the structure and functions of government, public sector accounts, and fiscal policy intentions and projections), with the Fiscal Responsibility Act of 1994. Australia and the UK have adopted similar arrangements. The key elements that these frameworks share are an explicit legal basis, an elaboration of guiding principles for fiscal policy, a requirement that objectives are clearly stated, an emphasis on the need for a longer-term focus to fiscal policy, and demanding requirements for fiscal reporting to the public.

These approaches have often combined and have, in some instances, evolved over time in the light of experience. For example, the UK, Australia and New Zealand combine legally mandated transparency with rules or objectives for deficits and debt, and the Netherlands uses expenditure and revenue rules to meet its requirements under the Stability and Growth Pact. The US puts more emphasis on expenditure rather than deficit rules.

The evolution of fiscal frameworks has been driven in some cases by a change in focus from improving an initially weak fiscal position toward maintaining a sound position over the medium term. In the former case, fairly inflexible ceilings on deficits or expenditure have typically been applied; in the latter, more sophisticated considerations generally come into play, including imposing debt ceilings, specifying rules in cyclically adjusted terms, and emphasizing fiscal transparency. There are two main justifications for these institutional reforms. First, fiscal rules and transparency strengthen fiscal discipline, thus helping governments maintain commitments to improve public finances: while rules limit the influence of contingent events on fiscal outcomes, transparency increases accountability for the design and implementation of fiscal policy. Second, problems caused by lax fiscal policy can spill from one jurisdiction to the next within a currency area or a federation. This would provide justification for the deficit and debt limits in a European framework.

The advantage of fiscal rules is that, compared to other approaches, they are clear and focus on a generally well-understood macroeconomic aggregate. The main criticism of deficit rules in general, and balanced budget rules in particular, is that they are inflexible and therefore tend to be procyclical. This is an important issue for national governments, less for sub national governments. Deficit rules for national governments have increasingly been refined to address this problem and now generally apply either to a cyclically adjusted deficit measure or an average over the economic cycle. Thus, these rules allow the operation of automatic stabilizers and possible provide some room for discretionary policy within the cycle. This increased flexibility comes at a cost, however, since the benchmark against which fiscal performance is to be judged is made more complicated (especially if estimates of potential output are revised). This increases the scope to bypass the rules, making them potentially harder to enforce, which in turn undermines credibility. In countries with a poor record of policy consistency over time, fiscal policy rules have aimed to improve fiscal discipline and increase policy credibility

over time. However, experience remains mixed, and besides a number of successes, some rules have been ineffective, suspended, or abandoned (see Kopits and Symansky, 1998, for a comprehensive survey of experience).

Debt ceilings can be a useful adjunct to deficit rules, although the definition of an appropriate ceiling is difficult. In practice, debt ceilings have been driven not by calculations based on theory but rather by concerns about reducing high debt levels, and have thus generally been chosen on the basis of circumstances of individual countries. However, if debt is well below the ceiling, there may be significant room for maneuver in the short run and little restraint on policy. The choice of debt measure is also an issue: gross debt can be easily measured and compared across countries, but net debt is the best indicator to assess fiscal sustainability, although it presents substantial measurement difficulties in terms of which assets to consider and how to value them.

Expenditure rules typically impose ceilings on specific areas of expenditure. For example, discretionary as opposed to nondiscretionary and, in some cases, for particular programs. The principal advantages of capping expenditure are that this process is well understood by players in budget negotiations and the wider public, and it tackles deficit bias by addressing the principal source of rising deficits, namely political and institutional pressures to increase expenditure. Governments are also made accountable for what they can control most directly, which is not the case with deficits, given that they are highly dependent on economic developments. Ceilings on specific expenditure items can impose fiscal discipline while allowing the operation of automatic stabilizers on both the revenue and on the expenditure side, and can therefore operate in effect like a cyclically adjusted deficit rule. In contrast, caps on overall spending could force unwarranted cuts in discretionary spending items during a cyclical downturn in order to support higher transfer spending.

To be effective, a rules-based fiscal policy has to address two main potential drawbacks upfront: First, achieving fiscal sustainability under a fiscal rule should not come at the expense of macroeconomic stability, by impairing the short-run stabilization and smoothing roles of fiscal policy. Thus, fiscal rules must be *flexible enough* to accommodate exogenous shocks, beyond the control of the government. Second, application of fiscal rules in a framework that does not ensure budgetary transparency would likely be self-defeating, by leading to circumventions and the proliferation of non-transparent, off-budget practices. Thus, an integrated fiscal framework that promotes fiscal transparency would be a prerequisite for the implementation of a rules-based fiscal policy.

Fiscal transparency helps to relax the trade-off between the need for flexibility and discipline in fiscal policy. A commitment to transparency should improve credibility generally and increase the chances that a government can retain credibility in the event that it needs to temporarily deviate from, or substantively, change, its fiscal rules or targets. Japan, for instance, introduced a rules-based approach in 1997 without a commitment to transparency, but was forced to abandon this approach in the wake of the Asian crisis. There is already international evidence (Japan, UK, Australia, New Zealand)

that transparency legislation can complement other elements of a fiscal framework, such as deficit rules. Legislation, however, is not the only means to achieve fiscal transparency; in other advanced economies such as Canada Sweden and the US, transparency is associated with a long tradition of open governments.

Fiscal frameworks emphasizing transparency, deficit and debt rules, or expenditure rules have been increasingly adopted in developed countries, particularly in the EURO area, the US, Canada, New Zealand, Australia, Switzerland, the UK, Sweden, among others. Recent improvements in fiscal frameworks in emerging markets have also been adopted more recently. Peru introduced a Fiscal Transparency Law in 1999, which sets limits on the deficit and the growth of government expenditure. It also established a fiscal stabilization fund to ensure that fiscal savings in good years can be used during recessions and contains measures to encourage transparency. Brazil introduced a Fiscal Responsibility Law in 2000 which prohibits financial support operations among different levels of government, sets limits on personnel expenditure, and requires that limits on the indebtedness of each level of government be set by the senate. It also includes measures to improve transparency and accountability. Similar fiscal responsibility legislation is being considered in Colombia and India.

[1] Previous detailed studies (e.g. Young (1994) have shown education to be by far the most important element in accounting for differences in labor quality.

[2] This is different than *absolute convergence*, which implies that poorer countries should grow at a faster rate than richer one.

[3] ICRG Political Risk is a weighted average assessment of the following: Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religion in Politics, Law and Order, Ethnic Tensions, Democratic Accountability, and Bureaucracy Quality.

[4] More careful studies have found these variables to be significant determinants of long-term growth after controlling for endogeneity.

[5] This global experience is consistent with the experience of Algeria. In Algeria, the average per-capita growth rate during the 1971-1985 period was 2.7 percent, which crashed to –0.9 during 1986-2000.

[6] Note that we work with per-worker GDP and not per-capita GDP. This captures the standard production function better and also allows us to later break down the effects on GDP via capital accumulation and investment efficiency.

[7] The assumption of lump-sum transfers is a neutral way of intermediating the windfall through the private sector, as it does not affect relative prices. Practically, lump-sum transfers may not be a relevant policy instrument to implement redistribution of the hydrocarbon windfall. Reducing taxes may be a more appropriate policy. However, in that case, the impact of the distribution of hydrocarbon revenues to the private sector would be obscured by the reduction in distortions due to lower taxation.

[8] Djankov and Murrel. 2000. The Determinants of Enterprise Restructuringin Transition. An Assessment of the Evidence. Washington DC. World Bank. Review of the literature covering about 30 studies.

[9] World Bank. 2001. Bulgaria -The Dual Challenge of transition and Accession; World Bank. 2001. Czech Republic - Enhancing the Prospects for Growth with Fiscal Stability.

[10] These agreements cover most industrial goods. Some quantitative restrictions were set for textiles, agricultural products and fisheries.

[11] Algeria is looking to export power to Europe. In may 2001, the Algerian Energy Company (AEC) was formed as a 50:50 joint venture between Sonelgaz and Sonatrach to export electricity, among other duties. In November 2001, Sonelgaz signed a joint venture agreement with the Italian power grid manager GRTN on the possibility of constructing an undersea power cable to export electricity to Europe via Italy. A similar deal was singed in November 2001 with Spain's Red Electrica de Espana to build an underwater power line between Algeria and Spain.

[12] Stable macroeconomic factors alone are not *sufficient* for sustainable economic growth (World Bank 1991, 2001, 2002). Complementarity with structural reforms and other factors affecting growth would ensure maximum contribution of macroeconomic stability to growth, as documented in the main text of this study.

[13] Macroeconomic stability refers to the low and stable inflation, low ratio of the budget deficit to GDP, low distortion in foreign exchange markets or low parallel market exchange rate premium, and stable terms of trade.

[14] In particular, it is shown that a 1% of GDP improvement in the fiscal balance increases growth by about 0.22%, including a positive effect of improved fiscal balances on investment. Although there is also evidence that it is possible to sustain large deficits for some time and achieve higher growth, with the assistance of high saving rates and financial repression, medium- and long-run fiscal sustainability in this environment is questionable.

[15] Easterly and Rebelo (1993) found that public investment in transport and telecommunications sectors had a positive effect on growth, investment in public enterprises had no effect, and investment in agriculture had a negative effect.

[16] The model here is a discreet-time version of the model in Anand and van Wijnbergen (1989). See also Agénor, 2000.

[17] *Oil and Gas Journal*, December 24, 2001.

[18] US DOE, Arab Maghreb Union, 2001, http://www.eia.doe.gov/emeu/cabs/maghreb.html#AL.

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[20] Watkins, G.C., "Characteristics of North Sea Oil Reserve Appreciation", MIT, December 2000.
[21] Lynch, Michael, "Crying Wolf, Warnings About Oil Supply", MIT, March 1998.
[22] Ministry of Energy and Mines, and published widely in the international press.
[23] *Middle East Economic Survey*, May 6, 2002.
[24] International Energy Agency, *World Energy Outlook 2001 Insights*, 2001.
[25] International Energy Agency, *World Energy Outlook 2001 Insights*, 2001.
[26] Varangis, Panos, Takiyama Akiyama, and Donald Mitchell, *Managing Commodity Booms-and Busts*, World Bank. 1995.
[27] This annex draws extensively from the work of Davis, Jeffery, Rolando Ossowski, James Daniel, and Steven Barnett, *Stabilization and Savings Funds for Nonrenewable Resources: Experience and Fiscal Policy Implications*, IMF, 2001.
[28] Gilbert, Christopher L. *International Commodity Control : Retrospect and Prospect*, Policy Research Working Paper No. 1545, World bank, 1995.
[29] Davis et. al., p. 9.
[30] Gelb, Alan, Benn Eifert and Nils Borje Tallroth, "The Political Economy of Fiscal Policy and Economic Management in Oil Exporting Countries", draft May 2002, presented to the IMF Conference on Fiscal Policy Formulation and Implementation in Oil-Producing Countries, June 5-6, 2002.
[31] Davis et. al., p. 12.
[32] Davis et. al., p 16.
[33] Skancke, Martin, "Fiscal Policy and Petroleum Fund Management in Norway", presented to the IMF Conference on Fiscal Policy Formulation and Implementation in Oil-Producing Countries, June 5-6, 2002.
[34] Norway Ministry of Finance, web site http://odin.dep.no/fin/engelsk
[35] Skanke.
[36] This section based on Warrack, Allan A. and Russell R Keddie, "Alberta Heritage Fund vs Alaska Permanent Fund: A Comparative Analysis", University of Alberta, 2001.
[37] See Alaska Permanent Fund web site http://www.apfc.org
[38] See Alberta Heritage Savings and Trust Fund web site http://www.revenue.gov.ab.ca/business/ahstf
[39] Alaska Permanent Fund Annual Report 2001.
[40] Warrack.
[41] Fasano, Ugo, Review of the Experience with Oil Stabilization and Savings Funds in Selected Countries, WP/00/112, IMF, 2000.
[42] Fasano, p 17.
[43] Ibid..
[44] Aljashmi, Nasser, "Omans' Experience with the State General Reserve Fund", presented to the IMF Conference on Fiscal Policy Formulation and Implementation in Oil-Producing Countries, June 5-6, 2002.
[45] Clemente, Lino, Robert Faris, and Alejandro Puente, "Natural Resource Dependence, Volatility and Economic performance in Venezuela: the Role of a Stabilization Fund", Andean Competitiveness Project, February 2002.
[46] Fasano, p 19.
[47] Davis. P. 26.
[48] Fasano, p. 19.
[49] Claessens, Stijn and Ronald C. Duncan, *Managing Commodity price Risk in Developing Countries*, The Johns Hopkins University Press, 1993.
[50] See New York Mercantile Exchange web site, http://www.nymex.com
and The International Petroleum Exchange web site, http://www.ipe.uk.com
[51] Daniel, James A. "Hedging Government Oil Price Risk", WP/01/185, IMF, 2001.
[52] Claessens, Stijn and Panos Varangis, "Oil Price Instability, Hedging, and an Oil Stabilization Fund: The Case of Venezuela", Policy Research Working Paper 1290, World Bank, 1994.
[53] See International Task Force on Commodity Risk Management in Developing Countries web site http://www.itf-commrisk.org
[54] Not included in external debt are trade debts from 1970-78 that are owed to Russia. Algeria has been negotiating the value of these debts with Russia. The amount outstanding is unclear, and will depend on the ruble/dollar. exchange rate used for valuing these obligations – i.e. could end up being between $500

million to $3 billion. After agreement on the value, these liabilities will be converted into investment in companies in Algeria.

[55] According to the DAC methodology the grant element has to be above 25 percent for a loan to be classified as concessional.

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[60] Streifel, Shane S. *Review and Outlook for the World Oil Market*, World Bank Discussion Paper 301, 1995.

[61] Watkins, G.C. and Shane Streifel, *World Crude Oil Resources: Evidence from Estimating Supply Functions for 41 Countries*, Policy Research Working Paper 1756, World Bank, 1997.

[62] BP, *BP Statistical Review of World Energy*, 2001.