

2. EFFECTS ON THE REPUBLIC OF PANAMA

In this section we focus on the effects of the mining development, examining the GDP and public finances (using the debt service ratio as a yardstick). As the first step we create a model describing the economy and government finances of the Republic of Panama. Secondly, we establish a scenario in the form of draft policies which represent the optimum in terms of model computations and which are practicable. Thirdly, we attempt to determine, through financial analyses, the separate effects in the event that the mining development takes place. The fourth step will be to calculate, on the basis of the scenario, the effects in the event that the mining development is carried out and in the event that it is not, using financial models. Finally we will clarify the effects of the mining development by comparing and studying these two situations. In the following paragraphs we will describe these effects following the Procedure outlined above.

2-1 Model

The data used in creating the model consisted entirely of information announced by the Panamanian Government. Concerning the necessary data items, we were only able to create a complete data base for the 11 years from 1968 to 1978. A structural equation was therefore worked out on the basis of data for the above period.

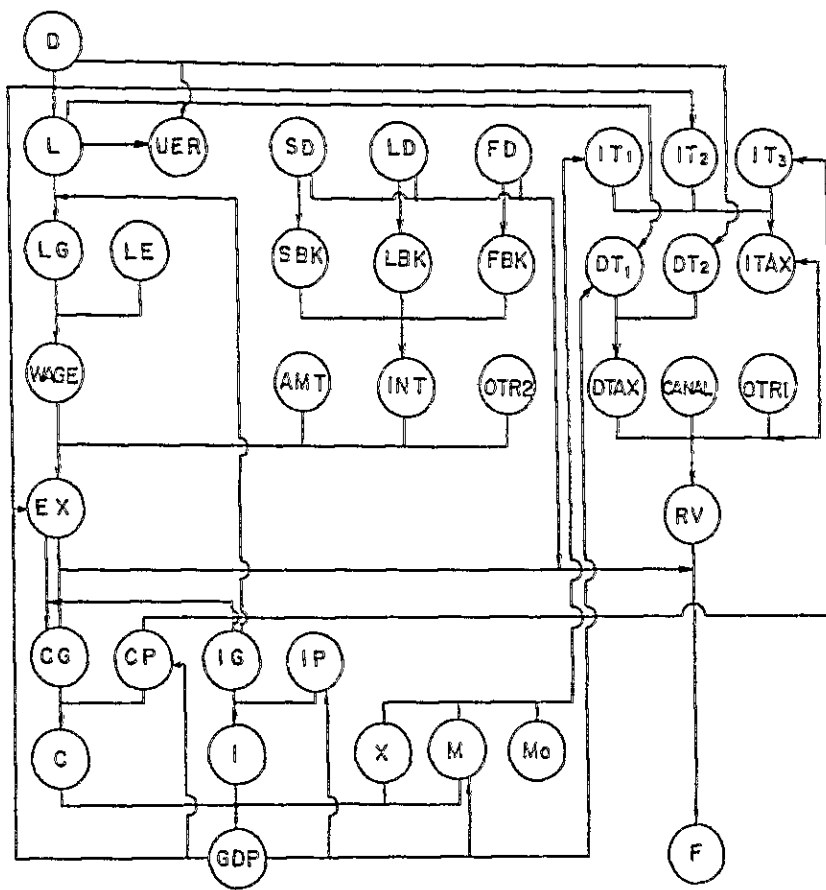
We regard the volume of government investment as being the main operative variable in the model, and the GDP and public debt ratio as being the main output.

The cause and effect relationships between the variables used in the model are shown in Figure V-1-2. As can be seen at a glance, the model is divided into 3 sectors: the economy, public finance and financing. These sectors are linked mainly at the output stage.

Input includes canal revenue, the export growth rate, the rate of growth in oil imports, the population growth rate, interest rates and the volume of government investment. These can be fed in at the desired figure for each year in the period to be forecasted. Canal revenue starts with \$12,000,000 (\$10,500,000 at 1975 prices) in 1979, and the fixed income of \$20,000,000 has been discounted by an average inflation rate of 8%.

The export growth rate was fixed at 4% on the grounds that there are no factors likely to cause major changes from past rates. The model has been fixed at the 1975 value of the dollar, so when the 8% inflation rate is taken into account the nominal growth rate for exports comes to 12.3%. Seen in terms of the current state of the Panamanian economy, this figure might be optimistic.

There is too much uncertainty surrounding the rate of increase in oil imports. It was therefore set at 4% for the purposes of the model on the basis of reference to past fluctuations. In any event, this model will be used not so much for finding absolute values as for comparing differences between cases with and without the Petaquilla project. Setting the rate at 4% should not, therefore, present any major problem.



Source: Survey Mission

Fig. V-2-1 Relationships between Variables in the Public Finance Model

Table V-2-1 Variables Used in the Public Finance Model

GDP	Gross domestic product	C	Consumption
CG	Government consumption	CP	Public consumption
I	Investment	IG	Government investment
IP	Private investment	X	Exports
M	Imports	P	Population
L	No. of workers employed	LG	Government employment
LE	Labor expenditure	RV	Government revenue
DTAX	Direct taxation	DTI	Income tax
DT2	Property tax and other direct taxes	ITAX	Indirect taxation
IT1	Taxation on imports and exports	IT2	Sales tax
IT3	Stamp duties and consumption tax	CANAL	Canal revenue
OTRI	Casino commissions and transfer revenue	EX	Government expenditure
WAGE	Wages and salaries	INT	Interest payments
AMT	Repayments of principal	OTR2	Other expenditure
F	New finance	SD	Domestic short-term debt
LD	Domestic long-term debt	FD	Foreign debt
RSD	Repayments on short-term domestic debt	RLD	Repayments on long-term domestic debt
FLD	Repayments on foreign debt	SBK	Total domestic short-term debt
LBK	Total domestic long-term debt	FBK	Total foreign debt
UER	Unemployment rate		

Source: Survey Mission

The rate of population increase has been set in accordance with the lowest, i.e. 2.53 in 1970 with simple reductions to 1.23 in the year 2000, of 4 cases presented in the Contralovia General population forecasts (Estimacion de Indicadores Demograficos de la Republica de Panama para el Periodo 1950-1970 y Proyecciones de Poblacion por Sexo y Grupos do Edades, Anos 1960 al 2000). We have thus, set the rate at a level favorable to the Panamanian economy.

Interest rate was regarded as remaining at the current level. However, since there is interest to pay on past borrowing, the various rates were calculated in accumulation and fed in under the separate headings of "domestic short-term", "domestic long-term" and "foreign debt" with reductions to allow for inflation. Incidentally, real interest rates as of 1978 were 3% for domestic short-term borrowing, 7% for domestic long-term borrowing and 6% for overseas borrowing.

Government investment is a policy variable. Decisions in this connection will be described in the next section.

2-2 Scenario

Although we use the term "scenario", the only controllable variable is the volume of government investment. The key point, therefore, is to decide what patterns government investment will follow during the period under consideration. To obtain the data necessary for this decision, we will simulate economic and financial developments in cases where government investment is restrained and in cases where it is carried out at the maximum possible level.

The nominal increase in the Panamanian Republic's development budget for FY1980 is about 10%. According to people involved in its compilation, the 1980 budget is "extremely conservative". It is not clear at present what percentage the 10% nominal increase will represent in real terms, but it will probably be between 0% and 2%. We thus calculated the depreciation limits for the compilation of development budgets depreciated over a long period. In these calculations, which covered the years 1980 to 2000, we assumed for the sake of convenience that real growth would be 2% p.a. The results are shown in Table V-2-2.

There is also the question of how to feed government investment at the maximum possible level into the model in terms of real growth per annum. From interviews conducted locally we formed the impression that the common-sense level for average growth in the long term (as opposed to over a period of one or two years) should be regarded as being around 5%. We therefore computed a case with the real growth rate set at 7% to represent the upper limit. The results are set out in V-2-2.

Table V-2-2 Results of Simulations Based on Growth Rates of 2% and 7% in Government Investment

	GDP	Balance of payments (deficit)	Imports	Private investment	Employment	Unemployment	Government revenue	Government expenditure	New borrowing	Principal and interest repayment	Total debt	Debt ratio (max.)
2% growth rate												
Average growth rate (%) (1980 - 2000)	2.4	-3.2	3.4	0.8	1.0	4.5	2.2	3.2	4.6	4.4	5.7	75.6
Ratio to growth in government investment	1.2	-0.8	1.7	0.4	0.5	2.3	1.1	1.6	2.3	2.2	2.9	
Ratio to growth in GDP	1.0	-1.3	1.4	0.3	0.4	1.9	0.9	1.3	1.9	1.8	2.4	
Ratio to growth in capital and interest repayments	0.5	-0.7	0.8	0.2	0.2	1.0	0.5	0.7	1.0	1.0	1.3	
Ratio to growth in the total debt ratio	0.4	-0.6	0.6	0.1	0.2	0.8	0.4	0.6	0.8	0.8	1.0	

(Table V-2-2 cont'd)

	GDP	Balance of payments (deficit)	Imports	Private investment	Employment	Unemployment	Government revenue	Government expenditure	New borrowing	Principal and interest repayment	Total debt	Debt ratio (max.)
7% growth rate												
Average growth rate (%) (1980 - 2000)	3.7	9.4	5.1	2.0	1.5	3.2	4.6	4.8	5.1	4.8	6.1	55.5
Ratio to growth in government investment	0.5	1.3	0.7	0.3	0.2	0.5	0.7	0.7	0.7	0.7	0.9	
Ratio to growth in GDP	1.0	2.5	1.4	0.5	0.4	0.9	1.2	1.3	1.4	1.3	1.6	
Ratio to growth in capital and interest repayments	0.8	2.0	1.1	0.4	0.3	0.7	1.0	1.0	1.1	1.0	1.3	
Ratio to growth in the total debt ratio	0.6	1.5	0.8	0.3	0.2	0.5	0.8	0.8	0.8	0.8	1.0	

Source: Survey Mission

The variables which reflect government investment positively are defined as being those which in Table V-2-2 show larger growth ratios with government investment increasing at 7% than at 2%. The only variable which meets this criteria is "Balance of payments". All other variables, therefore, reflect government investment negatively. To examine these relationships more closely we will introduce the concept of a rate of change, namely:

Growth in a given variable when growth in government investment is 7%.	-	Growth in a given variable when growth in government investment is 2%.
7% growth in government expenditure.	-	2% growth in government expenditure.

The results are shown in Table V-2-3.

Table V-2-3 Rates of Change in the Growth Rates of Variables

GDP	0.26	No. employed	0.10
New borrowing	0.10	Balance of payments	2.52
Unemployment	0.26	Capital and interest repayments	0.08
Imports	0.34	Total debt	0.08
Government revenue	0.48	Government expenditure	0.32
Private investment	0.24		

Source: Survey Mission

From Table V-2-3 it can be seen that increases in government investment contribute to deterioration in the balance of payments by a factor of 2.52 times, while the contribution in all other cases is less than 0.5 times, the largest being the increase in government revenue, followed by the expansion of imports and increases in government expenditure. It is worth noting that the rate of increase in government revenue exceeds that of government expenditure. The next group is made up of increases in the GDP, reductions in unemployment and growth in private invest-

ment. These all have rates of change in the vicinity of 0.25. The final group comprises increases in employment, increases in new borrowing, increases in total debt and increases in repayments. The rates of change for these are all 0.10 or below. It is worth noting here that increases in new borrowing, and therefore in principal repayments and interest and total debt, are not sensitive to increases in government expenditure.

To sum up, although increases in government expenditure are not overly effective in creating bouyancy in the Panamanian economy overall, it is fair to say that they do have a considerable effect in bringing improvement to public finances. Also, although the rate of change in growth in employment figures is small, it is still a positive sign and the effect seems to be accelerating. The problem is the deterioration in the balance of payments. For each increase of 1% in government expenditure, the deficit in the balance of payments grows by 2.25%.

As a financial indicator, the debt service ratio was defined and calculated as public debt payments divided by government revenue. The results are shown in Table V-2-4.

Table V-2-4 Debt Service Ratios

Year/Rate of increase in government expenditure	2%	7%
1980	48.8	48.8
81	51.7	50.8
82	53.9	51.2
83	55.8	51.4
84	57.7	52.3
85	59.6	53.9
86	61.4	55.2
87	62.8	55.5
88	63.7	54.6
89	64.5	53.6
90	65.4	53.4
91	66.6	53.9
92	67.9	54.4
93	69.0	54.1
94	69.6	53.0
95	70.3	52.0
96	71.1	51.6
97	72.3	51.6
98	73.6	51.8
99	74.8	51.4
2000	75.6	50.5

Source: Survey Mission

A glance at Table V-2-4 reveals that while the debt service ratio continues to climb in the case in which the ratio of increase is 2%, it shows a tendency to decline after peaking at 55.5%, in 1987 in the case where the rate of increase is 7%. This clearly shows the effectiveness of aggressive government investment in restraining growth in the debt service ratio.

On the basis of the above knowledge, we establish the following scenario:

- a) Government investment would be kept to a minimum in the 5 year plan starting in 1981. This is the policy of

- the Panamanian Government and is respected as such.
- b) 1983 will be regarded as the time when the low growth policy line is revised, reflected in the budget from 1984 onwards.
 - c) An upper limit will be established for the rate of increase in the deficit in the balance of payments resulting from government investment. This upper limit is regarded as being the same as the rate of growth in government investment.
 - d) An upper limit will also be set for the debt service ratio. This will be considered to be 60%.
 - e) The level of increase in government expenditure which can be maintained in the long term will be regarded as being 5% of the previous year's figure.
 - f) There will be a switch from 1984 onwards to a policy of growth within reasonable limits. Economic management policies which satisfy restrictions c, d and e are decided by a man-machine systems approach, using the model.

2-3 A Financial Analysis of the Petaquilla Copper Mining Development

Financial analysis of the Petaquilla copper mining development was based on the project scope and figures set out in "Revised Preliminary Feasibility Report of Petaquilla Project in the Republic of Panama", compiled in July 1979 by Panama Mineral Resources Development Co., Ltd. However, expenditure items were rearranged in line with the aims of this survey, and adjustments were made for up-to-date construction costs and charges with regard to roads and power-transmission lines. The results of the financial analysis, restricting to those aspects pertaining to the developmental effects of the Petaquilla copper mining development, are as follows.

1) Capital Expenditure

The construction funds required for this project total

to \$246.43 million, comprising \$188.32 million in the period up until operations commence and an additional investment of \$58.11 million subsequently. Only physical contingencies have been taken into account, and not price escalation. The percentage for physical contingencies is 10% of base costs for the mine development, 15% for road construction and 10% for power-transmission lines. The average weighting is 10.3% to base costs. Interest during the construction are 7.6% of base costs.

Table V-2-5 Capital Expenditure

	\$ million	%
Main Project		
Mine development	126.25	82.2
Construction of offices, etc.	7.23	4.7
Part, storage	3.98	2.6
Pre-operation expenses	3.90	2.5
Related infrastructure		
Roads	8.20	5.3
Power-transmission lines	4.04	2.6
Base costs	161.78	100.0
Physical contingencies	15.77	10.3
Interest during construction	11.64	7.6
Exploration and survey costs	7.28	4.7
Additional investment	58.11	37.8
Overall capital expenditure	246.43	160.4

Source: Survey Mission

2) Income Statement

Table V-2-6 shows pro forma income statement of the Petaquilla project. The tax rates used are the corporate tax of 50% of profits before tax and the dividend tax of 10% of dividend, as set down in the Panamanian regulations. When there is a deficit, this will be carried over into subsequent years, and deducted from profits. The remainder will be subject to taxation. Also, in the financial analysis carried out in this survey, all profits after-tax are dealt with as dividends.

Table V-2-6 Revenue and Expenditure Policies and Averages for the 20-year Period

** CASE 1 **

INCOME STATEMENT (I.I.)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
PRODUCTION										
ORE PRODUCTION	0.0	0.0	0.0	4725.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00
COPPER GRADE	0.0	0.0	0.0	0.66	0.76	0.76	0.72	0.73	0.71	0.64
CONCENTRATE	0.0	0.0	0.0	100.50	155.70	154.10	147.60	149.60	145.60	134.00
COPPER	0.0	0.0	0.0	52.72	83.99	83.11	79.60	80.67	78.53	71.40
GOLD	0.0	0.0	0.0	10.66	16.52	16.35	15.66	15.87	15.45	14.22
SILVER	0.0	0.0	0.0	187.36	290.43	287.38	275.23	278.94	271.56	249.75
REVENUE	0.0	0.0	0.0	42.52	67.72	67.01	64.17	65.04	63.32	57.58
NET REVENUE	0.0	0.0	0.0	45.38	72.15	71.39	68.37	69.30	67.46	61.35
COPPER	0.0	0.0	0.0	42.18	67.19	66.49	63.68	64.54	62.83	57.12
GROSS REVENUE	0.0	0.0	0.0	52.72	83.99	83.11	79.60	80.67	78.53	71.40
(LESS) T/C-R/C	0.0	0.0	0.0	10.34	16.80	16.62	15.92	16.13	15.71	14.28
GOLD	0.0	0.0	0.0	2.12	3.29	3.26	3.12	3.16	3.08	2.83
SILVER	0.0	0.0	0.0	1.07	1.66	1.65	1.58	1.60	1.56	1.43
(LESS) MARINE INSURANCE	0.0	0.0	0.0	0.11	0.17	0.17	0.16	0.16	0.16	0.15
(LESS) OCEAN FREIGHT	0.0	0.0	0.0	2.75	4.26	4.22	4.04	4.05	3.98	3.67
EXPENDITURE	0.0	0.0	0.0	49.65	55.05	53.75	52.05	50.32	48.70	47.35
OPERATING COSTS	0.0	0.0	0.0	23.12	28.71	28.70	28.65	28.66	28.63	28.54
SALARIES & WAGES	0.0	0.0	0.0	6.84	6.84	6.84	6.84	6.84	6.84	6.84
FUEL & OIL	0.0	0.0	0.0	1.86	2.49	2.49	2.49	2.49	2.49	2.49
ELECTRICITY	0.0	0.0	0.0	4.37	5.82	5.82	5.82	5.82	5.82	5.82
INLAND FREIGHT	0.0	0.0	0.0	0.76	1.17	1.16	1.11	1.13	1.10	1.01
OTHER EXPENSES	0.0	0.0	0.0	9.29	12.38	12.38	12.38	12.38	12.38	12.38
SHIP LOADING	0.0	0.0	0.0	0.48	0.75	0.74	0.71	0.72	0.70	0.65
DEPRECIATION	0.0	0.0	0.0	12.89	12.89	12.93	13.12	13.20	13.47	14.10
INTEREST	0.0	0.0	0.0	13.20	12.70	11.39	9.57	7.74	5.90	4.05
PROFIT BEFORE TAX	0.0	0.0	0.0	-7.17	12.67	13.25	12.12	14.72	14.61	10.23
(LESS) INCOME TAX	0.0	0.0	0.0	0.0	2.75	6.63	6.06	7.36	7.31	5.11
PROFIT AFTER TAX	0.0	0.0	0.0	-7.17	9.92	6.63	6.06	7.36	7.31	5.11
(LESS) DIVIDEND	0.0	0.0	0.0	0.0	2.47	5.96	5.45	6.62	6.58	4.60
(LESS) DIVIDEND TAX	0.0	0.0	0.0	0.0	0.27	0.66	0.61	0.74	0.73	0.51
PROFIT AFTER TAX & DIVIDEND	0.0	0.0	0.0	-7.17	7.17	0.00	0.00	0.00	0.00	0.00

(Table V-2-6 cont'd)

		INCOME STATEMENT (2)										
		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
PRODUCTION												
ORE PRODUCTION		6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	6300.00	
COPPER GRADE		0.64	0.64	0.64	0.64	0.63	0.62	0.71	0.84	0.84	0.84	
CONCENTRATE		134.00	134.00	134.00	134.00	152.80	152.80	155.30	171.10	171.10	171.10	
COPPER		71.40	71.40	71.40	71.40	79.21	79.21	81.41	97.58	97.58	97.58	
GOLD		14.22	14.22	14.22	14.22	16.21	16.21	16.48	18.15	18.15	18.15	
SILVER		249.79	249.79	249.79	249.79	284.88	284.88	289.67	319.02	319.02	319.02	
REVENUE												
NET REVENUE		57.58	57.58	57.58	57.58	63.89	63.89	65.66	78.63	78.63	78.63	
COPPER: NET REVENUE		61.39	61.39	61.39	61.39	68.23	68.23	70.07	83.51	83.51	83.51	
GROSS REVENUE		71.40	71.40	71.40	71.40	79.21	79.21	81.41	97.58	97.58	97.58	
(LESS) T/C-R/C		14.28	14.28	14.28	14.28	15.84	15.84	16.28	19.52	19.52	19.52	
NET REVENUE		2.83	2.83	2.83	2.83	3.23	3.23	3.28	3.62	3.62	3.62	
SILVER: NET REVENUE		1.43	1.43	1.43	1.43	1.63	1.63	1.66	1.83	1.83	1.83	
(LESS) MARINE INSURANCE		0.15	0.15	0.15	0.15	0.16	0.16	0.17	0.20	0.20	0.20	
(LESS) OCEAN FREIGHT		3.67	3.67	3.67	3.67	4.18	4.18	4.25	4.68	4.68	4.68	
EXPENDITURE		45.74	44.53	45.05	45.25	45.50	46.44	47.27	37.20	37.03	35.56	
OPERATING COSTS		28.54	28.54	28.54	28.54	28.69	28.69	28.70	28.82	28.82	28.82	
SALARIES & WAGES		6.84	6.84	6.84	6.84	6.84	6.84	6.84	6.84	6.84	6.84	
FUEL & OIL		2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	
ELECTRICITY		5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	
INLAND FREIGHT		1.01	1.01	1.01	1.01	1.15	1.15	1.17	1.29	1.29	1.29	
OTHER EXPENSES		12.38	12.38	12.38	12.38	12.38	12.38	12.38	12.38	12.38	12.38	
SHIP LOADING		0.65	0.65	0.65	0.65	0.74	0.74	0.75	0.82	0.82	0.82	
DEPRECIATION		14.24	14.37	15.43	15.68	15.75	16.74	17.59	7.37	7.27	6.23	
INTEREST		2.31	0.97	0.43	0.38	0.33	0.28	0.23	0.18	0.13	0.08	
PROFIT BEFORE TAX		11.84	13.05	12.53	12.33	18.39	17.45	18.39	41.43	41.58	42.67	
(LESS) INCOME TAX		5.92	6.52	6.26	6.16	9.20	8.73	9.19	20.71	20.79	21.34	
PROFIT AFTER TAX		5.92	6.52	6.26	6.16	9.20	8.73	9.19	20.71	20.79	21.34	
(LESS) DIVIDEND		5.33	5.87	5.64	5.55	8.28	7.85	8.27	18.64	18.71	19.20	
(LESS) DIVIDEND TAX		0.59	0.65	0.63	0.62	0.92	0.87	0.92	2.07	2.08	2.13	
PROFIT AFTER TAX & DIVIDEND		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

** CASE 1 **

INCOME STATEMENT (3.1)

2004 2005 2006 0

PRODUCTION

ORE PRODUCTION	6300.00	6300.00	6300.00	12425.00
COPPER GRADE	0.84	0.83	0.83	14.65
CONCENTRATE	171.10	170.00	170.00	3008.39
COPPER	97.58	98.68	98.68	1643.15
GOLD	18.15	18.04	18.04	319.19
SILVER	319.02	316.86	316.86	5609.05

REVENUE	78.63	79.50	79.50	1324.61
NET REVENUE	84.35	84.35	84.35	1410.27
COPPER: NET REVENUE	78.06	78.94	78.94	1314.52
GROSS REVENUE	97.58	98.68	98.68	1643.15
(LESS) T/C R/C	19.74	19.74	19.74	328.63
GOLD: NET REVENUE	3.62	3.59	3.59	63.60
SILVER: NET REVENUE	1.83	1.82	1.82	32.15
(LESS) MARINE INSURANCE	0.20	0.20	0.20	3.35
(LESS) OCEAN FREIGHT	4.68	4.65	4.65	82.31
EXPENDITURE	35.48	35.29	34.02	891.68
OPERATING COSTS	28.82	28.82	28.82	568.19
SALARIES & WAGES	6.84	6.84	6.84	136.88
FUEL & OIL	2.49	2.49	2.49	49.09
ELECTRICITY	5.82	5.82	5.82	114.97
INLAND FREIGHT	1.29	1.28	1.28	22.68
OTHER EXPENSES	12.38	12.38	12.38	244.56
SHIP LOADING	0.82	0.82	0.82	14.49
DEPRECIATION	5.80	5.65	4.38	239.12
INTEREST	0.04	0.01	0.00	69.89
PROFIT BEFORE TAX	43.14	44.21	45.49	432.92
(LESS) INCOME TAX	21.57	22.10	22.74	216.46
PROFIT AFTER TAX	21.57	22.10	22.74	216.46
(LESS) DIVIDEND	19.41	19.89	20.47	194.81
(LESS) DIVIDEND TAX	2.16	2.21	2.27	21.65
PROFIT AFTER TAX & DIVIDEND	0.0	0.00	0.00	0.00

2-4 An Estimation of Future Economic Indicators and the Significance of the Petaquilla Copper Mining Development

After a number of trial balances, the policy selected was to maintain increases in government investment of 2% p.a. up to 1983 and 5% p.a. from 1984 onwards. The results are summarized in Table V-2-7.

The policy adopted generally satisfies the restrictions. Thus, the ratio of growth in balance payments' deficit to growth in government investment is 1.1 and the maximum debt service ratio is 62.8 (in the year 2000).

Items showing growth in a ratio in excess of 1.0 to growth in government investment are total debt (1.3), new borrowing (1.1) and deficits of balance of payments (1.1). Items for which the ratio was less than one are private investment (0.3), employment (0.3), GDP (0.6), government revenue (0.7), imports (0.9), unemployment (0.9) and government expenditure (0.9). The ratio for principal repayment and interest is 1.0.

There is a certain amount of fluctuation in the debt service ratio, between 48.8% in 1980 and 62.8% in 2000. The general trend, however, was simple growth.

It is obvious from these facts that the policy adopted is not guaranteed absolutely to bring about sound development in the Panamanian economy. Our reasons for winding up policy studies in spite of this are described below:

- a) It is considered that the general trend from now on in the balance of supply and demand for oil will be towards a stronger position for the suppliers, and hence firmer prices.
- b) Industrial nations will from now on shift the high price of oil as a raw material onto the price of their

products. This will result in a vicious circle with oil prices, leading to a basic trend of inflation in the world economy.

- c) If this basic trend of inflation is accepted, some manipulation will be necessary when evaluating results, even though calculations in this model are all based on the 1975 value of dollar.
- d) Thus, when money borrowed in 1975 is repaid in 1980, it means that it is borrowed at 1975 values and repaid at 1980 values. Repayments at 1980 values, therefore, need to be discounted back to 1975 values. In this sense, the output of this model exaggerates debts.
- e) In other words, if inflation is to be taken into account in ceilings set at fixed values, these should be reset higher by the extent of inflation.
- f) In conclusion, if one takes the point-of-view that the inflation structure has become established, it is clear when the scenarios are studied that a high-growth policy is desirable for public finances, except for the inherent disadvantages of growth in the deficit of balance of payments. It would be fair to say, therefore, that the wisest course would be to continue to follow a policy of high growth within the limits tolerated by the balance of payment situation.
- g) The point at which the deterioration in the balance of payment becomes equal to depreciation of the dollar resulting from inflation may be regarded as being the maximum tolerable limit of deterioration.
- h) The same can be said of the debt service ratio. Thus, the fact that a ceiling of 60% in real terms has been set means that when depreciation of past debt resulting from inflation is taken into account, a figure in excess of 60% can be tolerated as output from the model.

Table V-2-7 Simulation Results (Scenario)

	GDP	Balance of payment (deficit)	Imports	Private investment	Employment	Unemployment	Government revenue	Government expenditure	New borrowing	Principal payments & interest	Total debt	Debt service ratio (maximum)
Average growth rate (%) (1980 - 2000)	2.9	5.1	4.2	1.3	1.2	4.0	3.3	3.9	4.8	4.6	5.9	62.8
Ratio to growth in government investment	0.6	1.1	0.9	0.3	0.3	0.9	0.7	0.9	1.1	1.0	1.3	
Ratio to growth in GDP	1.0	1.8	1.4	0.4	0.4	1.4	1.1	1.3	1.7	1.6	0.4	
Ratio to growth in principal payments & interest	0.6	1.1	0.9	0.3	0.3	0.9	0.7	0.8	1.0	1.0	1.3	
Ratio to growth in total debt	0.5	0.9	0.7	0.2	0.2	0.7	0.6	0.7	0.8	0.8	1.0	

Source: Survey Mission

This study does not take the Cerro Colorado copper mining development into account.

We explain the case in which the Petaquilla copper mining development takes place. The procedure followed will be an explanation of the devices incorporated and figures used in the model, an introduction of the results of the calculations, and a clarification of the effects of the development based on a comparison with a case in which the development does not take place.

The items in which there is a relationship between the development work and the model are employment, imports, exports, added value (GDP) and tax revenue. Figure V-4-1 shows that employment is determined by population and the GDP. As has already been stated, a very large number of workers would be employed for construction work when the project was initiated. However, it is inconceivable that the project itself would have an extremely unusual employment structure compared to other general industries in Panama. Thus, the employment figures produced by the model using GDP figures which include production from this venture are regarded as including the employment figures for this project.

Imports are determined by GDP. However, since the volume of imports for the project in question shows a widely differing pattern from that of Panamanian industries in general, we calculated imports using GDP figures which did not include production from this project. The imports for the project in question were then fed in separately and added in. The input figure for exports was used unchanged, and the exports from the project were simply added on outside the model. At the same time, the internally generated increase in imports, which results from growth in the GDP because of the Petaquilla project, was amended and subtracted using manual calculations.

The added value of the venture will be added to the GDP immediately after the calculation of the GDP inside the model.

Tax revenue was calculated as the increase in every type of tax affected directly or indirectly by increases in the GDP resulting from this project.

The figures which will actually be fed in have been summarized from the results of the financial analysis and set out in Table V-2-8. Also, studies hitherto have only gone as far as the year 2000 because of such questions as the type of predicted values available, but the Petaquilla mine is scheduled to operate until 2006. The following calculations, therefore, will cover up to the year 2006.

With regard to input figures: exports are calculated on a FOB basis from the output of the financial analysis; import figures are based on planning by Panama Mineral Resources Development Co., Ltd.; added value is the total of wages and salaries, depreciation, interest and profits before tax as shown in the financial analysis.

The important indicators among the results of calculations based on the scenario, and which have been clarified by our studies hitherto, are the GDP, the balance of payment and the debt service ratio. Table V-2-9 compares the case in which the Petaquilla project takes place with the case in which it does not, by showing these indicators, with the addition of employment figures, for each case. Also, it should be understood that the differences between the two cases were included in Table V-2-9 as absolute values to meet the requirement for knowledge of the effects in terms of absolute amounts.

Table V-2-8 Effects of the Petaquilla Mining Development

Unit: \$10³ (1975 values)

Year	Exports	Imports	Added value	Comments
1978	0	0	0	
79	0	0	0	
80	0	0	0	
81	0	0	0	
82	0	0	0	
83	0	0	0	
84	0	9027	25000	Commencement of preparations for development
85	0	17475	45175	
86	0	30199	55650	
87	37205	8538	22540	Year in which full-scale operations begin
88	59255	10287	39463	
89	58634	11736	38859	
90	56149	11059	36444	
91	56910	12390	37188	
92	55405	14953	35718	
93	50383	12568	30818	
94	50383	12576	30826	
95	50383	18458	30826	
96	50383	14119	30826	
97	50383	12184	30826	
98	55904	11812	36146	
99	55904	10725	36146	
2000	57452	13423	37669	
1	68801	13180	48843	Commencement of the Botija development
2	68801	12711	48843	
3	68801	12655	48843	
4	68801	12578	48843	
5	69563	10533	49621	
6	69563	10533	49621	Final year of operation

Source: Survey Mission

Table V-2-9 Simulation Results (Scenario, with and without Project)

	GDP (\$10 ⁶)			Balance of Payment (\$10 ⁶)			Employment (\$10 ³ people)			Debt service ratio (%)		
	With	Without		With	Without		With	Without		With	Without	
		Effect			Effect			Effect			Effect	
1984	2338.0	2314.3	23.7	-182.7	-157.4	-25.3	516.6	514.7	1.9	56.0	57.1	1.1
85	2452.1	2385.3	66.8	-240.4	-172.2	-68.2	527.1	521.4	5.7	54.9	57.9	3.0
86	2553.5	2457.5	96.0	-290.4	-185.9	-104.5	536.2	528.0	8.2	54.4	58.4	4.0
87	2576.5	2525.6	50.9	-203.5	-194.3	-9.2	538.3	534.2	4.1	57.2	59.2	2.0
88	2584.2	2591.6	-7.4	-141.4	-199.4	58.0	539.1	540.0	-0.9	60.7	60.0	-0.7
89	2641.5	2662.6	-21.1	-139.5	-206.7	67.2	544.1	546.3	-2.2	62.0	60.7	-1.3
90	2764.9	2743.6	21.3	-188.9	-220.3	31.4	554.8	553.3	1.5	60.3	60.9	0.6
91	2911.0	2833.2	77.8	-253.1	-238.7	-14.4	566.9	561.0	5.9	58.0	60.8	2.8
92	3015.5	2924.8	90.7	-284.8	-256.3	-28.5	575.4	568.6	6.8	57.7	60.9	3.2
93	3055.7	3013.3	42.4	-261.4	-269.0	7.6	578.8	575.8	3.0	59.9	61.2	1.3
94	3081.9	3100.6	-18.7	-221.6	-278.4	56.8	580.9	582.8	-1.9	62.8	61.7	-1.1
95	3162.3	3193.8	-31.5	-228.8	-290.4	61.6	587.3	590.2	-2.9	63.6	62.0	-1.6
96	3314.8	3297.9	16.9	-281.7	-309.0	27.3	599.1	598.3	0.8	61.8	62.2	0.4
97	3489.5	3411.6	77.9	-352.0	-332.5	-19.5	612.2	606.9	5.3	59.7	62.0	2.3
98	3623.9	3528.3	95.6	-383.3	-355.4	-27.9	622.1	615.6	6.5	59.3	62.1	2.8
99	3695.6	3643.2	52.4	-365.6	-373.8	-8.2	627.3	624.0	3.3	61.0	62.3	1.3
2000	3751.2	3758.2	-7.0	-334.5	-389.5	55.0	631.3	632.3	-1.0	63.3	62.8	-0.5
1	3867.6	3880.1	-12.5	-336.5	-407.9	71.4	639.5	640.9	-1.4	63.9	63.2	-0.7
2	4055.5	4014.2	41.3	-404.4	-433.1	28.7	652.5	650.2	2.3	62.4	63.3	0.9
3	4259.7	4159.2	100.5	-482.3	-463.8	-18.5	666.1	660.0	6.1	60.9	63.4	2.5
4	4414.5	4308.5	106.0	-516.8	-494.1	-22.7	676.2	669.9	6.3	61.0	63.5	2.5
5	4510.7	4457.6	53.1	-497.4	-520.6	23.2	682.4	679.6	2.8	62.9	63.9	1.0
6	4603.1	4608.3	-5.2	-474.3	-544.6	70.3	688.3	689.2	-0.9	64.9	64.5	-0.4

Source: Survey Mission

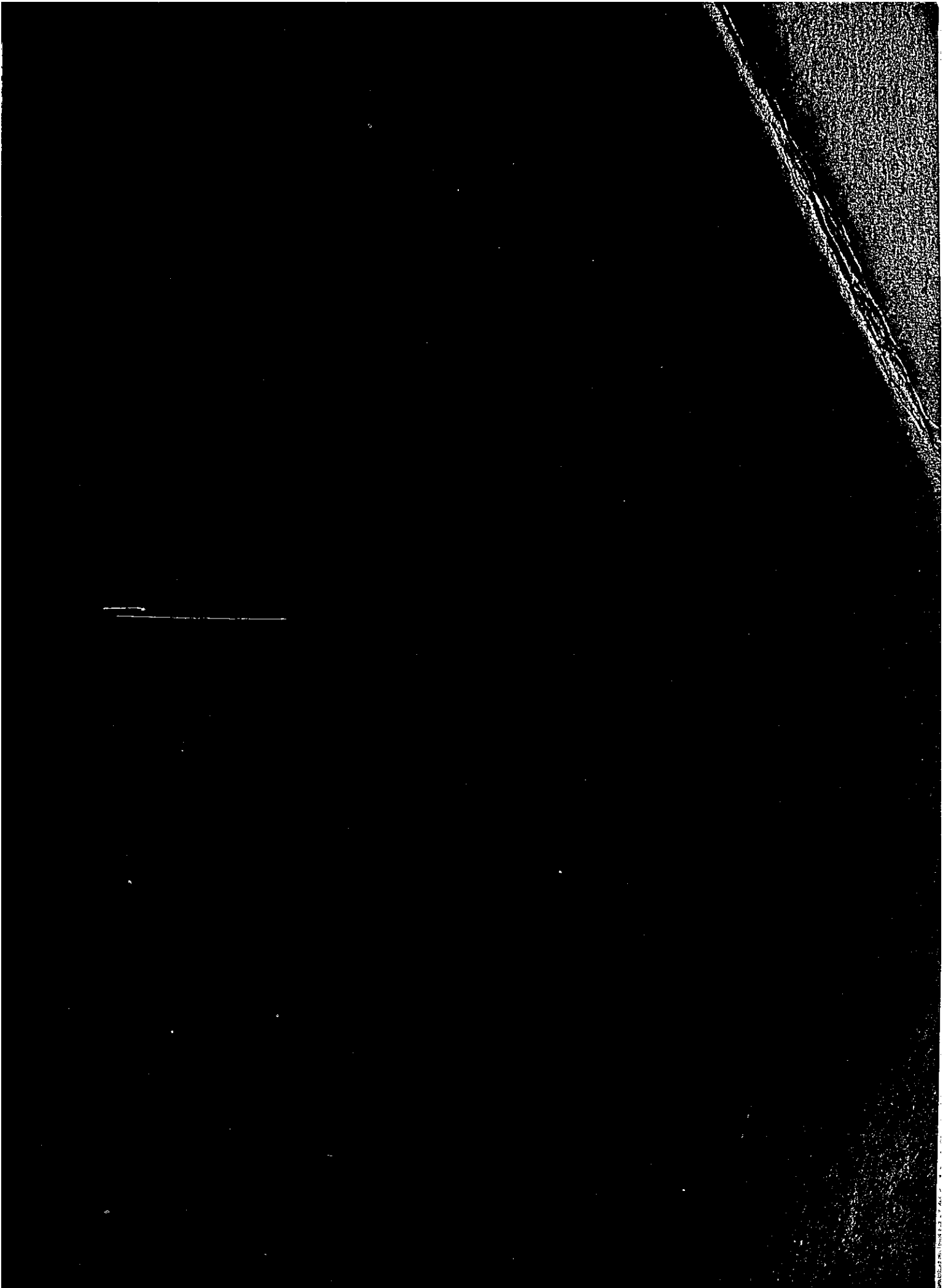
We use Table V-2-9 to examine changes in the GDP differential over a 20-year period. The average yearly increase in GDP resulting from the Petaquilla copper mining development over the 23-year period (including 3 years for construction) is \$39.6 million. There are 7 years in which the effect appears as a liability. This is a fluctuation resulting from the fact that private investment is calculated as 1.05049 times the difference between the GDPs of the two previous years (see appendix). In other words, since the increase in GDP resulting from the Petaquilla copper mining development changes in steps, the figure for private investment also shows a discreet change in the following year. On the other hand, since private investment influences the GDP, the overall GDP tends to decline in the first or second year after a year in which the increase in the GDP resulting from the Petaquilla development has appeared as a liability. Taken as an average over the 23-year period, however, such fluctuations can be ignored.

The balance of payment shows an average annual improvement of \$9.2 million over the 23-year period. This represents approximately one quarter of the increase in the GDP. The total effect comes to \$211.6 million.

The aggregate effect on employment figures comes to 2,578 persons per year. This is considerably in excess of the 1,832 people estimated in earlier sections as being the number employed directly and indirectly. This may be regarded as being caused by the existence of a circular phenomenon in which increases in the GDP of the previous year cause expansion in private and government investment, leading to increased employment. However, when the question is considered over a number of years, a larger effect becomes apparent.

The debt service ratio shows an average improvement of 1.1%. The ratio of this improvement effect to the debt service ratio in the case where the Petaquilla development does not take place is 0.018. The same calculation for the external accounts yielded a figure of 0.029 of approximately 2/3 of this.





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