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8 Bolivia: From Stabilization to What?

Federico A. Sturzenegger

8.1 Introduction

Bolivia is a landlocked and sparsely populated nation of South America. With an area the size of the United Kingdom, Germany, and France combined, Bolivia had by 1989 a population of only 7 million. The country is divided into three clearly differentiated geographical areas. The western portion of the country is a flat plateau at 12,600 feet above sea level. This area is mineral-rich and historically has been the political and economic center of the country. Known as the *altiplano,* this region includes the departments of La Paz, Oruro, and Potosí. East of the altiplano lies the *valles* (valleys), an intermediate region between the high Andean ridge and the *precordillera.* At 8,500 feet above sea level the area is rich in agricultural products and comprises the departments of Cochabamba, Chuquisaca, and Tarija. This region also contains the famed region of the Chaparé, one of the best in the world for the production of coca leaf. As a consequence this region has recently been a strong receptor of population, particularly from the altiplano (see Pereira, Montano, and Calle 1991). Finally, east of the valles lies the extensive (and mainly still unexploited) area of the lowlands, or *llanos.* With a thriving economic center at Santa Cruz, this area has increasingly become a major economic and political center for the country. The extensive department of Santa Cruz, together with the northern, selvatic, cattle-growing regions of El Beni and Pando, conform this region.

Table 8.1 shows Bolivia's interregional disparities and underscores two im-

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Table 8.1 **Bolivia's Regional Disparities**

Region	GNP (% of total)	GNP/L (US $)	Urban GNP (US $)
La Paz	26.0	545	896
Santa Cruz	24.9	872	1036
Cochabamba	17.8	767	1332
Potosí	7.0	366	972
Chuquisaca	7.0	603	1714
Oruro	5.9	685	1119
Tarija	5.9	937	1549
El Beni	4.6	752	529
Pando	0.9	839	3748

Source: Ministerio de Planeamiento y Coordinación (1989).

portant characteristics of the Bolivian economy. First, Bolivia remains a very poor country. With a per capita income of US$630 in 1990, it ranked lowest among all South American economies. Second, Bolivia presents striking income disparities across regions. Notice from table 8.1 that the intraregional disparity in income is substantially lower than the interregional differences. While these disparities have found response in labor migration, the economy remains to some extent segmented along the lines of its geographical division. This of course is fundamental in evaluating the ability of the economy to adjust to shocks.

Bolivia has been, and to a great extent still is, a mining country. Development of mining products is among the main reasons both Incas and Spaniards were interested in the region. An analysis of productivity and growth potential can by no means be separated from the mining issue. Mining has historically been the main source of foreign exchange and savings for the country, a point first emphasized by Eder (1968). Not surprisingly, the recent collapse in Bolivia's mineral markets has had a major impact on Bolivia's economy.

Bolivia also brings to mind political instability, with twenty-one presidents since 1952. Between 1979 and 1982, nine presidents held office, a mere 4-month average tenure! Even the period between 1960 and 1980, which is considered a period of relative political tranquility, experienced eight coups and thirteen presidents. In section 8.2 I will show that the econometric link between political instability and growth is weak. Still I argue that this will not be enough to disregard the role of political instability as detriment to growth.

More recently, Bolivia has become an important coca-producing country with a large sector of the economy completely separate from that of the formal (and legal) economy. Samuel Doria Medina (1986) estimates for 1985 that the informal GNP was actually larger than that of the formal sector. He estimates an informal GNP of US$3,147 million, while that of the formal sector was

$3,055 million.[1] He also finds that the total and relative importance of coca production was growing very significantly until the end of the study in 1985. While in 1980 the value added associated with the production of cocaine was $353 million, by 1985 this figure had reached US$2 billion. Considering that the price of cocaine has fallen by half during the same period, it is clear that there has been a strong shift in factors of production (land, capital, and labor) toward this sector during the last decade. If the informal sector of the economy remains rather constant, at least for some computations, one could presume that use of the formal sector data should not strongly bias the results. Unfortunately, this presumption is not necessarily true. An increase in the inflation rate, for example, is a major incentive to avoid the formal sector, usually characterized by longer contracting periods and payment intervals. Below I try to adjust for this component where I think that misleading results would otherwise obtain. Unfortunately, lack of reliable data requires making heroic assumptions.

In summary, any analysis of Bolivia's growth performance has to cope with these issues: the role of mining, the low level of income, the role of political instability, and coca production and the informal sector. I study, first, the growth experience since the early 1950s. I try to uncover the driving forces of growth in Bolivia and then, from understanding such forces, to derive implications for future policy action.

Bolivia is a country of paradoxes. These go beyond geographical contrasts to the reign of politics, its interplay with macroeconomics and growth. After the Chaco war of the 1930s, the country entered an economic slide that triggered in the early 1950s a revolutionary movement with a socialist orientation, led by the Movimiento Nacional Revolucionario (MNR) and headed by the *caudillos* Victor Paz Estenssoro and Hernán Siles Zuazo. The revolution came to power with a clear socialist platform, implemented an agricultural reform, and nationalized mining production. Victor Paz Estenssoro was appointed president and immediately embarked on an expansionist spending program. Only a few years later the country was in a situation of increasing inflation and general economic disorder.[2] Hernán Siles Zuazo, sworn in as president in 1956, in order to cope with inflation implemented a very strict fiscal austerity and rationalization program, which with external supervision quickly put inflation under control. These reforms were the prelude to a long period of stability and high growth, which lasted until the early 1980s.

The late 1970s and early 1980s saw the collapse of a boom in mineral prices, which had allowed Bolivia to increase its standard of living significantly. The fall in the international price of tin was closely followed by the onset of the

1. The Doria Medina estimate is considered to be, at best, an upper bound for the amount of coca production. I discuss this issue in detail below.

2. See Eder (1968) for an incisive account of both the economic reality and policy making in Bolivia during this period.

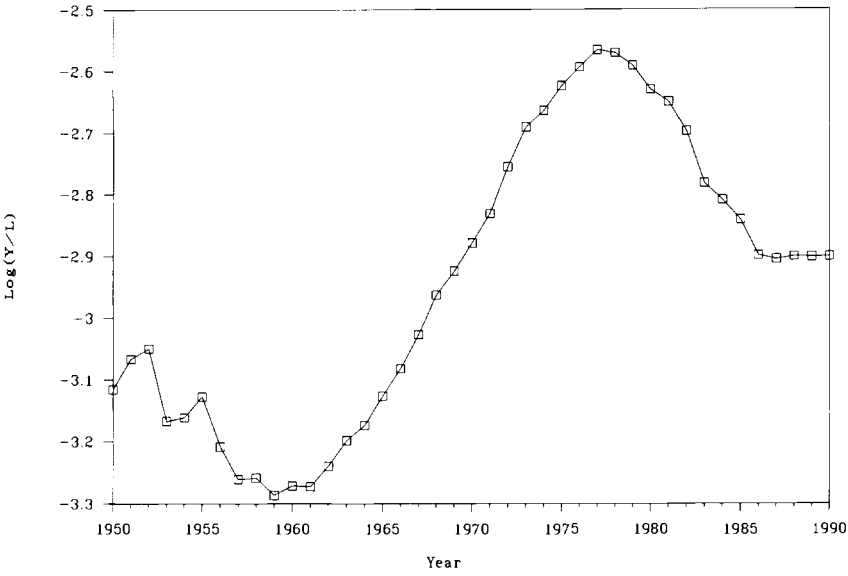

Fig. 8.1 Output per capita
Source: Data from Juan Antonio Morales, based on information provided by Banco Central de Bolivia and Instituto Nacional de Estadísticas.

international debt crisis. With increased impoverishment of the economy, the political struggle and the redistributive conflict intensified so that the military delegated power to a democratically elected government. The new democratic regime, headed once again by Hernán Siles Zuazo, was responsible for dealing with the strong adjustment that international markets were imposing on the Bolivian economy. Unfortunately, in spite of six stabilization attempts during his presidency (see Morales 1988), the underlying causes of Bolivian inflation were not tackled. This eventually resulted in the most traumatic experience of Bolivian modern history, as the economy hit hyperinflation by mid-1985. Hyperinflation created the consensus for a broad reform program that, in a reversal of roles from the 1950s, was this time put forward by Victor Paz Estenssoro.[3] The set of policies implemented and known as "new economic policy" (NEP) are well known (see Morales 1991; Morales and Sachs 1989) to have quickly brought inflation and fiscal accounts under control.

Figures 8.1 and 8.2 show (in log scale) output per capita for Bolivia from 1950 to 1990. Figure 8.1 contains official data only. Figure 8.2 has been adjusted to include the product of Bolivia's cocaine sector. The size of Bolivia's cocaine sector has been estimated for the period 1980–85 (Doria Medina

3. To understand why hyperinflation induces the political consensus for reform, see Labán and Sturzenegger (1992a, 1992b).

Fig. 8.2 Output per capita (informal sector added)
Sources: Data from Juan Antonio Morales, based on information provided by Banco Central de Bolivia and Instituto Nacional de Estadísticas; Doria Medina (1986).

1986). We have assumed that this product was zero prior to 1980 and constant at the 1985 level for years after 1985. Regarding this last assumption, work by Gutierrez and Pando (1989) suggests that the production of coca leaf has remained constant or has slightly declined. Godoy and De Franco (1990) suggest values for 1985 production similar to those of Doria Medina. Serious discrepancies arise in evaluating the value of this production. Doria Medina uses the price of cocaine hydrochlorate, though data from the National Narcotics Intelligence Consumer Committee (NNICC 1989) suggest that only 15% of coca paste is transformed into cocaine hydrochlorate in Bolivia itself (most of this process takes place in Colombia). Godoy and De Franco use instead the price of coca paste and obtain estimates roughly one-third of the Doria Medina estimates for 1987–89. I have used the Doria Medina numbers because they constitute a clear upper bound to the estimate range.

Both figures 8.1 and 8.2 show that the 1950s are characterized by a fall in real income induced by the social and political convulsion that characterized the Bolivian economy during this period. Civil war in 1952 brought the MNR to power. Both 1955 and 1956 were years of extreme inflation, the rest of the decade being dominated by a strict austerity program. The country then experienced steady growth from the early 1960s to the early 1980s. Growth halted in the 1980s as prices of tin collapsed, the debt crisis started, and inflation picked up. The stabilization attempt of 1985 was considered a major step to-

ward recovering growth. As shown by the two graphs, this hope has not been validated by the facts; this paper examines why.

In section 8.2 I review the main factors contributing to Bolivia's economic growth. In section 8.3 I take the main elements identified in the empirical analysis and develop a model that I hope provides a unifying framework for the discussion of terms of trade, real exchange rates, optimal taxation, and coca production and its relation to growth. In section 8.4 I discuss the theoretical and empirical relation between inflation and growth. In section 8.5 I discuss the relation between structural reform and poststabilization productivity. After computing productivity for specific industrial sectors for the poststabilization period, I conclude that improvement in productivity has been sluggish. In section 8.6 I discuss other possible explanations for Bolivia's recent poor growth performance, a puzzling result given that it constitutes a "model" case of fiscal austerity and market liberalization. Section 8.7 contains some policy conclusions that can be derived from the paper.

8.2 Sources of Growth

In this section I identify the main sources for Bolivia's growth performance by looking at the evolution of productivity. In order to study the performance of productivity I compute the total factor productivity (TFP) for Bolivia for the period 1950–90. While data are available for measures of the capital stock (see Huarachi 1988) and for population,[4] information on factor shares in unavailable. I perform the computation by estimating the shares as in Griliches and Ringstad (1971).[5] I assume that there exists a production function with constant elasticity of substitution and possible nonconstant returns to scale; that is,

$$Y = B[\delta K^{-\rho} + (1 - \delta)L^{-\rho}]^{\frac{\mu}{\rho}}, \tag{1}$$

where B is an aggregate productivity parameter, K is capital stock, L is employment, μ represents the elasticity of scale, and $\sigma = 1/(1 + \rho)$ is the elasticity of substitution. In order to estimate this production function, Griliches and Ringstad suggest taking a second-order Taylor expansion around $\rho = 0$ for a log version of equation (1). This gives the equation

$$\ln(Y/L) \cong a_0 + a_1 \ln \mathrm{L} + a_2 \ln(K/L) + a_3 \ln(K/L)^2. \tag{2}$$

From (2) we can obtain estimates for the elasticity of output with respect to both factors, labor and capital. a_1 is a measure of increasing returns to scale. Estimates of (2) turned out to be very unstable for the sample periods considered. For the sample 1950–87, equation (2) gives the following result for the official data:

4. Population data are available for the whole sample. The labor force was computed from estimates obtained from census data, interpolating for the intermediate years.

5. The particular formalization used here allows for nonconstant returns to scale as discussed in Dollar (1988) and Wang (1990).

$$(3)\quad \ln(Y/L) \cong \underset{(0.14)}{-5.06} + \underset{(0.16)}{0.49 \ln L} + \underset{(7.33)}{3.43 \ln(K/L)} + \underset{(1.70)}{0.57 \ln(K/L)^2},$$

where standard errors are shown in parentheses. As can be readily observed from the standard errors, the coefficients on ln (K/L) are very imprecisely estimated.

For the data including the informal section I use only the Cobb-Douglas specification ($a_3 = 0$). Estimation gives

$$(4)\quad \ln(Y/L) \cong \underset{(0.11)}{-9.84} + \underset{(0.10)}{0.65 \ln L} + \underset{(0.17)}{1.02 \ln(K/L)}.$$

Notice that the estimates in (4) are favorable to "endogenous growth" theories, indicating the presence of increasing returns to scale and an almost constant capital-output ratio.[6] From (3) and (4) we can compute the elasticities with respect to capital and labor as $\varepsilon_K = a_2 + 2a_3 \ln(K/L)$ and $\varepsilon_L = (a_1 + 1 - a_2) - 2a_3 \ln(K/L)$. And from these we can compute the factor shares as

$$(5)\quad \alpha = \frac{\varepsilon_K}{\varepsilon_K + \varepsilon_L},$$

and

$$(6)\quad \beta = 1 - \alpha.$$

An estimate of TFP is then obtained from[7]

$$(7)\quad TFP = \frac{Y}{K^{\alpha}L^{\beta}}.$$

These estimates for the elasticities (α and β) and *TFP* (TFP_2 corresponds to the data that include the informal sector) are presented in the last four columns of Table 8.2. The table also shows data for the capital/labor ratio (ln(K/L)), employment (ln(L)), output per capita (ln(Y/L), official data), and the growth rates of output per capita (both for the official data [γ_1] and with the informal sector [γ_2]). TFP estimates are plotted in figures 8.3 and 8.4. The estimates obtained assign a share to capital of between 55 and 80% for the official data case, and of 62% for the data including the informal sector.[8]

Figures 8.3 and 8.4 indicate a very clear pattern, with an upward swing in productivity that culminates in the early 1980s. Since then the two graphs disagree, as one omits the effect of the informal economy. The official figures suggest a drastic collapse in the productivity of the Bolivian economy, down by 35% since 1979. Figure 8.4 suggests, on the contrary, a stagnant profile for productivity, though with an important fall during the first half of the 1980s.

6. See, among others, Romer (1986); Rebelo (1991); Lucas (1988); Jones and Manuelli (1990). For a comprehensive survey see Sala-i-Martin (1990a, 1990b).

7. Use of the Cobb-Douglas specification is appropriate as long as we could not reject the hypothesis that $a_3 = 0$.

8. Certainly my measure of TFP may have several biases. Most important, human capital has been patently excluded from the estimation and therefore is subsumed in the residual term.

Table 8.2 **Total Factor Productivity and Sources of Growth**

Year	Ln(K/L)	Ln(L)	Ln(Y/L)	γ_1	γ_2	α	β	TFP	TFP_2
1950	−2.15	13.80	−3.12			0.66	0.34	0.18	0.17
1951	−2.15	13.81	−3.07	.05	.05	0.66	0.34	0.19	0.18
1952	−2.15	13.83	−3.05	.02	.02	0.66	0.34	0.19	0.18
1953	−2.17	13.85	−3.17	−.12	−.12	0.64	0.36	0.17	0.16
1954	−2.19	13.86	−3.16	.01	.01	0.63	0.37	0.17	0.16
1955	−2.18	13.88	−3.13	.03	.03	0.63	0.37	0.17	0.17
1956	−2.18	13.90	−3.21	−.08	−.08	0.63	0.37	0.16	0.16
1957	−2.19	13.92	−3.26	−.05	−.05	0.63	0.37	0.15	0.15
1958	−2.21	13.94	−3.26	.00	.00	0.61	0.39	0.15	0.15
1959	−2.24	13.96	−3.29	−.03	−.03	0.59	0.41	0.14	0.15
1960	−2.26	13.99	−3.27	.02	.02	0.57	0.43	0.14	0.15
1961	−2.29	14.01	−3.27	−.00	−.00	0.55	0.45	0.13	0.16
1962	−2.30	14.03	−3.24	.03	.03	0.54	0.46	0.14	0.16
1963	−2.30	14.05	−3.20	.04	.04	0.54	0.46	0.14	0.17
1964	−2.31	14.08	−3.17	.02	.02	0.54	0.46	0.14	0.17
1965	−2.31	14.10	−3.13	.05	.05	0.54	0.46	0.15	0.18
1966	−2.35	14.12	−3.08	.04	.04	0.50	0.50	0.15	0.20
1967	−2.34	14.13	−3.03	.06	.06	0.51	0.49	0.16	0.21
1968	−2.30	14.13	−2.96	.06	.06	0.54	0.46	0.18	0.21
1969	−2.28	14.14	−2.92	.04	.04	0.55	0.45	0.19	0.22
1970	−2.26	14.15	−2.88	.05	.05	0.57	0.43	0.20	0.23
1971	−2.22	14.15	−2.83	.05	.05	0.60	0.40	0.22	0.23
1972	−2.18	14.16	−2.75	.08	.08	0.64	0.36	0.25	0.24
1973	−2.15	14.16	−2.69	.06	.06	0.66	0.34	0.28	0.26
1974	−2.10	14.18	−2.66	.03	.03	0.69	0.31	0.30	0.26
1975	−2.07	14.20	−2.62	.04	.04	0.72	0.28	0.32	0.26
1976	−2.04	14.23	−2.59	.03	.03	0.74	0.26	0.34	0.26
1977	−2.00	14.25	−2.57	.03	.03	0.77	0.23	0.36	0.26
1978	−1.95	14.27	−2.57	−.00	−.00	0.81	0.19	0.37	0.26
1979	−1.92	14.30	−2.59	−.02	−.02	0.83	0.17	0.37	0.25
1980	−1.93	14.32	−2.63	−.04	.03	0.82	0.18	0.35	0.26
1981	−1.94	14.35	−2.65	−.02	−.02	0.82	0.18	0.35	0.25
1982	−1.96	14.37	−2.70	−.05	−.11	0.80	0.20	0.32	0.23
1983	−1.99	14.39	−2.78	−.09	−.03	0.78	0.22	0.29	0.23
1984	−2.01	14.42	−2.81	−.03	−.01	0.76	0.24	0.28	0.23
1985	−2.04	14.44	−2.84	−.03	.06	0.74	0.26	0.27	0.25
1986	−2.07	14.47	−2.90	−.06	.04	0.71	0.29	0.24	0.26
1987	−2.10	14.50	−2.90	−.01	−.03	0.70	0.30	0.24	0.26
1988	−2.12	14.52	−2.90	.00	−.01	0.68	0.32	0.23	0.26
1989	−2.10	14.55	−2.90	−.00	−.01	0.70	0.30	0.24	0.25
1990	−2.09	14.57	−2.90	.00	−.01	0.70	0.30	0.24	0.25

Sources: Capital stock from Huarachi (1988). Population from International Financial Statistics and census data. Output from Banco Central de Bolivia and Instituto Nacional de Estadísticas.

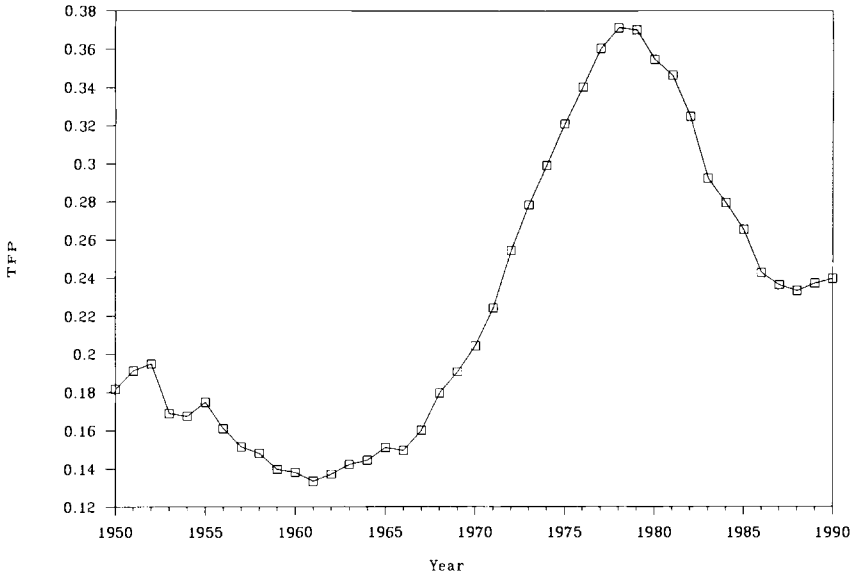

Fig. 8.3 Total factor productivity

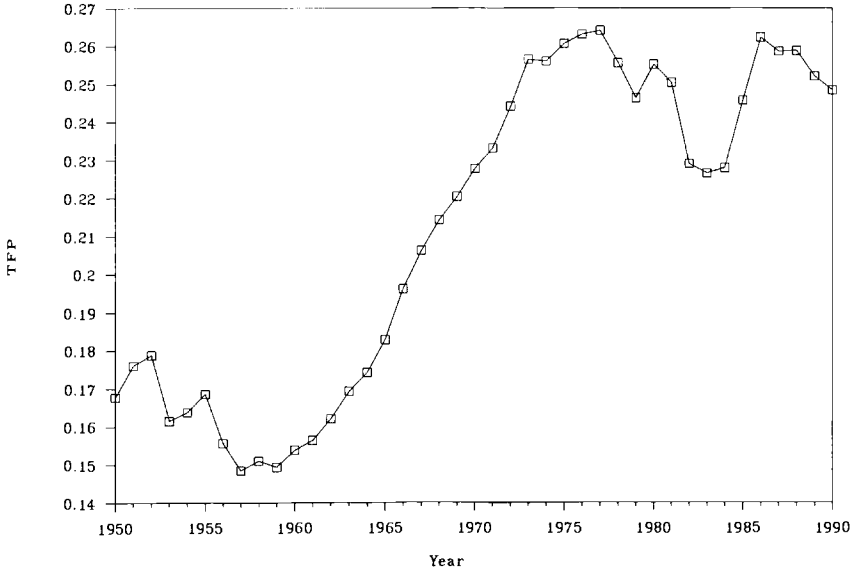

Fig. 8.4 Total factor productivity (informal sector added)

The figure suggests that the 1985 stabilization brought productivity back to the values observed at the beginning of the 1980s.

In trying to understand the sources of productivity, several variables are clearly relevant. Since TFP for Bolivia is a stationary series (an augmented Dickey-Fuller test [three lags] gives a coefficient of −3.35, which clearly rejects the hypothesis of unit root), standard econometric techniques are appropriate in this case. In particular for the period 1954–90 and the official data, the following regression is performed:[9]

$$\underset{(6.83)}{TFP = 0.1281} \underset{(-2.23)}{- 0.0001\pi} \underset{(2.16)}{+ 4.6E - 9\pi^2} \underset{(6.92)}{+ 0.0004Tin} + \underset{(0.39)}{0.0002Zinc} \underset{(-1.19)}{- 0.0076PI}.$$

The first three variables, the inflation rate, the inflation rate squared, and the dollar price of tin, are significant, as indicated by their corresponding serial-correlation robust Newey-West *t*-statistics. The dollar price of zinc together with political instability (*PI*, understood as the number of changes in executive power during a given year), while of correct sign, have no significant effect on productivity.[10] Inflation has had a negative effect on productivity; increases in the price of tin and zinc have increased productivity. As expected, the coefficient on inflation is negative and that on inflation squared is positive, indicating that the costs of inflation do not increase as quickly once inflation has risen to high levels. R^2 equals 81%, so that a substantial portion of the movements in productivity are accounted for by these few variables.[11]

I do not find the insignificance of the *PI* dummy to be very revealing. First, it is clear that the political turmoil of the early 1950s and 1980s was associated with poor growth performance. Second, most of the effects of the *PI* variable may be colinear with the inflation rate, as both high inflation and political turmoil come together. Finally, it is difficult to capture the notion of political instability with a set of dummies in a time series approach. Cross-section growth models have certainly found important effects of many political variables on growth performance. I therefore conclude that, in spite of the result,

9. The inclusion of a trend variable proved insignificant.

10. Regressions were also performed using a political instability dummy that takes a value of 1 only when the change in executive power leads to a change in policy; that is, the new power is ideologically different than the previous one. The results were similar.

11. The strong effect of the price of Bolivia's main exports on productivity requires an explanation. An example may illustrate the relevant issue. Imagine an economy that produces only an internationally traded export: $X = F(K_t, L_t)$ valued at price p_{x_t} in international markets. Nominal GNP will then equal $Y_t = p_{x_t}X_t$. Consumers in this country purchase, with the proceeds of exports, a commodity basket with a corresponding price index denoted p_{c_t}. Real GNP equals $y_t = y_t/p_{c_t} = p_{x_t}/p_{c_t} F(K_t, L_t)$. Notice that the first term, which denotes a relative price effect, enters exactly like the TFP index in standard growth models. The result generalizes to allow for domestic production of the consumption good. While this measurement problem exists in all estimates of Solow residuals, it appears especially acute for a country like Bolivia, which relies so heavily on a small subset of export products.

it is very difficult to disregard the hypothesis that political instability affects growth performance negatively.

When computing the same regression for the data that include the contribution of the informal sector, I obtain

$$\begin{aligned} TFP = 0.16 &- 0.00004\pi + 3.6E - 9\pi^2 + 0.001Tin \\ (8.77)\ &(-2.97)\quad (3.02)\quad\quad (2.60) \\ &+ 0.001Zinc - 0.0043PI\,. \\ &(2.92)\quad (-1.07) \end{aligned}$$

Again the standard errors are Newey-West corrected for serial correlation. Inference is as above, though the R^2 coefficient falls to 62%.[12]

I have identified two important sources for understanding Bolivia's growth performance: the price of Bolivia's main exports and the inflation rate. In sections 8.3 and 8.4 I discuss each of these in turn. Section 8.3 develops a model that reveals the role played by the export of primary products, specifically of mining, on growth and relative prices. This primary sector, characterized by decreasing returns to scale, is important for growth, as it is the main source of foreign exchange used for the purchase of capital goods. While recently several nontraditional exports have been increasing in importance (soybeans and natural gas among them), it appears that no alternative sector could substitute in the role played by mining in the near future. Coca production is an alternative source of foreign exchange and is discussed below.

Section 8.4 discusses the issue of inflation. Stabilization has been considered a main asset for the Bolivian economy and a warranty of future growth. I analyze in this section how inflation relates to the growth rate of the economy.

8.3 A Model of the Bolivian Economy

A distinguishing characteristic of the Bolivian economy is its reliance on natural resource production for the provision of foreign exchange. Production of tin, zinc, and more recently natural gas has been important in generating the external resources required for capital accumulation (see table 8.3). Morales, Espejo, and Chavez (1992) document the participation of tin, zinc, and natural gas in total exports since 1929 and show this participation has fluctuated between 50 and 70% of total exports. When the prices of mineral products and

12. Econometric problems are more serious for this specification. An augmented Dickey-Fuller test for TFP with a coefficient of -1.83 does not enable rejection of the hypothesis of a unit root. Furthermore, when a cointegration test is performed on the residuals of the cointegrating relation, the augmented Dickey-Fuller test equals -2.18, which does not allow rejection of noncointegration when compared to the critical values in Engle and Granger (1987) and Engle and Yoo (1987). In order to compare the results with the previous example and because of the low power of unit root tests, I feel confident of the results of the regression and have decided to show them here. Finally, while a trend was not significant in the TFP equation for official data, this is not the case for the current specification. Including a time trend delivers a coefficient of 0.041 with a Newey-West coefficient of 5.22.

Table 8.3 **Income from Mining**

Year	% of Government Revenue	Revenue (% of GNP)	Price of Tin	Tin (% Exports)	Mining (% GNP)
1970	na	1.4	166.63	46.9	17.29
1971	na	0.4	159.30	49.0	18.36
1972	na	0.8	169.64	46.5	19.97
1973	7.70	1.7	217.83	38.7	21.68
1974	17.82	2.9	371.23	38.0	20.17
1975	8.41	1.0	311.92	32.9	18.65
1976	12.51	1.5	344.08	34.7	17.85
1977	16.46	1.9	390.08	46.1	17.81
1978	18.09	2.0	584.01	51.6	16.98
1979	15.90	2.3	700.68	46.2	15.62
1980	15.02	1.5	761.03	36.5	15.78
1981	7.60	0.6	642.69	34.5	16.23
1982	9.20	0.4	581.95	31.0	16.45
1983	4.10	0.1	589.11	25.4	16.78
1984	13.30	0.7	554.76	31.7	14.77
1985	2.50	0.2	523.16	27.8	12.93
1986	0.40	0.0	294.31	16.3	11.25
1987	0.50	0.1	315.61	12.1	11.19
1988	na	0.1	330.94	12.8	12.84
1989	na	0.1	394.95	15.4	14.89
1990	na	0.1	281.03	11.2	na

Sources: Columns 1 and 4 from Morales, Espejo, and Chavez (1992). Columns 2 and 3 from Banco Central de Bolivia, Annual Memory (1990, 1980).

particularly of tin collapsed in the early 1980s, the Bolivian economy experienced one of its biggest recessions, a collapse of investment, and acute lack of foreign exchange. Bolivia faced problems with its foreign debt prior to the general onset of the debt crisis; this of course was a product of the collapse of the tin market in 1980.[13]

To understand the growth potential of the Bolivian economy, we need to study the implications of this dependence on mining. In the mining sector decreasing returns to scale are bound to appear. If the sector that sustains capital accumulation has this characteristic, growth eventually disappears. As discussed in the introduction, both a sectorial and geographical transformation of the Bolivian economy have been observed in the last twenty years due to the declining productivity of the mining sector. This process of transformation, or of movement toward the valles and the llanos, was temporarily halted with the mining boom of the late 1970s but has accelerated considerably since then.

In this section I look at the growth dynamics of an economy dependent on

13. There is some evidence that after the collapse of tin markets in late 1985 the fraction of exports accounted for by tin has declined steadily, reaching about 11% in 1990. (The decline in terms of government resources is even more significant.) See Morales, Espejo, and Chavez (1992) and table 8.3.

a tradable, decreasing returns-to-scale sector for the provision of foreign exchange. The model accounts for the effect of the price of minerals on productivity and growth. It traces the dynamics of investment and the real exchange rate and allows us to study the effects of price shocks on the Bolivian economy.

The economy is composed by a representative agent that maximizes the utility function:[14]

$$U = \int_0^\infty \ln c e^{-\rho t}\, dt, \tag{8}$$

where c denotes consumption.

The economy produces two goods with three factors of production. It produces a "mineral" product (T) that is exchanged in world markets for an investment good at an exogenous international price. It also produces a consumption good that is nontradable. This implies that the equilibrium relative price between the investment (mineral) good and the consumption good measures the real exchange rate. In summary, the possible spending levels of investment are given by

$$I = p_T T = p_T A'(z(1 - \phi))^{\beta} M^{1-\beta} = A(z(1 - \phi))^{\beta} M^{1-\beta}, \tag{9}$$

where $A = A' p_T$, with A' an exogenous productivity parameter and p_T the relative price between the investment and mineral goods. This relation introduces a link between export prices of mineral products and productivity. z indicates the stock of capital and ϕ the fraction of the capital stock used for consumption purposes. Finally, M indicates the number of "miners," which we will consider fixed and normalized to one.

Because $\beta < 1$, the model indicates that the marginal product of capital is not bounded above the value of the discount factor, and growth will eventually disappear.

Capital is accumulated with technology:

$$\dot{z} = I - \delta z, \tag{10}$$

where δ is the depreciation rate. Finally, consumption is produced with production function

$$C = B(\phi z)^{\alpha} L^{1-\alpha}, \tag{11}$$

where $\alpha < 1$, and L is the number of "workers," which we also consider fixed and equal to one. Maximization of (8) subject to the previous constraints can be reduced to the dynamic system in (ϕ, z). After simplification the solution of this system has first-order conditions

14. The assumption of a representative agent basically indicates that distributional issues are not important. This of course is just a first cut; I deal with the issue of distributional conflict below.

$$\dot{\phi} = \frac{(1-\phi)^{\beta}\phi\beta A z^{\beta-1}}{(1-\beta\phi)} - \frac{(\delta+\rho-\beta\delta)(1-\phi)}{(1-\beta\phi)} \tag{12}$$

and

$$\dot{z} = A(z(1-\phi))^{\beta} - \delta z. \tag{13}$$

These two equations are graphed in figure 8.5, which shows that the steady state is a saddle and therefore the equilibrium is unique. The relation between consumption share and capital is positive: the economy increases consumption as it accumulates capital.

The steady-state solution is given by

$$\phi = \frac{\delta(1-\beta)+\rho}{\delta+\rho} \tag{14}$$

and

$$z = \left(\frac{\beta A}{\delta+\rho}\right)^{\frac{1}{1-\beta}} \frac{\delta+\rho}{\delta\beta}. \tag{15}$$

Notice that the solution for ϕ does not depend on the productivity coefficient A; this is a special characteristic imposed by assuming log preferences but which has no major implication for the issues at hand.

From the first-order conditions for capital investment, we obtain an expression for the real exchange rate or relative price of tradables to nontradables (q). Because capital is perfectly mobile, the return to capital must be equalized across the two sectors; this implies

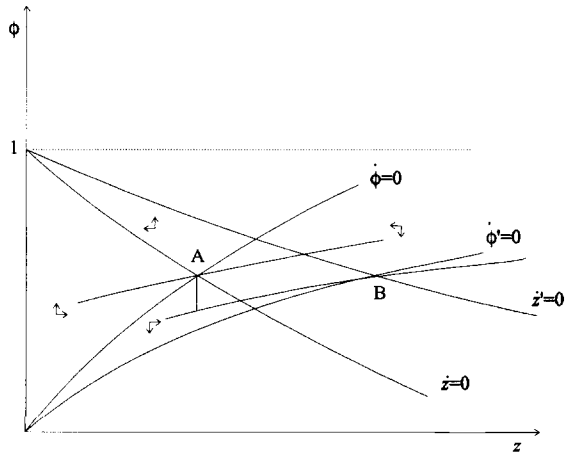

Fig. 8.5 An increase in mineral prices

$$q = \frac{\alpha B(1 - \phi)^{1-\beta}}{\beta A \phi^{1-\alpha}} z^{\alpha-\beta}, \tag{16}$$

so that q decreases with both ϕ and z. The decrease of the real exchange rate as a function of the level of capital accumulation is a reflection of the Balassa-Samuelson hypothesis on real exchange rate. The tradable sector is more capital intensive than the nontradable sector. As development proceeds, real wages increase, pushing up the relative price of nontradables. This is true here, with the caveat that the change in real wages is induced by an endogenous change in relative prices: as relative productivity in the nontradable sector lags behind, the relative price of nontradables increases. The response of the real exchange rate to ϕ reflects the fact that the allocation of capital to the tradable sector increases in its relative price. Along the growing path both (ϕ, z) are increasing, so that the real exchange rate appreciates.

The model can be used to study the effects of shocks to the economy, such as changes in the world price of minerals. Imagine an increase in the price of minerals. This will shift both curves in figure 8.5 to the right, with the intersection remaining at the same level of ϕ (we have seen the steady-state value does not depend on A). As in the new steady state the optimal level of capital and productivity have increased and the value of ϕ remains the same, the real exchange rate appreciates. This corresponds to the notion that equilibrium real exchange rates respond to terms of trade (see Edwards 1989). More interestingly, the model predicts a transition characterized by a fall in ϕ with convergence to the same value at a higher level of the capital stock. While the real exchange rate appreciates in the long run, notice that in the adjustment to higher productivity (or higher prices), the economy shifts resources from consumption in order to allow for capital accumulation, thus the need for a short-run depreciation of the real exchange rate.

Shocks to the nontradable sector can also be studied. If the productivity parameter (B) changes there will be no effect on investment decisions and growth performance (notice that B does not appear in the dynamic equations). It will nevertheless affect the consumption possibilities of nontradables and the real exchange rate.

8.3.1 Endogenous Growth?

The previous model can easily be extended to include the cases of endogenous growth. For this I assume $\beta = 1$. Equations (12) and (13) become

$$\dot{\phi} = A\delta - \rho$$

and

$$\dot{z} = Az(1 - \phi) - \delta z.$$

The solution is presented in figure 8.6, where there will be steady-state growth as long as $A - \delta - \rho > 0$. Because in steady state $\phi = \rho/A$, the equilib-

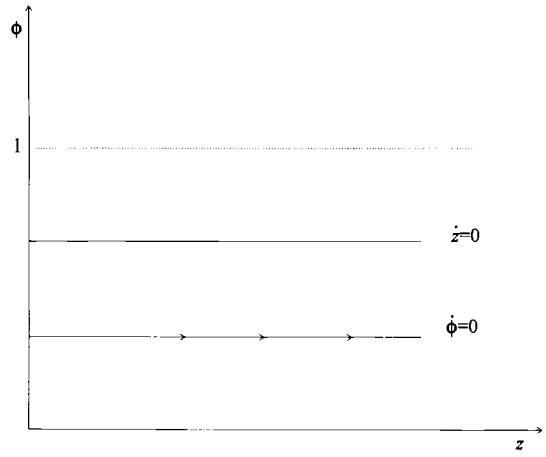

Fig. 8.6 The endogenous growth version

rium growth rate will equal $A - \delta - \rho$. This model has the attractive feature that changes in productivity will affect the growth rate.

8.3.2 Capital Adjustment

Independent of accepting a traditional growth model, or the endogenous version presented in section 8.3.1, it will always be the case that changes in productivity are the leading force in inducing changes in the capital accumulation process which allows for long-run changes in income per capita. Figure 8.7 shows the contribution of capital accumulation to the growth process both for the official data and for data including the informal sector. The value is computed as $\alpha_i \dot{k}/k$, where k is the capital/labor ratio. The graph is interesting because it shows that capital accumulation moves at low frequencies. The economy presents long intervals, in general over ten years, in which the contribution is either positive or negative. The graph shows that capital was a force in economic growth only between 1965 and 1980. During the other years the contribution was negative; that is, there was a decrease of capital.

This sluggish adjustment of capital to productivity shocks (after the 1956 stabilization, capital accumulation finally picked up ten years after productivity started to increase) arises from several factors: the existence of lags in installation, sluggishness in the revision of forecasts about the future economic situation, or irreversibility in investment decisions, which gives value to the option of waiting before committing investment resources.

Another reason capital accumulation adjusts so slowly arises from the movement in tax rates. Table 8.3 shows data on fiscal income accruing from mining taxes. The first column shows the fraction of total government revenue collected from mining taxes. The second column computes the same revenue as

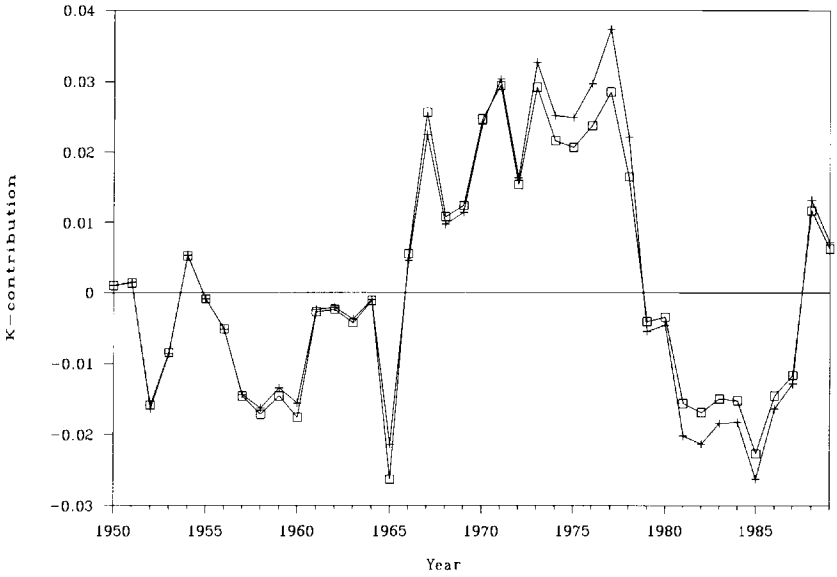

Fig. 8.7 Capital contribution to growth

a percentage of GNP. The last three columns indicate the nominal price of tin (see also figure 8.12), the share of tin in Bolivia's exports, and the participation of mining in GNP.[15]

These taxes have not been stable: while they were high and positive in the 1970s, when prices of mineral products were high, they fell drastically in the early 1980s, and even more after the collapse of tin prices in 1985. In this section I try to explain this variability in the tax rates. Trade taxes in developing countries have been strongly countercyclical with respect to the evolution of international prices. Morales and Sachs (1989) discuss the role of the Bolivian public sector as a "shock absorber" for external shocks, but this relation has been found for other developing countries as well (see Krueger, Schiff, and Valdes [1992] for Argentina and Schiff and Valdes [1992] for a cross section of developing countries). In Bolivia this pattern is clear from the system of *regalias,* in which the tax is computed as a function of the difference between world prices and a "presumed cost" set by the Bolivian Ministry of Mines. When the price increases, so does the implicit tax rate, reducing price variability at the producer level. While the regalias system appears to be providing insurance, it does not reduce price fluctuations for the economy as a whole and

15. Mineral prices fluctuate considerably. Morales, Espejo, and Chavez (1992) propose an intervention mechanism in order to reduce variability in real prices. This variability is considered to have negative effects by imposing strong variability in consumption. Morales et al. estimate this variability to imply a welfare loss for Bolivia of the order of 0.7% of GNP per year.

cannot be considered insurance for producers, who obtain no return when prices are low.[16] In 1991 a new mining tax law was approved that taxes utilities of mining companies at a fixed rate. But nothing in the political structure has changed to suggest that, if mineral prices increase, the government will not once again tax the mining sector with more intensity.

One possibility for explaining the time variation in the level of transfer relies on the political economy structure of the model in section 8.3. The economy has three factors of production: capital (used in both sectors), miners (specific to the mining sector), and workers (specific to the nontradable, consumption sector). While the assumption that miners cannot move is rather extreme, it should be appropriate in the short run. The income for each group can be determined from the production functions in competitive factor markets. The groups vote for taxing either mining or consumption. Under these assumptions it is easy to show that the miners would never vote for taxing the mining sector, as they would suffer from the tax and it would reduce in turn the total level of the capital stock. For workers the choice is ambiguous: A consumption tax reduces their income, but a mining tax reduces the capital stock and through that channel reduces their income. If they side with miners, the mining sector would never get taxed. This is certainly not the case, so we assume the contrary. The remaining group is capital owners, who, having a stake in both sectors of the economy, can be a shifting coalition depending, for example, on the international price of mineral products. If so, the setup works in a way opposite to that of the stylized facts previously described. If the price of the mineral products increases, capitalists will side with miners (because the tax becomes more onerous the higher the price of minerals), and government revenue will be levied through other mechanisms such as inflation. This is contrary to the evidence.

An alternative explanation relies on "optimal" taxation approaches. This approach can give a better account of the intertemporal change in taxes than the political economy explanation. Imagine a policymaker who tries to set up a tax policy to maximize the utility of workers.[17] The solution to this problem implies that, if the productivity of the mining sector increases, the taxes or transfers from that sector increase as well. The trade-off arises because, while the policymaker does not care about miners, he realizes that taxing this sector will jeopardize the process of capital accumulation and therefore reduce the productivity of labor (i.e., his constituency) in the nontradable sector.

16. It could be argued that there is an insurance component to the extent that the mining sector needs the provision of basic infrastructure. If the infrastructure provided is not affected by the fall in taxes when prices are low, then the mechanism may smooth out the payment of such services.

17. Choosing the workers as the target group of the policymaker can be justified in two ways. First, it generates a result that is compatible with the evidence on Bolivia. Second, workers are the biggest group and are therefore an important source of political legimitization. A formal solution is presented in the appendix.

Taxes on mining are important, since this sector is essential in generating the resources for capital accumulation, thus affecting growth. The most comprehensive study of Bolivia's public mining sector concludes, "The origin of the operating rules for COMIBOL, maximizing production in the short run, was based on the needs of the state of maximizing, also in the short run, the availability of income and foreign exchange" (CEMIT, 1989, 40).

In the model in section 8.3, consider a tax on the production of minerals at a rate τ. Solving the optimization problem, the optimal capital stock is now

$$z = \left(\frac{\beta A(1-\tau)}{\delta+\rho}\right)^{\frac{1}{1-\beta}} \frac{\delta+\rho}{\delta\beta}, \tag{17}$$

so that the tax on mining reduces the capital stock for the economy.

In the presence of price shocks we expect investment to adjust optimally. Fluctuating tax rates may choke the adjustment to shocks. Morales, Espejo, and Chavez (1992) find mixed evidence on the presence of unit roots for prices of major export products. Unit roots may be important because they indicate the existence of permanent shocks. A compensating tax increase may induce a stock of capital that never is at the optimal level.

8.3.3 The Effects of Coca Production

The importance of coca production for the Bolivian economy cannot be dismissed. As discussed before, it represents an alternative source of foreign exchange that is critical for the capital accumulation process. While the discussion here is in terms of coca production, the results of this and section 8.3.4 apply equally to the role of nontraditional exports and foreign indebtedness.

I capture this by adding a term Δ to the investment accumulation equation (13). Δ represents the resources made available by coca production. The dynamic equations that describe the optimization problem now become

$$\dot{\phi} = \frac{(1-\phi)^{\beta}\phi\beta A z^{\beta-1}}{(1-\beta\phi)} - \frac{\delta(1-\beta)(1-\phi)}{(1-\beta\phi)} - \frac{\beta\Delta(1-\phi)}{z(1-\beta\phi)}$$

and

$$\dot{z} = \Delta + A[z(1-\phi)]^{\beta} - \delta z.$$

The dynamics are depicted in figure 8.8. The difference from the previous models relies on the possibility of sustaining a capital accumulation process with high consumption shares, even in those cases in which the capital stock is very low. Consider an increase in Δ, which may arise because of legalization of drug production, lower enforcement, or positive technological or price shocks for coca production. Figure 8.8 shows the implications of this for capital accumulation and the real exchange rate. The real exchange rate appreciates across steady states on impact. Output increases with the process of capital accumulation, but consumption increases as well, as indicated by a jump in ϕ.

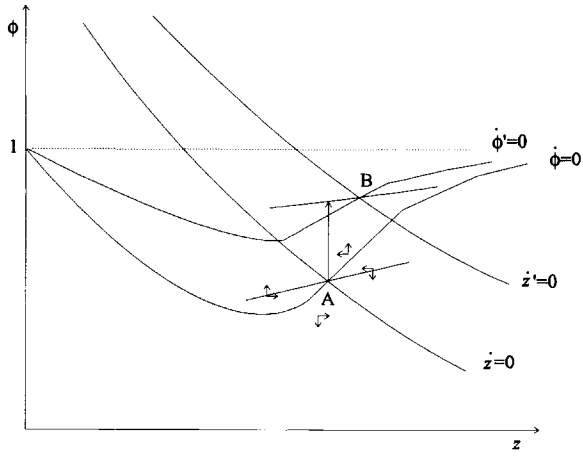

Fig. 8.8 The economy with coca production

The current formalization does not allow for steady-state growth, for the exogenous contribution of coca production to the process of capital accumulation becomes insignificant as capital accumulation takes place.

Notice that the analysis disregards the substitution effect known as "Dutch disease." This nevertheless may be an important issue in the presence of learning or irreversibility of investment projects.

8.3.4 Endogenous Growth Again?

Assume that the contribution of coca production is Δz. In this case it is easy to see from the equation of capital accumulation that the rate of growth of capital will equal $\Delta - \delta$ in steady state. The assumption that the resources of coca production increase linearly in the capital stock is very stringent. How likely is it that it will be satisfied? There are two reasons that suggest that this condition may be possible and three reasons that suggest it is very unlikely to be satisfied. On the positive side we have some evidence that yields may be improving. The NNICC (1989) estimates the coca-leaf yield to have increased from 1.4 metric tons per hectare for the period 1984–88 to about 2.7 metric tons per hectare for the period 1990–91. More important, there has been an upgrade in the production process in Bolivia. While initially Bolivia exported only coca paste, it now has expanded to the production of cocaine hydrochlorate, a much more advanced stage in the production process for cocaine. On the negative side we have, first, that production is constrained by the availability of natural resources (appropriate land) for coca cultivation; therefore it is unlikely that increases in physical yields will persist for a long time. Second, the price of coca has been decreasing substantially in international markets (a reflection of an inelastic demand for cocaine). Godoy and De Franco (1990) show that the wholesale price of cocaine in the United States has fallen from US $6,000

per kilogram in 1980 to less than $2,000 in 1988. More important, the price of coca paste, Bolivia's main export, fell by a half, from $1,500 to $700 between 1987 and 1989. Finally, most of the resources obtained from coca production are not retained in the country. Doria Medina (1986) estimates that about 80% of the value added of cocaine production leaves the country as capital flight. It is true that the return to this capital is a component of Bolivia's GDP as it accrues to residents. With open capital markets it may even be possible to argue that, if invested abroad, this capital will obtain a higher rate of return. Unfortunately, this is not the case; drug capital is not easily "whitened." In this case, some of this capital flight may be incurred at a loss of rate of return.

Overall it seems unlikely that coca and derivatives will become an engine of growth for Bolivia in the future. Other nontraditional exports—cattle, soybeans, and gold—will probably play a more important role than coca production in the near future.

8.4 Inflation and Growth

Table 8.4 shows Bolivia's inflation. The table underscores a major point: Bolivia is not a high-inflation country, with years of extreme inflation in the triple digits, such as Argentina, Brazil, or Peru. In this context the hyperinflation of 1985 seems a rare occurrence and therefore may have different effects and implications than in countries with chronic inflation.

Regarding TFP the inflation rate seems important in explaining the performance of the Bolivian economy. As inflation increases, the productivity of the economy falls. In section 8.2 I estimated the relation between inflation and TFP. Figures 8.9 and 8.10 show the efficiency of the Bolivian economy relative to that of a situation with no inflation, both for the official GNP and for data including the informal sector. The main implication of the graph is the negative impact of the high-inflation (hyperinflationary) experience of the mid-1980s. In both cases the data indicate that the economy during 1984–85 operated at

Table 8.4 **Yearly Inflation Rates**

Year	π	Year	π	Year	π	Year	π
1952		1962	5.80	1972	6.50	1982	123.50
1953		1963	−0.70	1973	31.40	1983	275.60
1954	124.80	1964	10.10	1974	62.80	1984	1,282.40
1955	77.90	1965	2.90	1975	8.00	1985	11,857.10
1956	181.20	1966	6.90	1976	4.40	1986	276.30
1957	115.50	1967	11.10	1977	8.10	1987	14.60
1958	3.00	1968	5.40	1978	10.40	1988	16.00
1959	20.30	1969	2.20	1979	19.70	1989	15.17
1960	11.50	1970	3.80	1980	47.20	1990	17.12
1961	7.50	1971	3.60	1981	32.10	1991	14.52

Sources: Morales and Sachs (1989); Banco Central de Bolivia, Monthly Bulletin.

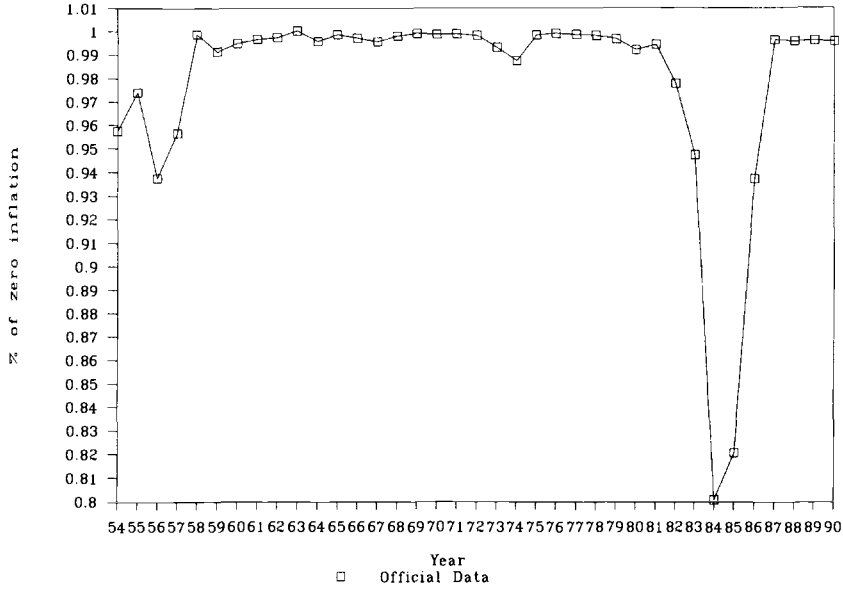

Fig. 8.9 Productivity effects of inflation (official data)

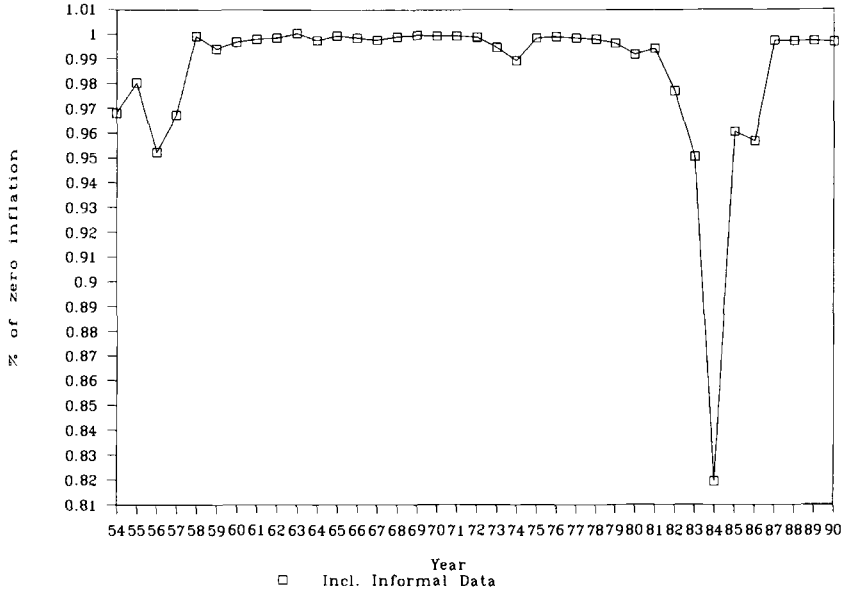

Fig. 8.10 Productivity effects of inflation (informal sector added)

about 80% of its potential productivity (and at about 95% during 1983 and 1986).[18]

The evidence on the effects of inflation on growth or productivity is not entirely new and has been found by many authors for cross-sectional studies. Fischer (1991) and Kormendi and Meguire (1985) find a negative relation between inflation and growth. Barro (1990a) finds that inflation enters insignificantly in the growth equations, but that inflation affects the level of output.

While the exact measure of the effect of inflation remains controversial, the qualitative effect of inflation on economic efficiency is not. Why does inflation affect productivity? First, it reduces the use of an efficient transactions mechanism. This is captured both by Bailey's monetary triangle and in the shoeleather costs discussed in Fischer and Modigliani (1978). A much more important effect of inflation comes from the disorganization of the production system. Ball and Romer (1992) and Tommasi (1992) have suggested that high inflation has negative effects on economic efficiency because agents decide to gather less information, as inflation reduces the informational content of prices through an increase in the variability of relative prices. In equilibrium the price system is less efficient in allocating resources, and more inefficient producers remain in the market. Another dimension in which inflation affects efficiency is by affecting agents' time allocation. De Pablo and Martinez (1989) comment that "in Argentina, CEOs are so busy that they don't have time to work." In Sturzenegger and Tommasi (1992) in the context of a Schumpeterian model of growth, we discuss how high inflation may use up scarce entrepreneurial time for activities such as information gathering or financial activities rather than for pursuing growth-enhancing activities.[19]

A final and crucial mechanism through which inflation affects productivity is the financial sector. The financial sector allocates savings to investment projects, monitors their execution, and provides working capital for firms. At the same time it is strongly affected by market imperfections arising from adverse selection problems and moral hazard issues. If inflation increases the variability of relative prices, these two problems are aggravated by an increase in the inflation rate.

Table 8.5 shows the amount of financing provided by the banking system as a percentage of GDP, and the percentage of this financing provided by commercial and specialized banks, as opposed to the central bank. The total amount of financing fell drastically with hyperinflation but has recovered since. This is clear reflection of how the moral hazard and adverse selection problems become more acute in the presence of high inflation. This in turn affects productivity adversely. A final reason why the financial sector becomes less efficient in times of high inflation is understood by looking at the third

18. This may be an overestimation due to widespread excess capacity induced during the same period.

19. See also De Gregorio (1991, 1992); Roubini and Sala-i-Martin (1992).

Table 8.5 **Financial Indicators**

Year	Savings/ GNP	Total Financing/ GNP	Commercial Banks/ Total Financing
1980		24.4	56.7
1981	12.5	25.2	59.0
1982	19.3	42.5	42.6
1983	12.0	32.2	41.4
1984	11.2	24.2	48.0
1985	9.2	7.1	200.8
1986	5.4	5.0	214.1
1987	5.1	9.7	140.0
1988	7.0	13.9	108.1
1989	8.0	20.4	87.5
1990	8.8	24.0	87.3

Source: Banco Central de Bolivia, Annual Memory (1990).

column of table 8.5. During hyperinflation the public sector became a net borrower in financial markets. In 1985 commercial banks lent about the same amount to the public sector as they did to the private sector. This is a development not unique to Bolivia; Argentina, for example, experienced a similar process during the late 1980s. More recently the proportion of total lending provided by commercial and specialized banks has increased substantially as compared to the prehyperinflation period. This is a positive development since it ensures better allocation of investment projects.

Inflation has been shown to have important negative effects on productivity. Is it possible to argue that it has a positive effect? I believe there are two important reasons that suggest this may be the case. In particular, hyperinflation has developed the financial sector considerably and has allowed fiscal reform to take place. I discuss each of these developments in turn.

The development of the financial sector has two somewhat related objectives. First, it allocates savings to investment and therefore performs a critical role in the growth process. Second, it becomes a hedge against high inflation. The hyperinflation period was accompanied by strong development of financial institutions, a process that is common to all high-inflation experiences. While some of that development certainly reverses after price stability is achieved, it is possible to argue that in the new equilibrium the total use of financial instruments is greater. In the presence of fixed costs (and low marginal costs) to the use of financial instruments, the high-inflation period may have brought an important fraction of consumers to the financial sector. These do not exit automatically when inflation falls. These hysteresis effects are supported by two basic empirical facts: (1) money demand has not increased to prestabilization levels, and (2) the financial sector exhibits strong dollarization of financial instruments (see Dornbusch, Sturzenegger, and Wolf 1990).

Figure 8.11 shows some of these developments. Total liquidity fell during

hyperinflation and has recovered somewhat since. But notice that the recovery is in indexed assets, $M4 - M1$, rather on monetary holdings. Hyperinflation has therefore played a role in changing the relative composition of monetary holdings in favor of indexed assets in the financial sector. The total amount of $M4$ is today higher than at the beginning of the 1980s, and this recovery has been made possible by the development of new financial instruments induced by inflation. These instruments have taken the form of dollarized indexed deposits.

The second positive effect of high inflation is the readjustment of the political scenario. Drazen and Grilli (1990) and Velasco (1992) have stressed that extreme-inflation experiences may be a catalyst for change and induce the political support for reform. They show that, though inflation is costly, the fact that reform is made possible may make inflation, even hyperinflation, desirable. Labán and Sturzenegger (1992a, 1992b) have shown that, in addition to making reform acceptable, inflation may have strong income distribution effects, which should not be disregarded when evaluating the "benefits" of hyperinflation. Because inflation is more painful for the agents who do not have access to the financial sector, these groups eventually lose in the bargaining process that characterizes a stabilization program. The income distribution implications may be long-lasting. In general, it seems difficult to argue that hyperinflation can be desirable, but is undeniable that, once the costs of inflation become overwhelming, reform is implemented.

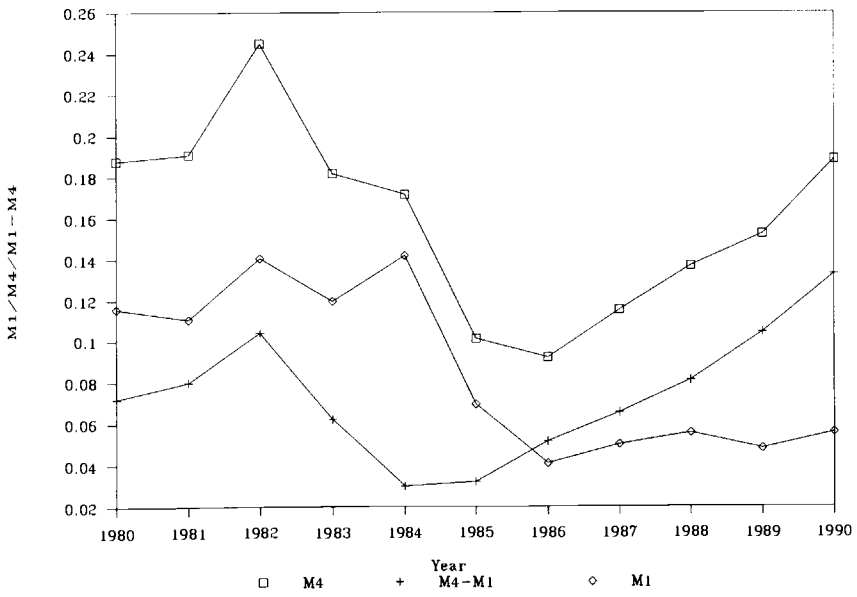

Fig. 8.11 M1 and M4 as percentage of GNP
Source: Data from Banco Central de Bolivia.

These two developments allow the possibility of long-lasting stability. Any deviation from strict fiscal balance, in the presence of a dollarized financial sector (and very low holdings of domestic currency), would immediately trigger hyperinflation. The risk of this outcome is what makes the current program of fiscal austerity sustainable from a political point of view.

8.5 Poststabilization Productivity

8.5.1 Stabilization and Productivity

Stabilization is considered the main asset of the Bolivian economy. The *Estrategia de Desarrollo Económico y Social, 1989–2000* claims: "The permanent control of inflation constitutes a basis for economic growth and for the long-term policies considered in the strategy for economic and social development. Keeping price stability has maximum priority in this strategy, helping in achieving the objectives of improving the international competitiveness of the Bolivian economy, of maintaining consistently an equilibrium in the balance of payments, and using investments efficiently" (Ministerio de Planeamiento y Coordinación 1989, 43).

This statement reflects the current belief in Bolivia. Notwithstanding this, we know that growth has been slow to return, and income per capita has re-

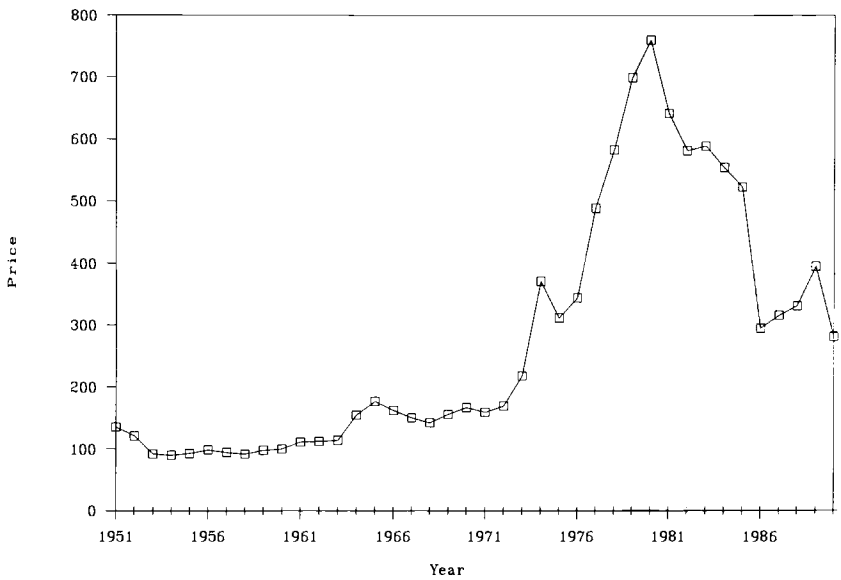

Fig. 8.12 Nominal price of tin
Source: International Financial Statistics.

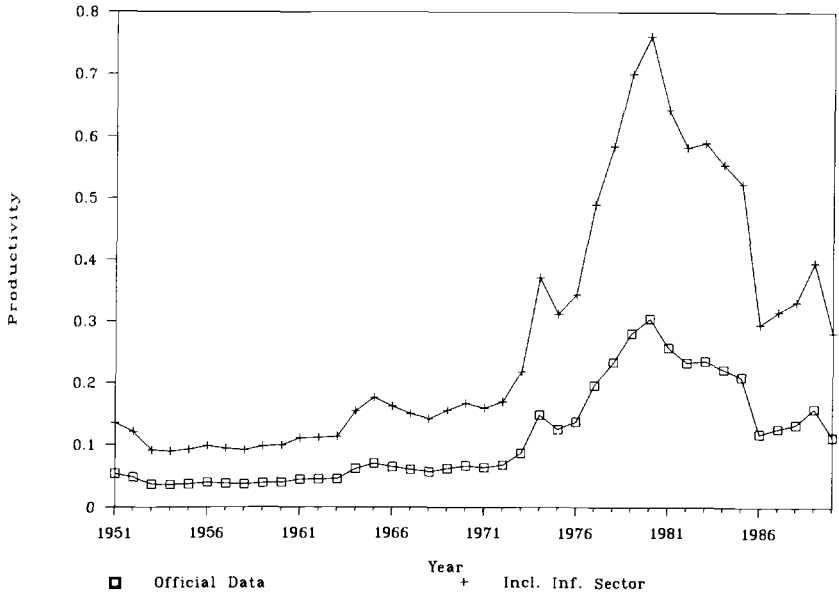

Fig. 8.13 Contribution of tin to productivity

mained at best stagnant (see figs. 8.1 and 8.2). Productivity, as measured by TFP, has remained stable at a level similar to that of 1985. This seems to contradict the previous result that the reduction in inflation has boosted productivity at 20%; the additional factor to be considered is the price of tin. Prior to the outset of the debt crisis Bolivia suffered a drastic reduction in the price of tin, its main export product. The price of tin (dollars per pound) fell in nominal terms from 7.61 in 1980 to 6.39 in 1981 and 5.78 in 1982, and in 1985 from 5.38 to 2.57. Figure 8.12 shows the nominal price of tin, and figure 8.13 shows the contribution of tin to TFP. As can be seen, between 1985 and 1986 the economy experienced a drastic decline in productivity due to this channel. Decreased inflation managed to counteract this decline. The overall effect was to leave productivity virtually unchanged. (In the case of data for the informal sector, TFP actually increases after 1985; i.e., stabilization more than compensated the decrease in productivity induced by the fall in tin prices.)

Compare Bolivia's experience in the 1950s. The stabilization program of 1956 was as successful in halting inflation as the 1985 stabilization. But as can be seen from table 8.2, it was eleven years before productivity again reached the value achieved in 1956. It did so due to the increase in mineral products, an event completely exogenous to policy variables. The outlook for the 1990s appears more favorable. Even though the price of tin plunged after 1985, productivity has remained constant or has slightly increased.

8.5.2 Structural Reform and Productivity

The stabilization program also implemented a sweeping reform in trade and financial markets (see Morales and Sachs 1989). In order to show the effects of these reforms on the economy, an independent measure of productivity was estimated for different industrial sectors.[20] Figure 8.14 shows the average yearly increase or decrease in productivity between 1986 and 1989 for a number of industrial sectors. The sectors are numbered following the Bolivian classification (see appendix). I chose industrial sectors not related to mining in order to discuss the implications beyond the effect of mineral prices on productivity. In addition I have used the period 1986–90 in order to avoid the big fluctuations induced by hyperinflation. The estimates are computed using data on total employment, value added, and investment by industrial sector. The employment data allowed computation of the labor share, while from investment a measure of the capital stock was estimated. Consumption of electricity was used as a proxy, though very imperfect, of capacity utilization. (For a more detailed description of the corresponding sectors and methodology, see the appendix.) Despite the assumptions, no strong productivity increase reveals itself clearly. Figure 8.14 shows that only seven out of seventeen sectors experienced a positive productivity shock during this period. There is no clear pattern of industry type in which sectoral productivity has been particularly boosted. The upper range of manufacturing starting in the 360s (nonmetallic products) and 381 (metallic products) seems to be the most favored. On the other hand productivity in the chemical industry (350s) seems to have uniformly deteriorated, sector 356 (plastic products) exhibiting the largest drop in productivity. It is difficult to infer much from these numbers, except that there is no clear upward trend in productivity arising from the current reforms. This study has the virtue of finally measuring these effects and therefore allowing serious evaluation of the structural reform programs.

The results presented in figure 8.14 are interesting because they suggest that the effects of structural adjustment on productivity (and therefore on capital accumulation) may not be immediate. Taking figure 8.14 literally would suggest that productivity actually deteriorates in the short run, while Edwards (chap. 1 in this volume) shows that structural reform significantly improves productivity in the long run. This is important because many countries implementing structural reform programs expect quick improvements in productivity as a consequence of structural adjustment. Combining these two results suggests the existence of a J-curve to structural adjustment. A J-curve may exist for two reasons.

First, there is a need for industrial reconversion when relative prices are changed. In the presence of irreversible investments this may lead to decreases

20. Because industrial sector price indices are used, the relative price measure problem is nonexistent in these estimates.

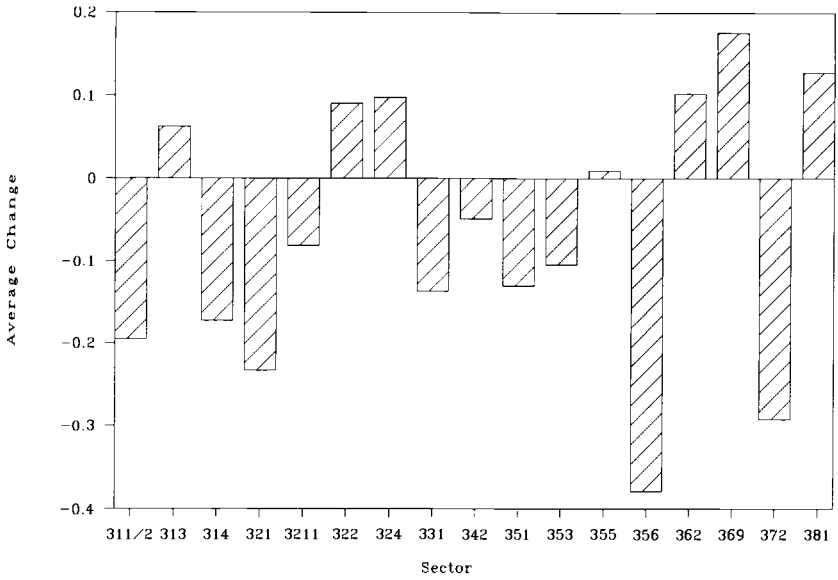

Fig. 8.14 Poststabilization productivity, 1986–89
Source: Based on data provided by Instituto Nacional de Estadísticas.

in productivity as firms use less than optimal production techniques to accommodate their equipment to the new production mix. The striking decrease in tin prices, for example, will induce a significant reconversion of industrial production. Such a reconversion is basically equivalent in the context of irreversible investments to a loss of part of the capital stock. If the price of tin falls to zero, for example, all the investment specific to tin production losses its value. True enough, much of the equipment or the training of the labor force will be substituted into other areas of production. But as the experience of Eastern Europe suggests, this is not a painless process and entails an important decrease in the total level of output.

Second, there is the issue of partial reform. When only some sectors of the economy are deregulated, distortions can be exponentiated. For example, imagine that wood is used both for boxes and for house construction. Say that initially the price of wood is regulated and equal across sectors, but with chronic excess demand. The government, in its attempt to deregulate, decides to free the price of wood used for house construction. Immediately the price of wood for housing purposes will jump, and no more wood will be allocated to production of boxes. Of course this may have very negative effects on the distribution process for other products and a significant negative effect on total productivity. Both mechanisms are at work. The experience of East Germany, which completed its reform quickly and across the board, suggests that the industrial reconversion hypothesis cannot be easily dismissed.

What the numbers indicate from the "model" case of Bolivia is that policymakers should not expect wonders from price liberalization or trade reform. Even less should they expect important effects in the short run.

8.6 Other Important Issues

We turn now to the discussion of additional factors to consider when evaluating the growth possibilities of the Bolivian economy. These include the possibility of development traps, the importance of human capital, the role of the financial sector, the importance of "animal spirits," and income distribution considerations.

8.6.1 Development Traps

The J-curve of structural reform can have long-run detrimental effects on the level of output in the presence of development traps, as it may shift the economy to a completely different equilibrium. Azariadis (1992) has suggested that development traps are very likely to appear once we depart slightly from the traditional assumptions of neoclassical growth models. For development traps to appear, the savings rate must increase very rapidly with the level of income, so that it is possible to sustain a high level of capital accumulation (because then income and savings are high) but also a low level of capital accumulation (where both income and savings are low). This may happen due to externalities (increasing returns to scale) or to saving behavior differing between capital and labor owners (the traditional renditions for the existence of development traps), but also to Leontief technologies (because factor payments change drastically beyond a certain level of the capital stock), subsistence consumption levels, and endogenous population growth. The presence of development traps makes a compelling argument for government intervention. This argument was implicitly behind many development programs like the "big-push" ideas during the postwar period. A consensus on whether these programs work is still to be achieved. I return to this point below.

Figure 8.15 shows the drastic decline in the capital stock per capita during the 1980s. The capital stock, estimated by Huarachi (1988), does not include capital gains and losses implied by changes in relative prices. Therefore it probably underestimates the decline in the level of the capital stock experienced during the 1980s.

The development trap model suggests that a collapse in the capital stock will lead to such impoverishment that savings and capital accumulation will fall even further. The average investment rate for 1972–77 was 16.31% of GDP; the corresponding investment figures for the 1980s are shown in table 8.6. While investment has fallen (a reflection of the collapse of mineral products, the shrinking of the government, and hyperinflation), the collapse has not been massive. Additional evidence is presented in figure 8.7, in which we see that the capital contribution has recovered extremely quickly (at least as compared with the 1956 stabilization). Due to this recent recovery of investment

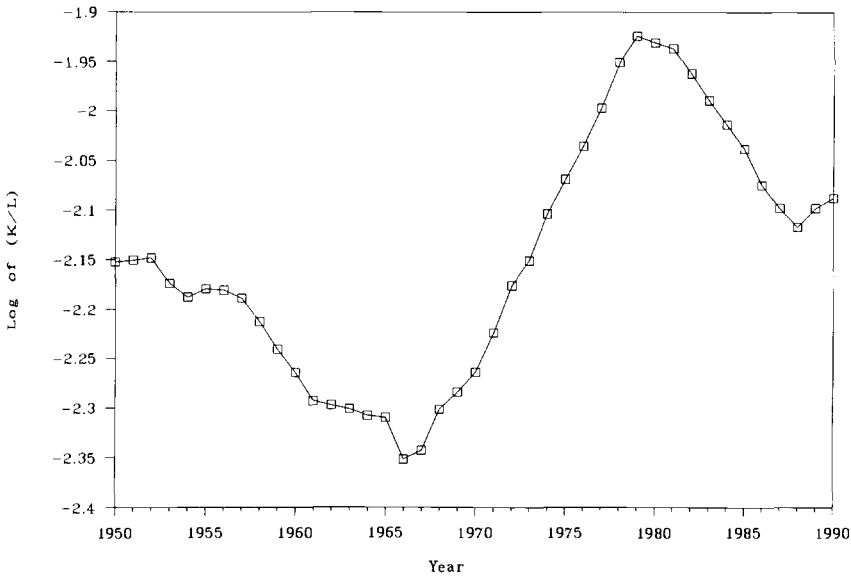

Fig. 8.15 Capital stock per capita
Source: Based on data from Huarachi (1988).

rates, it is safe to argue that there is no serious evidence of a development trap in the case of Bolivia.

8.6.2 Human Capital

The role of human capital has been emphasized in the new growth literature as a potential source of long-run growth. The highly educated labor force in Korea, Mexico, and Brazil has been argued to be an important element in explaining those countries' growth performance. Estimates in cross-country growth regressions have reinforced the notion that human capital accumulation is fundamental for growth. Barro (1991) estimates that an increase in 10% of the enrollment ratio in secondary education increases the growth rate by 0.3%. Similarly, for primary education the growth rate increases by 0.25%. These numbers suggest that a strategy of development of human capital resources is necessary and should be recommended.

Table 8.7 shows the evolution of some human capital indicators. The table shows that progress was made even during the 1980s. Still, these improvements seem not to have spurred any substantial growth, so the question remains, why did Bolivia not attain significant growth during the 1980s, when illiteracy rates fell by 50%.[21]

21. Human capital indicators were not included in the regression analysis because of the scattered nature of the data. Still, I have shown that the other variables accounted for about 80% of the variability of TFP and that this TFP was a stationary series. Both elements indicate that it is unlikely that human capital has played a very significant role.

Table 8.6 **Investment Rates**

Year	Investment Rate (% of GDP)	Year	Investment Rate (% of GDP)
1980	14.25	1985	9.48
1981	13.77	1986	9.47
1982	10.24	1987	9.72
1983	7.94	1988	9.66
1984	10.43	1989	10.14

Sources: Banco Central de Bolivia and Instituto Nacional de Estadísticas.

Table 8.7 **Human Capital Indicators**

	1965	1980	1988	1989
Primary enrollment				
Total	73			81
Female	60			77
Secondary enrollment				
Total	18			34
Female	15			31
Tertiary enrollment	5			23
Illiteracy		36.8	18.3	
Urban		15.2	7.7	
Rural		53.1	31.1	
Infant mortality		123	102	

Source: World Bank (1990); *World Development Report* (1992).

Most growth models that discuss the role of human capital (in particular Lucas 1988) assume a stock of human capital that is passed on, accumulating forever, from parents to children. But education and knowledge are not similar to physical endowments and do not accumulate automatically, as they are constrained to an individual person and disappear with him or her. In school we spend most of our time studying what our parents, and their parents, had to study: how to learn and write. If this is true, we should not expect human capital to increase significantly through time and become a thriving force of economic development, except for countries experiencing quick progress in literacy and enrollment rates. Even so, it is not clear whether these indicators properly capture progress in human capital development.

The literature has stressed two measures of human capital, average level (because it potentiates interactions and therefore individual productivity) and total level (because one profits from a general externality). Here I claim that the distribution of the human capital is important as well. Figure 8.16 shows the distribution of basic services and some human capital indicators by language spoken. I divide the population into Spanish, bilingual, and native (Aymara and Quechua) speakers. The first four categories represent basic services,

the last five education indicators. As can be observed, there is a major difference among language groups. If one group lags behind in its human capital skills, then the economy will have to adjust to the human capital of that group to interact at all with those agents. Imagine two agents who want to communicate in writing. If one does not know how to read and write, there is no point for the other to improve his literary skills. Distribution matters, and the production function in human capital models should perhaps have a term that resembles a Leontief production function ($F(K, L, H)$ where $H = \min(h_1, h_2)$). If this is correct, a basic implication is that more effort should be made to homogenize the provision of human capital across different social groups.

8.6.3 Financial Markets

Growth performance cannot be independent of financial markets. The process of capital accumulation cannot be supported if there are no mechanisms that allow savings to be allocated into investment projects. If savings are not intermediated through the financial sector, the chain between savings and capital accumulation underscored in the neoclassical growth theory is broken, and there is no possibility of growth. The distinction that is relevant here is that between a "storage" and an "investment" economy. If people save by storing goods, this does not allow buildup of the capital stock, and growth will not happen; it is necessary then to transfer the savings from storage to the financial sector. In this sense the long-run effects of hyperinflation may be very positive.

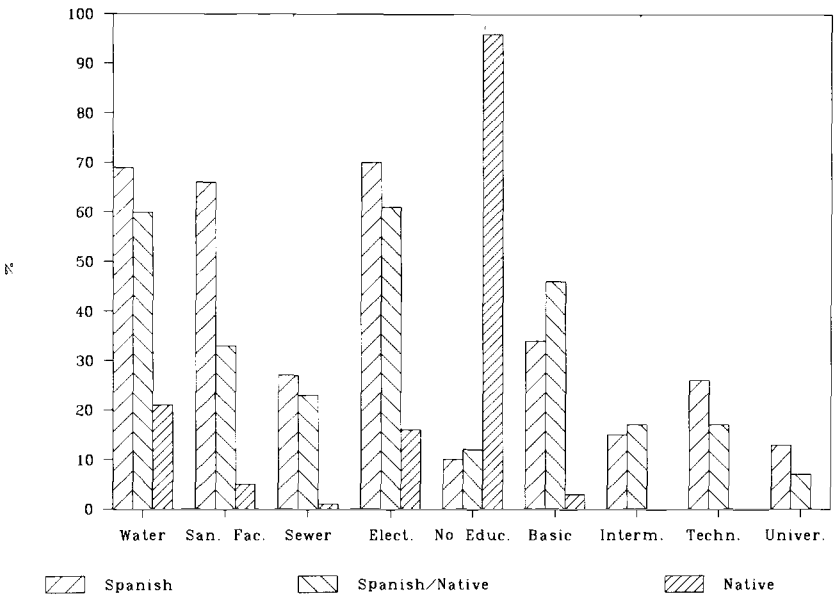

Fig. 8.16 Language spoken and social indicators
Source: World Bank (1990).

By developing the financial sector, ever-increasing savings are intermediated to productive activities.[22]

Both interest rates, that is the incentive to save, and the characteristics of the institutional system are fundamental for this transmission process. High reserve requirements will reduce the amount of credit; regulated interest rates will reduce the incentive to save. Savings have fallen since the collapse of tin prices and the stabilization program (see table 8.5), and while there is a steady recovery, the level of savings remains well below historical averages. Low savings may be a reflection of expectations of transitory low levels of income.

Other institutional arrangements also contribute to low savings. The Aymara communities, for example, have implicit (informal) arrangements by which those individuals with unexpectedly high income (unexpected good harvest) have to transfer some of their income to the less fortunate. These schemes are possibly welfare enhancing, as they permit avoiding very low consumption levels, but they also induce a lower degree of overall savings.[23]

8.6.4 Multiplicity and Animal Spirits

Animal spirits have been emphasized since Keynes and Schumpeter as important driving forces of growth and business cycles. Korea, Brazil, and Chile are usually portrayed as countries in which the "excitement" of entrepreneurs is sufficient to keep the country growing. Recently, the big-push ideas have been formalized in the context of imperfect competition models by Murphy, Shleifer, and Vishny (1989a, 1989b). The idea is simple: in the presence of imperfect competition, pecuniary externalities matter. If the level of activity is believed to be low, then it does not pay to finance high levels of fixed investment, which in turn contributes to keeping output low. An alternative equilibrium is one in which everybody believes output will be high, investments look ex ante profitable, and entrepreneurs finance high investment levels. This in turn sustains the high output level. In addition to development issues there is some evidence on the relation between animal spirits and business cycles. Farmer and Guo (1992) have shown that fluctuations in consumer confidence permits replication of most of the characteristics of business fluctuations for the United States.

What assessment can be made of this mechanism? The multiplicity story is true in the presence of effective lack of demand, and therefore may be true only for closed economies. A small open economy cannot face an effective lack of demand. But for primary products, such as Bolivia's mineral exports, the argument does not hold (even taking into account that the Tin International

22. In addition, it has recently been argued that financial development allows better information revelation and therefore better decisions (see Greenwood and Jovanovic 1991).

23. Those individuals who are successful and do not abide by these social rules are in general discriminated against and rejected from the community.

agreements and the bilateral negotiations with Argentina regarding gas exports provide some imperfect competition characteristics even to these markets.)

In one dimension the model may, nevertheless, be relevant. This dimension includes the issue of capital repatriation. Dornbusch (1990) develops a model in which there is multiplicity in the rate of returns on capital, depending on the degree of capital repatriation.

The issue is polemic because it leads to recommendation of extensive government support for investment projects, while extensive evidence in Latin America indicates that these policies are very negative in the long run. Long periods of high subsidies have allowed the existence of a protected and inefficient industrial sector. The reason is that protective policies are time inconsistent (Tornell 1991) and affect the incentives of firms. If the subsidy will always be there, no incentive exists for becoming efficient.

8.6.5 Development Paths

Ed Leamer (1987) has coined the expression "paths of development" to characterize the evolution of output and factor prices as factor accumulation takes place. In standard neoclassical growth models there is only one path of development, and that is with capital accumulation and increasing real wages. If the model allows for more than two factors of production and more than one good, then the evolution of real wages and the return to real factors of production may not be monotonic.

For Bolivia, figure 8.17 shows a triangle of factor endowments. It represents all possible combinations of land, labor, and capital the economy may have. The endowment of factors of production will change as development takes place.

The economy can produce two industrial commodities (which do not use land): a labor-intensive and a capital-intensive good. The economy can also produce a good called "cattle," which uses only land and labor, or a good called "coca" or soybeans, which uses the three factors of production. The exact location of the corners depends on technology, and the partition of the triangle depends on final goods prices (see Leamer 1987). In the upper-left triangle capital is very scarce and both cattle and coca are produced; the return to capital is very high. In the lower-right triangle capital is very abundant, and only coca and the capital-intensive industrial products are produced; the return to capital is relatively low. A path of development following the arrow indicates an increase in capital and in land/labor ratio. Real wages in general increase along this development path but fall in the transition from the upper-left triangle to the next. The composition of the production mix now supports a lower real wage. It is not unlikely that this development path will find strong political opposition. For Bolivia this is a critical issue because the development of the economy has been characterized by an increase in the importance of the lowlands, and therefore by an important change in relative factor endowments, with an increase in the endowment of arable land.

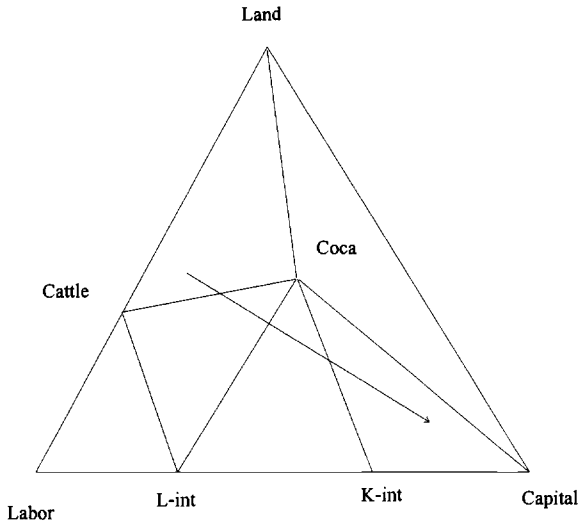

Fig. 8.17 Paths of development

8.6.6 Income Distribution

It has been argued in our discussion of human capital that Bolivia presents sectorial and ethnic segmentation. In addition income distribution is very regressive. Lorenz curves have been computed for 1982, 1985, and 1988. The distribution of income seems to look rather constant across time, especially between 1982 and 1988. In both cases the poorest 30% of the population earns about 10% of income and the poorest 50% of the population earns 20% of income. In 1985 the richest 5% had doubled its income relative to 1982, but this increase seems to have faded as stability consolidated. This strong effect of inflation on income distribution is consistent with the findings in Cardoso, Paes de Barros, and Urani (chap. 5 of this volume) for Brazil.[24]

Perotti (1990) stresses the relation between income distribution and human capital formation. In poor societies a very regressive income distribution may make the accumulation of human capital impossible for wide sectors of the population. The economy then finds it impossible to take off. Inequality also feeds into the political process by calling for radicalization and transfers. If this leads to higher capital taxes, it may reduce equilibrium growth, as suggested in Alesina and Rodrik (1991) and Persson and Tabellini (1991). The argument is that very unequal societies will tend to have higher taxation of capital; this in turn will translate into less growth.

24. Extreme inflation tends to deteriorate income distribution because some agents in the economy do not have access to financial adaptation technologies. See Sturzenegger (1992a, 1992b).

Recently Bolivia has followed the trend in Latin America toward more moderate economic policy, and political polarization is not a major threat at the moment. This has also been helped by the changes in the world and in other Latin American countries, which tend to suggest the possibility of successful reform programs. But countries also experience inverted-U Kuznets curves of income distribution; how long political moderation will last is an open question.

Income distribution has certainly been a major concern in Bolivia's policy making. Land reform was a major political event that still accounts for most of the support received by the MNR. Unfortunately, land reform did not improve income distribution significantly. When in power, the MNR implemented a promised land reform by which estates in the altiplano were divided and allocated to individual families. Landowners were compensated with large estates in the (at that time) underdeveloped area of Santa Cruz. Unfortunately, this meant that peasants were constrained to remain at a single location in the altiplano, which cannot support a family all year long. Indians used to move during the winter to the valley, or *yungas*, which is better for winter agriculture. Anthropologists point to the discontinuous space conception of Aymara Indians, who were used to this migration process. Land reform prevented this migration from taking place, and poverty therefore increased significantly in the altiplano.

8.7 Conclusion

Given the facts discussed in section 8.6, can something be done to stimulate the sluggish growth performance of the Bolivian economy?

Godoy and De Franco (1991) argue that Bolivia has to rediscover itself. But what does that mean? Does it mean extensive government intervention, strong laissez-faire, or a balance of both? Latin America and the world in general have recently undergone a major transformation in terms of acceptable economic policies. A shift toward free markets and international integration, pioneered by Chile and Mexico, followed by Bolivia, Argentina, and to a lesser extent other Latin American countries, is generally attributed to three main causes: (1) exhaustion of a given economic model as represented by the import-substitution, inward-orientation, high-deficit strategies of the past (see Vial 1992); (2) ideological change induced by exogenous factors, such as the relative success of the economic policies of the Reagan and Thatcher administrations and the collapse of communism (see Cardoso's chapter in Vial 1992); (3) implementation of International Monetary Fund and World Bank reform programs.

These three factors are relevant in the real world, and Bolivia has not been immune to any of them. Therefore the prevailing mood is one of minimal government control and regulation. This mood has been reflected in many coun-

tries through widespread programs of privatization and deregulation. While Bolivia was a pioneer in macroeconomic reform, it has so far been unable to launch a significant privatization program. This can be an important drawback if partial reforms are important but has given Bolivia time to learn from the hasty privatization attempts of its neighbors. In Argentina privatization seems a desperate attempt to signal a change of policy rather than an effort to increase the efficiency of the economy; that is, privatization is taking place without any regulatory framework and with extensive monopoly concessions granted to the new owners. It is likely that there will be efficiency gains as principal-agent problems and the level of corruption decline significantly. But the current situation will lead to major departures from optimal pricing which Bolivia should try to avoid.

Barro (1990b) has emphasized the relation between government infrastructure and growth. He claims a nonlinear relation between the two variables. If infrastructure is very low, there is a positive association between infrastructure and growth, while beyond a certain threshold the relation runs in the opposite direction because the tax burden on the private sector more than outweighs the benefits of a larger infrastructure. Government spending has been historically allocated to subsidies, inefficient projects with no clear public service component, and administrative bureaucracy. The challenge of the new leadership is to allocate the properly financed (i.e., not with monetary creation) government resources to badly needed public goods and infrastructure.[25] The government should continue its program of structural reform, but not allow the current tide of minimalist government to interfere with the realization that it has, through the building of infrastructure, a significant role to play in increasing Bolivia's productivity. To some extent this message seems to be taken into account. Table 8.8 shows the percentage of GDP allocated by the nonfinancial public sector to capital spending. The recovery is healthy, bringing capital spending back to the levels of the early 1980s, though not yet making up for years of low capital spending.

A development policy might possibly use alternative models of development such as the Japanese and Korean. Contrary to mainstream thought, I believe that the main factor behind the strong growth performance of these economies is not industrial targeting and R&D but the existence of tight links between firms and the banking sector. In Japan the *keiretsu* is an industrial conglomerate that, headed by a financial institution, owns and controls a wide variety of vertically and horizontally integrated firms. This system (similar to the Korean *jaebuls*) may provide implicit insurance and allow a reduction in the strong level of asymmetric information present in credit markets, thereby deblocking and allowing implementation of profitable projects, which a completely decentralized market cannot achieve. Of course, this institutional framework cannot arbitrarily be put in place. There is not even a compelling argument for think-

25. For example, it takes, even today, two days to travel from La Paz to Santa Cruz.

Table 8.8 **Capital Expenditures as a Percentage of GDP**

Year	Capital Spending	Year	Capital Spending
1980	7.39	1985	3.34
1981	6.10	1986	4.58
1982	5.93	1987	5.34
1983	4.24	1988	6.84
1984	3.73	1989	5.81

Source: Unidad de Análisis de Política Económica.

ing that it may be appropriate to Bolivia. In Japan it appeared as a historical derivation of the *zaibatsu,* and there may be important thresholds both in size and in endowment of human capital that may make the system work. Whether these institutions would spring up from decentralized markets is yet to be seen and is an important topic for further research, as are the mechanisms by which the government could help in its implementation.

I have stressed the importance of financial institutions and of financial sector development in transforming a stagnant storage economy into a growing capital accumulation economy. Much of the work has been done by the high-inflation experience of the mid-1980s. It is the task of the government not to mingle with the financial sector to the point where some of these gains are lost. I have also stressed the important negative effects of inflation. Maintenence of stabilization should also be considered a priority for the government, even more so in the presence of a very dollarized financial sector. Finally, I have stressed the need to homogenize the provision of human capital across agents, and have pointed to possible income distribution problems along the current development path; the government should be active in neutralizing and compensating some of these changes. Bolivia can spare some active redistribution; it cannot afford to have its development path blocked.

Appendix

Proof of Tax Policy

For the model of section 8.3 the policymaker maximizes workers income,

$$I^w = (1 - \alpha)B(1 - \psi)(\phi z)^{\alpha} + g, \tag{A1}$$

subject to the budget constraint of the government that includes taxes either on consumption (ψ) and on mining production (τ),

$$g = \psi B(\phi z)^{\alpha} + \tau A((1 - \phi)z)^{\beta}. \tag{A2}$$

The first-order conditions of this problem, assuming an interior solution, can be reduced to the equation

$$\text{(A3)} \qquad \phi^{\alpha}\alpha z^{\alpha-1}\frac{\partial z}{\partial \tau} + \frac{A}{B}((1-\phi)z)^{\beta} + \frac{A}{B}\tau\beta(1-\phi)^{\beta}z^{\beta-1}\frac{\partial z}{\partial \tau} = 0,$$

plus the budget constraint. Implicit differentiation of the system of equations (A2) and (A3) gives the result

$$\text{(A4)} \qquad \frac{d\tau}{d_B^A} > 0.$$

Total Factor Productivity

The computation of TFP for industrial sectors implied the following steps. First a measure of real output was obtained by deflating nominal sectoral value added by the industrial sector price index. Employment in number of hours of labor was provided as data. Total income accrued to that labor was also given as data and used to compute the labor share. Computation of capital was by the inventory accrual method based on the investment figures provided for the corresponding years. Adjustments were made to account for the change in number of firms surveyed each year. Once both capital and labor shares are computed, TFP computation is straightforward. The numbers presented are the average for the periods and sectors considered.

The sectors are

311/2	Food products	351	Chemical industry
313	Beverages	353	Oil refineries
314	Tobacco	355	Rubber products
321	Textiles	356	Plastics
3211	Apparel	362	Glass and derivatives
322	Clothing	369	Nonmetallic products
324	Shoes	372	Nonferric metals
331	Wood products	381	Metallic products
342	Printing		

References

Alesina, Alberto, and Dani Rodrik. 1991. Distributive Politics and Economic Growth. NBER Working Paper no. 3668. Cambridge, MA: National Bureau of Economic Research.

Azariadis, Costas. 1992. Poverty Traps in Convex Economies. University of California, Los Angeles. Mimeo.

Ball, Laurence, and David Romer. 1992. Inflation and the Informativeness of Prices. University of California, Berkeley. Mimeo.

Barro, Robert. 1990a. Comment on "Extreme Inflation, Dynamics, and Stabilization" by Rudiger Dornbusch, Federico Sturzenegger, and Holger Wolf. *Brookings Papers on Economic Activity* 2:68–75.

———. 1990b. Government Spending in a Simple Model of Endogeneous Growth *Journal of Political Economy* 98 (5), pt. 2: S103–25.

———. 1991. Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics* 106(2): 407–44.

Centro de Estudios de Mineria y Desarrollo (CEMYD). 1989. *Desempeno y Colapso de la Mineria Nacionalizada en Bolivia.* La Paz: CEMYD.

De Gregorio, José. 1991. Inflation, Taxation, and Long-Run Growth. International Monetary Fund. Mimeo.

———. 1992. Economic Growth in Latin America. *Journal of Development Economics* 39 (1): 59–84.

de Pablo, Juan Carlos, and Alfonso Martinez. 1989. *Argentina: A Successful Case of Underdevelopment Process.* Buenos Aires. Mimeo.

Dollar, David. 1988. The Factor Price Equalization Model and Industry Labor Productivity: An Empirical Test across Countries. In R. Feenstra, ed., *Empirical Methods for International Trade.* Cambridge: MIT Press.

Doria Medina, Samuel. 1986. *La Economia Informal en Bolivia.* La Paz: Unidad de Análisis de Política Económica.

Dornbusch, Rudiger. 1990. Short Term Macroeconomic Policies for Stabilization and Growth. Mimeo.

Dornbusch, Rudiger, Federico Sturzenegger, and Holger Wolf. 1990. Extreme Inflation: Stabilization and Dynamics. *Brookings Papers on Economic Activity* 2:1–84.

Drazen, Allan, and Vittorio Grilli. 1990. The Benefits of Crises for Economic Reform. NBER Working Paper no. 3668. Cambridge, MA: National Bureau of Economic Research.

Eder, G. 1968. *Inflation and Development in Latin America: A Case History of Inflation and Stabilization in Bolivia.* Michigan International Business Studies no. 8. Ann Arbor: University of Michigan Press.

Edwards, Sebastian. 1989. *Real Exchange Rates, Devaluation, and Adjustment.* Cambridge: MIT Press.

Engle, Robert, and Clive Granger. 1987. Cointegration and Error Correction: Representation, Estimation, and Testing. *Econometrica* 55 (2): 251–76.

Engle, Robert, and Byung Sam Yoo. 1987. Forecasting and Testing in Co-integrated Systems. *Journal of Econometrics* 35:143–59.

Farmer, Roger, and Jang-Tin Guo. 1992. Real Business Cycles and the Animal Spirits Hypothesis. University of California, Los Angeles. Mimeo.

Fischer, Stanley. 1991. Growth, Macroeconomics, and Development. In O. Blanchard and S. Fischer, eds., *NBER Macroeconomics Annual.* Cambridge, MA: MIT Press.

Fischer, Stanley, and Franco Modigliani. 1978. Towards Understanding the Real Effects and Costs of Inflation. In *The Collected Papers of Franco Modigliani,* 5:280–303. Cambridge: MIT Press, 1989.

Godoy, Ricardo, and Mario De Franco. 1990. The Economic Consequences of Cocaine Production in Bolivia: Historical, Local, and Macroeconomic Perspectives. Harvard Institute for International Development. Mimeo.

———. 1991. The Untraveled Road: Non-economic Barriers to Growth in Bolivia. Harvard Institute for International Development. Mimeo.

Greenwood, Jeremy, and Boyce Jovanovic. 1991. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy* 98 (5), pt. 1: 1076–1107.

Griliches, Zvi, and Vidar Ringstad. 1971. *Economies of Scale and the Form of the Production Function.* Amsterdam: North-Holland.

Gutierrez and Pando. 1989. *La Problematic de la Coca y su Relación con la Producción de la Cocaina.* La Paz: Ministerio de Asuntos Campesinos y Agropecuarios.

Huarachi, Guarachi. 1988. Estimación del Stock de Capital Fisico Total de la Economia Boliviana. Unidad de Análisis de Política Económica. La Paz. Mimeo.

Jones, Larry, and Rodi Manuelli. 1990. A Convex Model of Equilibrium Growth: Theory and Policy Implications. *Journal of Political Economy* 98 (5), pt. 1: 1008–38.

Kormendi, Roger, and Philip Meguire. 1985. Macroeconomic Determinants of Growth, Cross-Country Evidence. *Journal of Monetary Economics* 16:141–63.

Krueger, Anne, Maurice Schiff, and Alberto Valdes, eds. 1992. *The Political Economy of Agricultural Price Policy.* Baltimore: Johns Hopkins University Press.

Labán, Raúl, and Federico Sturzenegger. 1992a. Distributional Conflict, Financial Adaptation, and Delayed Stabilizations. University of California, Los Angeles. Mimeo.

———. 1992b. Fiscal Conservatism as a Response to the Debt Crises. University of California, Los Angeles. Mimeo.

Leamer, Edward. 1987. Paths of Development in the Three-Factor, *n*-Good General Equilibrium Model. *Journal of Political Economy* 95 (5): 961–99.

Lucas, Robert. 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics* 22:3–42.

Ministerio de Planeamiento y Coordinación. 1989. *Estrategia de Desarrollo Económico y Social, 1989–2000.* La Paz: Republica de Bolivia.

Morales, Juan Antonio. 1988. La Inflación y la Estabilización en Bolivia. In M. Bruno, G. DiTella, R. Dornbusch, and S. Fischer, eds., *Inflación y Estabilización la Experiencia de Israel, Argentina, Brasil, Bolivia, y Mexico.* Mexico: El Trimestre Económico.

———. 1991. The Transition from Stabilization to Sustained Growth in Bolivia. In M. Bruno, S. Fischer, E. Helpman, N. Liviatan, and L. Meridor, eds., *Lessons of Economic Stabilization and Its Aftermath.* Cambridge: MIT Press.

———. 1992. Bolivia's Tin and Natural Gas Crises of 1985–1989. Documento de Trabajo 4/92. Instituto de Investigaciones Socioeconomicas, Unviersidad Católica Boliviana.

Morales, Juan Antonio, Justo Espejo, and Gonzalo Chavez. 1992. Shocks Externos Transitorios y Politicas de Estabilización para Bolivia. Documento de Trabajo 2/92, Instituto de Investigaciones Socioeconomicas, Universidad Católica Boliviana.

Morales, Juan Antonio, and Jeffrey Sachs. 1989. Bolivia's Economic Crises. In J. Sachs, ed., *Developing Country Debt and Economic Performance.* Chicago: University of Chicago Press.

Murphy, Kevin, Andrei Shleifer, and Robert Vishny. 1989a. Income Distribution, Market Size, and Industrialization. *Quarterly Journal of Economics* 104 (3): 357–64.

———. 1989b. Industrialization and the Big Push. *Journal of Political Economy* 97 (5): 1003–26.

National Narcotics Intelligence Consumer Committee (NNICC). 1989. *Narcotics Intelligence Estimate.* Washington, DC: Drug Enforcement Agency.

Pereira, Rene, Jaime Montano, and Moises Calle. 1991. Bolivia: Movimientos Migratorios, Estrategia de la Población, y Efectos de las Politicas de Ajuste Estructural. La Paz, July.

Perotti, Roberto. 1990. Political Equilibrium, Income Distribution, and Growth. MIT. Mimeo.

Persson, Torsten, and Guido Tabellini. 1991. Is Inequality Harmful for Growth? Theory and Evidence. University of California Berkeley Working Paper no. 91-155.

Rebelo, Sergio. 1991. Long-Run Policy Analysis and Long-Run Growth. *Journal of Political Economy* 99 (3): 500–521.

Romer, Paul. 1986. Increasing Returns and Long-Run Growth. *Journal of Political Economy* 94:1002–37.
Roubini, Nouriel, and Xavier Sala-i-Martin. 1992. A Growth Model of Inflation, Tax Evasion, and Financial Repression. NBER Working Paper no. 4062. Cambridge, MA: National Bureau of Economic Research.
Sala-i-Martin, Xavier. 1990a. Lectures on Economic Growth I. NBER Working Paper no. 3564. Cambridge, MA: National Bureau of Economic Research.
———. 1990b. Lectures on Economic Growth II. NBER Working Paper no. 3565. Cambridge, MA. National Bureau of Economic Research.
Schiff, Maurice, and Alberto Valdes. 1992. "Effects of Intervention on Price Variability." In Anne Krueger, Maurice Schiff, and Alberto Valdes, eds., *The Political Economy of Agricultural Pricing Policies,* vol. 4, *A Synthesis of the Economies in Developing Countries*, chap. 13. Balitmore: Johns Hopkins University Press.
Sturzenegger, Federico. 1992a. Currency Substitution and the Regressivity of Inflationary Taxation. *Revista de Analisis Económico* 7, (1): 177–92.
———. 1992b. Inflation and Social Welfare in a Model with Endogenous Financial Adaptation. NBER Working Paper no. 4103. Cambridge, MA: National Bureau of Economic Research.
Sturzenegger, Federico, and Mariano Tommasi. 1992. Deadlock Societies, the Allocation of Time, and Growth Performance. UCLA Working Paper no. 660.
Tommasi, Mariano. 1992. The Welfare Effects of Inflation: The Consequences of Price Instability on Search Markets. University of California, Los Angeles. Mimeo.
Tornell, Aaron. 1991. Time Inconsistency of Protectionist Programs. *Quarterly Journal of Economics* 106 (August): 963–74.
Velasco, Andrés. 1992. A Model of Fiscal Deficits and Delayed Fiscal Reforms. CV Starr Center for Applied Economics no. 92/06. New York University.
Vial, Juan. 1992. *Adonde va America Latina? Balance de las Reformas Económicas.* Santiago: Corporación de Investigaciones Economicas para Latinoamerica.
Wang, Fang-Yi. 1990. Reconsidering the "East Asian Model of Development": The Link between Exports and Productivity Enhancement Evidence from Taiwan. University of California, Los Angeles. Mimeo.
World Bank. 1990. *Bolivia: Poverty Report.* Washington, DC: World Bank.
World Bank. 1992. *World Development Report.* Washington, DC: World Bank.

Comment on Chapters 7 and 8

Jacques Trigo-Loubière

Comment on Chapter 7

One of the paper's main virtues is its recognition of the need for the reform process to be steadily pursued for years to come if the cumulative structural distortions of the Argentine economy of the last few decades are to be corrected.

However, while I agree that the reform process will continue for a prolonged period, I wonder whether this does not clash somewhat with the conclusion

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reached at the end of the paper, that "another devaluation would . . . risk an outbreak of another inflation wave." The reasons for avoiding devaluation would appear to be rather seductive in the short term; but in the longer-term context, which, I repeat, the paper rightly recognizes, currency appreciation may become untenable. All the more so if wage pressures cannot be contained.

At the same time, the 1992 deterioration in the balance of trade suggests that if this situation persists for several financial periods it could become untenable and will call for corrective measures. Moreover, in the current context of globalization of markets, the need to maintain external competitiveness simply cannot be ignored; otherwise it could compromise the industrial reconversion program.

The paper recognizes the need to continue increasing fiscal savings. It would entail an enormous additional effort, since the already approved reform of the social security system would involve a 20% increase in budgetary expenditure. Nor does the paper mention the need to find a solution to the fiscal deficit problems that still persist in some provinces.

I agree that the strong inflation evident in the service sector is surprising and deserves more thorough analysis. Perhaps the reason is that the economic agents and consumers, long accustomed to existing in a climate of chronic inflation, are making no aggressive attempts to bring down prices. I understand that Minister Cavallo is constantly inciting the population to negotiate prices when they make a purchase or pay for a service, and I am convinced that this is essential for promoting consumer awareness.

Comment on Chapter 8

Federico Sturzenegger has prepared an interesting study in which he analyzes the performance of the Bolivian economy from a historical perspective, its sources of growth, and particularly the role of the mining and coca-producing sectors. I agree with many of his arguments and conclusions, but would like to touch on a few points where I consider his assertions to be erroneous. I will also touch on some aspects—not dealt with in the analysis, but which I feel need to be highlighted in the case of Bolivia—that address the legitimate concern reflected in the title of the paper.

The study concludes that political instability has had no significant impact on economic growth. I consider this assessment to be incorrect. The sharp decline in the gross domestic product and the high rate of inflation from the early to mid-1950s were preceded by a period of great political instability. More recently, the hyperinflation that peaked in 1985 was also largely due to political, social, and labor conflicts, which led Siles Zuazo, the president elected by an absolute majority of the votes, to demit office a year before his constitutional term was up.

The paper mentions at several points the impact of coca production on the Bolivian economy. It specifically states that the magnitude of the coca economy is equivalent to the gross national product. Reference is also made to a

study that put cocaine production at $2 billion in 1985. Had this been the case, Bolivia would never have had a balance-of-payments problem, for at that time $2 billion represented four times the amount of exports.

I believe that the author is confusing the value of coca production with the value of cocaine on the streets of New York, which is certainly $2 billion. A paper prepared by the Analysis and Economic Policies Department of the Bolivian Ministry of Planning suggests that the inflow of foreign exchange generated by the coca economy amounted to $350 million, which would appear to be a more realistic figure.

While the mining industry's current and future importance for the Bolivian economy is indisputable, I do not share the view that there is no alternative sector that could compare to the role played by mining as a generator of foreign exchange. The outlook is good for natural gas and for agriculture, such as cultivation of soybeans, sorghum, and cotton in the eastern plains, especially in the Department of Santa Cruz, and all the more so if the highway projects and the waterway project are implemented.

Section 8.5, which deals with stabilization, reforms, and productivity, notes that, despite reforms in the financial and foreign-trade sectors, the industrial sector has not gained in productivity. On the basis of this finding, the author suggests that the structural reforms have had little impact on economic development. This assertion is certainly polemic, since the industrial sector has been growing at rates of over 5% since 1987, and because any estimate of capital stock must be viewed with great caution. In this regard, there is no explanation as to how the capital stock was measured.

I shall now deal with some of the problems that, to me, partly explain why the Bolivian economy, which has been achieving price stability, has still not attained high levels of economic growth and why the balance of payments is extremely fragile.

The Bolivian model presupposes that reduction of the role of the state would go hand in hand with the strengthening of the private sector, but this has not been the case. Private investment has displayed little momentum. Fixed private capital formation represented 5% of GDP in the last five years, whereas it accounted for 9% in the 1970s. What is the explanation for the attitude of the Bolivian entrepreneur and the foreign investor? I shall try to answer this.

With the change in government, private business stood back and waited, since one of the political parties that acceded to power had advocated throughout the electoral campaign a complete overhaul of the economic model.

With the new government's renewal of the ESAF (extended fund facility) agreement with the International Monetary Fund and the World Bank, the authorities sent out the important signal that the reform process would continue and that the economic model installed by the previous government was the one to follow. The reform process has been slow, however, and some of the ground rules that were thought to be permanent have changed over the years.

For instance, the Law on Tax Reform was altered with supreme decree

22555, which granted tax exemption to a substantial segment of the country's economy (small business) and constituted a clear infringement of the principle of universality of the tax system. Subsequently, tax on the net worth of businesses doubled from 1 to 2%, value-added tax rose from 10 to 13%, fuel taxes were raised with an increase in the price of gasoline from 30 cents to nearly 50 cents a liter, and the tax on beer was also increased. At the same time, public spending began to mount in order to finance excessive current expenditure.

The rational course would have been to cut down on state bureaucracy and refrain from sending out such a damaging signal that the fiscal balance was highly precarious. The precariousness of public finance was confirmed last year when the country failed to meet the fiscal targets agreed upon with the International Monetary Fund. According to preliminary information, it appears that those targets will not be met this year either. Consequently, the conclusion is that the fiscal balance has not been consolidated in the case of Bolivia, which is a sine qua non for maintaining internal stability.

Another change was eliminating the system of export incentives, with the promise that they would be replaced with a more rational system. So far this has not been done.

The Bolivian model also accorded great importance to foreign private investment as a means of boosting the economy. In this connection, a law on investments was promulgated, which meted out equal treatment to national and foreign investment. However, apart from one foreign investment to expand a gold deposit of a firm already in existence, there have been few foreign investments of any significance. This is explained by deplorable experiences such as failure to enter into a concrete agreement with a foreign firm to exploit the Lithium Corporation (LITCO), and the annulment of risk-sharing contracts between the state and local and foreign mining companies for working the Bolívar, Tasna, and Catavi mines. These have sent negative signals to foreign and local private investors alike.

At the same time, structural reforms have continued at a very slow pace.

There have been delays in bringing in thorough financial reform that would help mobilize savings for financing investment funding and credit democratization. The Bank Law has been "on the verge of approval" for over two years, although the government has a parliamentary majority. Also, the lending rate for both local and foreign currency has remained at very high levels, discouraging private investment. The local currency lending rate was 54% in October 1992, while inflation was 13% in the same month. The dollar lending rate was 19%.

Social security reform has been "under discussion for three years," and a proposal to introduce new instruments and mechanisms that would speed up the functioning of the stock market has yet to be studied by the financial authorities.

Early in 1992 the Reform of the Customs System was approved with much difficulty, and the privatization process was launched in the middle of the year.

Comment on Chapters 7 and 8

John Williamson

Rudiger Dornbusch's paper gives a graphic description of the sixty years of Argentina's economic decline, from its position as the seventh member of the contemporary version of the Group of Seven in the early 1930s to its reputation as a case study in economic failure by 1990. The causes of this dismal record were defiance of the rules of good economic management in both the micro- and macrodimensions: extreme import substitution, excessive regulation, and irrational subsidization on the one hand, and eternal fiscal deficits complemented by repeated overvaluations on the other hand. The question that Dornbusch poses in his paper is whether the policy changes introduced by Domingo Cavallo in the last eighteen months, which have brought such hope to the Argentine people, have finally broken the cycle of decline initiated by Peron's populism.

So far as microeconomics is concerned, the omens look propitious. The opening of the economy to both trade and foreign direct investment, deregulation, privatization, and now the reform of the social security system, look to be as irreversible as they were profound.

The macro-omens are less reassuring. Dornbusch enthuses that the tax yield in terms of dollars doubled between 1989 and 1991, but since table 7.4 shows a recovery in the tax yield of only 2.8% of GDP, to a level only 0.5% of GDP higher than in 1985, one has to worry that the doubling of the dollar yield is primarily a consequence of the increased dollar value of GDP resulting from real appreciation. One must then ask whether the improvement in tax performance is large enough—and permanent enough—to have eliminated all need for the inflation tax, understanding that the cornerstone of the current macrostrategy, the convertibility law that supposedly guarantees a fixed exchange rate against the U.S. dollar, excludes any significant future resort to the inflation tax.

Dornbusch argues that real appreciation has already—as so often in the past—led to a serious overvaluation of the peso. His evidence for this proposition is hardly conclusive, even though he mentions no less than five measures based on two different concepts, four different price indices, and two different base periods, which one gathers are supposed to demonstrate overvaluation.[1]

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1. One can trace changes in the ratio of the price of services to the price of goods—a proxy for the Chicago concept of the real exchange rate, the price of nontradables in terms of tradables—from table 7.9. CPI and WPI inflation are presented in figure 7.5; they suggest that Argentina has lost a lot of competitiveness, as measured by the more traditional concept of the real exchange rate as the relative price of two national outputs, in terms of the former—though not the latter—measure since March 1991. Table 7.10 shows two measures of the real effective exchange rate calculated by the Central Bank of Argentina, one import-weighted and one export-weighted (without any statement of the price index utilized, which is apparently a fifty-fifty mix of CPI and WPI), both based on the traditional concept of the real exchange rate, and both of which show a large real appreciation since the late 1980s.

An assertion that a currency is overvalued in comparison to its fundamental equilibrium exchange rate, or some analogous concept, needs to face squarely the difficulties of identifying the equilibrium rate. This is not to argue that the task of diagnosing overvaluation is impossible, but to urge that it needs to be treated seriously rather than dismissed with a few casual statistical comparisons, without even taking the trouble to argue that a particular base period has some claim to be considered an equilibrium.

In fact, Dornbusch's concern about overvaluation probably *is* merited. The next question that arises is what should be done about it. He offers us five alternatives: do not devalue but tough it out by following the gold standard rules of the game irrespective of cost; reinforce the first strategy of not devaluing by tightening fiscal policy, thus reducing the danger of a further accentuation of the overvaluation with its concomitant danger of undermining credibility; devalue one last time (as usual); start a crawling devaluation; and complete the process of dollarization. He advocates the second or fifth strategy, citing in support of his rejection of the devaluation options a *modelzinho* drawn from his earlier work that makes the point that Kiguel and Liviatan have emphasized, that an exchange rate–based stabilization brings an initial boom followed by the need for a prolonged recession in order to deflate prices back to equilibrium.

I endorse Dornbusch's rejection of the option of "one last devaluation." A promise of no subsequent devaluations would have zero credibility, and the whole stabilization program would probably collapse if its linchpin were removed by yet another surprise abrogation of the fixed-rate promise. It is good to see Dornbusch fulfilling the professional duty that often falls on practitioners of the dismal science to warn of the need for blood, sweat, and tears rather than nurturing populist hopes that instant activism can be guaranteed to get growth going again without painful delays.

Nevertheless, we also have a duty to minimize pain, something that nowadays we all believe can be promoted by maximizing credibility. There is in my view a strong presumption that pain could be reduced, inter alia because credibility could be increased, by complementing further fiscal tightening with the initiation of a crawling depreciation. I think it is quite wrong to suggest that the psychology of moving to a crawl would be similar to that of a step devaluation: the change could be debated in parliament prior to its implementation, rather than having to take the form of a surprise renunciation of previous promises. Adoption of a crawl would mark Argentina's passage from the unconvincing posture of promising undying fidelity to a noncredible promise into the ranks of the well-managed Latin American countries like Chile, Colombia, and Mexico that recognize that controlling inflation requires more than an intention to stick with an unchanged nominal anchor.

Federico Sturzenegger's paper deals with the country whose experience of a successful stabilization that failed to crowd in growth originally provoked Dornbusch's concern with this issue (Dornbusch 1989). The paper notes that

the stabilization of August 1985 was followed by a second collapse in the price of Bolivia's principal tradition export, tin, and that recovery has been hampered by the illegality of the main nontraditional export, coca (80% of whose foreign exchange earnings are reported never to reach the country). The process of developing alternative nontraditional exports, on the success of which future Bolivian growth surely depends, merited more systematic treatment than it receives in the paper, although there are some indications of hopeful developments.

I have comments on two of the conclusions of the paper.

I doubt whether we should conclude from the econometric finding that Bolivian productivity varied with the price of minerals, that Bolivia's future growth depends on a recovery of mineral prices. Sturzenegger does not offer a theoretical explanation for his empirical finding. I would conjecture that it reflects the fact that in the past the Bolivian economy was dominated by mineral production, and high prices for major exports permit an economy to operate at full capacity which brings a cyclical increase in productivity. If that is indeed the explanation, it follows that Bolivia will still have growth possibilities even if the mineral sector remains as minor as it has now become (table 8.3 reveals that since 1976 tax revenue on the sector has amounted to only 0.1% of GDP, while both legal exports and formal GNP accounted for by minerals have fallen below 15%). Successful development of nontraditional exports could provide a perfectly satisfactory substitute.

The most interesting and useful result in the paper seems to me to be the estimate of the impact of hyperinflation on productivity. Until I find a superior source of evidence, my stylized fact will henceforth be that hyperinflation reduces productivity, and hence output, by around 20%. This interpretation suggests that output first fell around 20% because hyperinflation was allowed to develop, and then failed to recover because the removal of that shock was accompanied by another negative shock—the collapse in the terms of trade—of similar size. It is an interpretation that permits Bolivians some hope that the future will be brighter than the recent past.

Reference

Dornbusch, Rudiger. 1989. From Stabilization to Growth. Paper presented to a conference, The Economic Reconstruction of Latin America, at the Getulio Vargas Foundation, Rio de Janeiro, 7–8 August.

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