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## Attacking poverty in Bolivia - Past evidence and future prospects: Lessons from a CGE analysis

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**Attacking Poverty in Bolivia – Past Evidence and  
Future Prospects: Lessons from a CGE Analysis**

*por*

*Rainer Thiele*

*and*

*Manfred Wiebelt*

# **Attacking Poverty in Bolivia – Past Evidence and Future Prospects: Lessons from a CGE Analysis\***

by

Rainer Thiele\*

and

Manfred Wiebelt\*\*

## **Abstract:**

This paper reviews Bolivia's economic and social development over the period 1985–99, and investigates the country's future prospects for pro-poor growth using a Computable General Equilibrium (CGE) model. It turns out that past economic growth cannot be called pro-poor. Model simulations show that under optimistic assumptions the growth and poverty goals envisaged in the Bolivian poverty reduction strategy may be achieved, but that performance will fall short of expectations once external shocks are taken into account. The evolution of poverty is likely to remain uneven, with considerable improvements in urban areas and a high persistence in rural areas.

JEL classification: D58, 054

Keywords : Growth, Poverty, Income Distribution, CGE Analysis, Bolivia

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Attacking Poverty in Bolivia – Past Evidence and  
**Future Prospects: Lessons from a CGE Analysis**

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**1. THE ISSUE**

There is an ongoing debate about the success or failure of structural adjustment programs under the auspices of the IMF and the World Bank (for an overview, see Thiele and Wiebelt 2000). This debate does not only focus on whether the programs have been able to restore macroeconomic equilibrium and initiate a sustained process of economic growth, but also on their impact on poverty and inequality. Bolivia is one of the few adjusting countries where significant achievements in terms of macroeconomic stabilization and structural reforms are beyond doubt. It is less evident whether these efforts have been sufficient to bring about broad-based increases in living standards, i.e., pro-poor growth. This paper attempts to shed some light on this issue by providing an account of the country's past economic and social development, starting in 1985, when a hyperinflation made adjustment measures inevitable, and by investigating the future prospects for pro-poor growth.

The remainder of the paper is structured as follows. Section 2 describes the evolution of growth, economic structure, poverty and income distribution, as well as possible links between these variables, over the period 1985–1999. Section 3 first outlines the economic and social goals as set out in the Bolivian Poverty Reduction Strategy (BPRS), and then evaluates some aspects of the strategy using a Computable General Equilibrium (CGE) model. After a short description of the modeling framework, three different simulations are presented, each covering a ten-year period. The first simulation establishes an optimistic growth scenario based on continued macroeconomic reforms, the second shows how an external shock such as El Niño can undermine possible progress in poverty reduction, and the third illustrates how measures targeted towards specific population groups may make growth more pro-poor. The paper closes with some concluding remarks.

## 2. ECONOMIC AND SOCIAL DEVELOPMENT DURING ADJUSTMENT

### 2.1 Growth and Structural Change

Following the hyperinflation in 1985, comprehensive reforms, most notably a quick and effective monetary stabilization, enabled Bolivia to restore economic growth. Figure 1 shows that after the initial stabilization phase GDP per capita increased steadily, with the exception of the two recession years 1992 and 1999 where the rise in GDP fell short of the population growth rate. While this performance compares favorably with the average of developing countries, various macroeconomic constraints prevented Bolivia from achieving even higher growth rates. Very low savings and investment ratios appeared to be particularly growth-retarding (Schweickert 2003). Remaining inefficiencies in labor markets and the tax system probably also played a role (see below).

In explaining possible changes in the production structure during adjustment, the evolution of two core relative prices, the real exchange rate and the rural-urban terms of trade, is of particular importance. Typical structural adjustment programs are characterized by real devaluations concomitant with improvements in the terms of trade of the more outward-oriented rural sector. They thereby provide strong incentives for farmers and contribute to rural poverty alleviation. In Bolivia, developments have been quite different. The country experienced a substantial real devaluation right at the beginning of the stabilization phase, but then the Boliviano steadily appreciated in real terms until the mid-1990s and exhibited no clear trend thereafter.<sup>1</sup> The rural-urban terms of trade deteriorated by more than 20 percent in the first stabilization year and never fully recovered from this drop. Movements in these two core relative prices have thus not turned out to be favorable for outward-oriented sectors and for agriculture, which in Bolivia is not among the most outward-oriented activities.

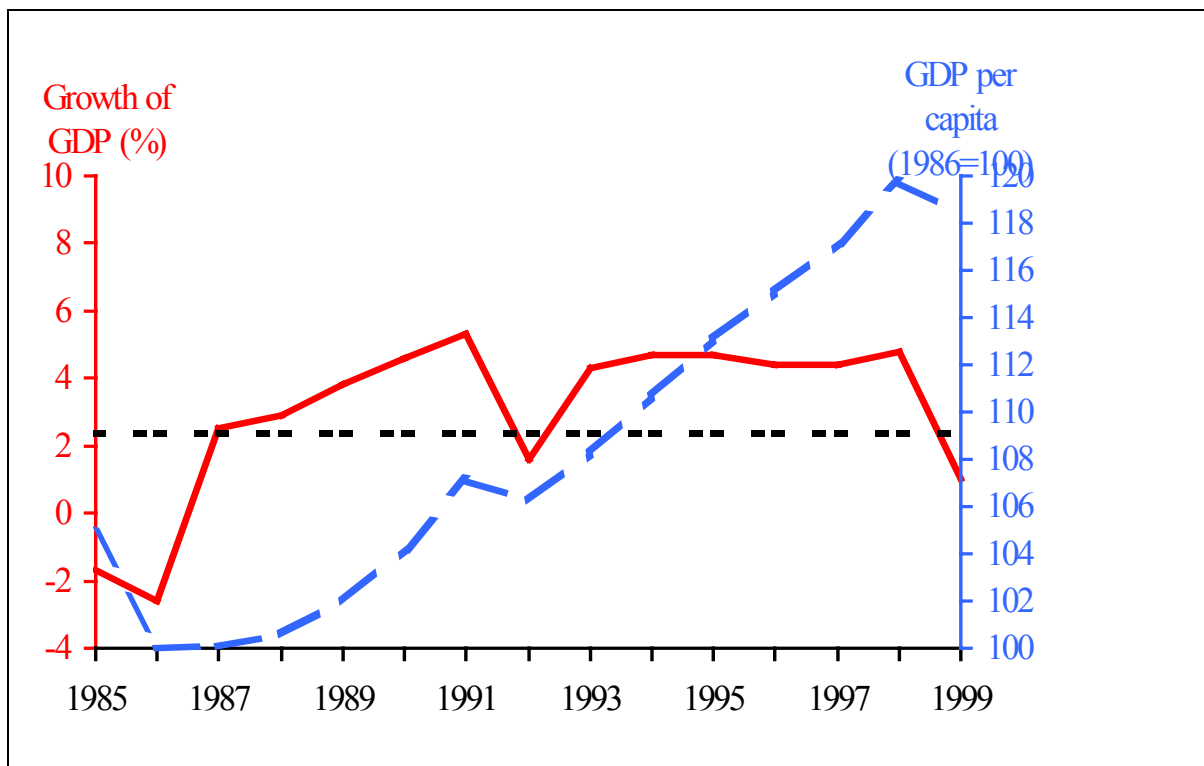
This pattern of incentives is at least partly reflected in the evolution of the sectoral production structure (Table 1). The combined share in GDP of the two most outward-oriented sectors, mining and manufacturing, has remained roughly constant over the period 1985–99, while agriculture's share has decreased somewhat. Within agriculture, however, the

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<sup>1</sup> For a discussion of the macroeconomic implications of real exchange rate movements in Bolivia during adjustment, see Schweickert (2003).

export-oriented modern segment has gained substantially at the detriment of the much more inward-oriented traditional segment where most of the rural poor earn their living. Unfortunately, given the lack of survey data on rural income development, it cannot directly be assessed whether the relative decline of traditional agriculture primarily reflects the outmigration of farmers that has taken place at a considerable scale, or whether it also corresponds with stagnating average incomes for the remaining smallholders. An indication of the latter is the very limited productivity growth of most traditional crops.

Figure 1: Growth of GDP and GDP per Capita, 1985–1999



Source: INE (2001a).

**Table 1: GDP by Sector of Origin, 1985–1999**

Sector	1985	1990	1995	1999
Agriculture	16.2	15.4	14.9	14.2
Traditional	15.0	13.9	12.3	11.6
Modern	1.2	1.5	2.6	2.6
Mining	10.7	10.3	10.2	9.5
Manufacturing	16.2	17.0	17.1	16.6
Construction	3.2	3.1	3.4	3.7
Commerce	8.6	8.9	8.6	8.5
Transport	8.4	9.3	10.0	10.9
Services	19.4	17.6	17.8	19.4
Public Administration	11.8	10.1	9.4	8.9

Source: INE (2001a).

**Table 2: The Urban Labor Force by Sector of Activity and Type of Employment (percent), 1985–1999**

	1985	1989	1999
<b>Sector of activity</b>			
Agriculture	2.2	2.2	3.8
Mining	3.0	2.0	0.9
Manufacturing	17.8	14.1	18.4
Construction	6.1	7.8	8.8
Commerce	23.5	26.1	33.1
Transport	7.8	7.8	8.6
Services	30.7	32.6	22.5
Administration	8.9	7.2	3.9
<b>Type of employment</b>			
Wage Earners	/a	50.7	44.7
Blue collar	/a	11.6	10.3
White collar	/a	39.1	34.4
Employer	/a	2.7	4.3
Informal Sector	/a	46.7	50.0
Self-employed	/a	38.0	39.1
Family workers	/a	8.7	8.8
House employee	/a	/	3.0
Unemployed	6.0	10.4	7.2

<sup>a</sup>No comparable data available.

Source: Jemio (2000) ; Vos et al. (1998); own calculations based on the 1999 survey (INE 2001b).

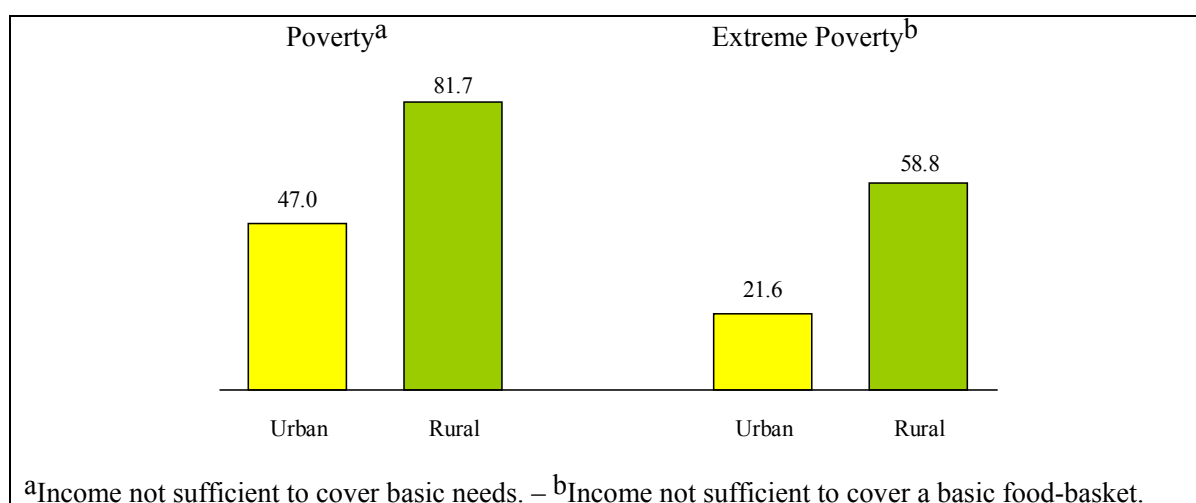
Overall, the sectoral production structure has changed only moderately. Somewhat more pronounced shifts can be observed in terms of employment. Changes in the urban labor force by sector of activity clearly reveal the process of fiscal retrenchment (Table 2). Many of the people who became redundant in the public administration and other public services found

a new job in commerce or construction. During the stabilization phase, open unemployment increased as well. It ceased to be a major problem in the 1990s, declining to an average rate of below 4 percent between 1994 and 1998. The higher unemployment rate shown for 1999 is due to the recession of that year. Viewed by the type of employment, the most striking feature is the persistently high share of the labor force working in the informal sector.

## 2.2 Poverty and Income Distribution

In assessing the evolution of poverty during adjustment, two basic concepts were distinguished. One is monetary, based on income or consumption, the other is non-monetary, based on unsatisfied basic needs (Thiele 2003). It turned out that urban income poverty as measured by the headcount ratio slightly increased during the stabilization phase (1986–89), and moderately decreased in the 1990s. Over the whole adjustment period, the headcount ratio dropped by about 5 percentage points, reducing the share of extremely poor people from above to below 20 percent and the share of moderately poor people from above to below 50 percent. Rural income poverty cannot be traced over time because representative household surveys became only available in 1997. The only firm conclusion that can be drawn is that poverty in the late 1990s was much more widespread in rural than in urban areas (Figure 2).

**Figure 2: Rural and Urban Poverty Incidence, 1999**



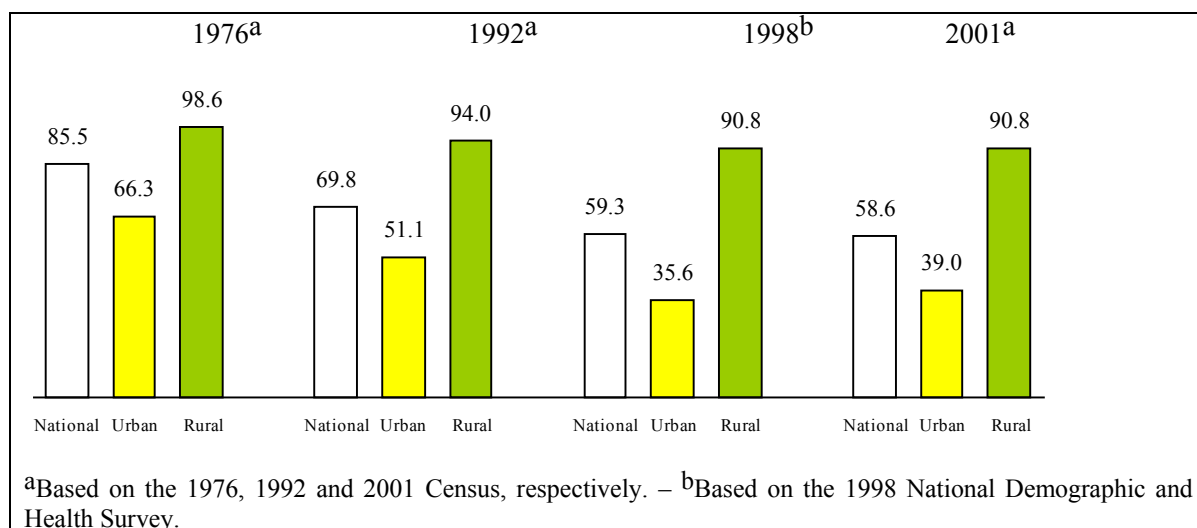
Source: World Bank (2000).



To capture the non-monetary dimension of poverty, an index of unsatisfied basic needs was constructed by aggregating sub-indices for housing conditions, water and sewage, energy, education, and health. Given the arbitrariness of the weighting scheme underlying the aggregation procedure, this indicator should be interpreted very cautiously. Figure 3 shows the rural and urban poverty incidence as measured by the index of unsatisfied basic needs for the years 1976, 1992, 1998, and 2001. A very clear picture emerges, with almost no progress in rural areas and a near halving of urban poverty between 1976 and 2001. The regional differences are so pronounced that, methodological problems notwithstanding, one can speak of a large and widening rural-urban gap in living conditions.

The evolution of inequality was analyzed for both labor income and overall income. The analysis was confined to urban areas because of the above-mentioned lack of rural data. Overall urban income inequality declined quite dramatically right after the end of the hyperinflation, which is not surprising because in a situation of hyperinflation poorer segments of the population typically possess much lower means to protect the real value of their income than do wealthier segments. Apart from this immediate stabilization effect, no larger movements can be discerned, with the Gini coefficient always remaining close to 0.5.

**Figure 3: Poverty Incidence According to Unmet Basic Needs, 1976–2001**



Source: Government of Bolivia (2000) and INE (2002).

The distribution of urban factor income, by contrast, exhibits a clear trend. Particularly revealing is a comparison of the three dominating occupational groups, i.e., blue collar workers, white collar workers, and the self-employed. Figure 4 shows that over the

period 1989–99 white collar workers experienced by far the largest real income increases. While income growth for blue collar workers still exceeded the average of 20.8 percent, incomes of the self-employed virtually stagnated. The rising skill premium for white collar workers suggests growing disparities in the urban labor market, and the meagre results for the self-employed point towards a relative decline of earning opportunities in the informal sector. The conflicting results for factor income and overall income may at least partly be due to the fact that the labor market participation of women from poor households has increased substantially, which has had the effect of lowering income disparities between households while raising wage inequality.

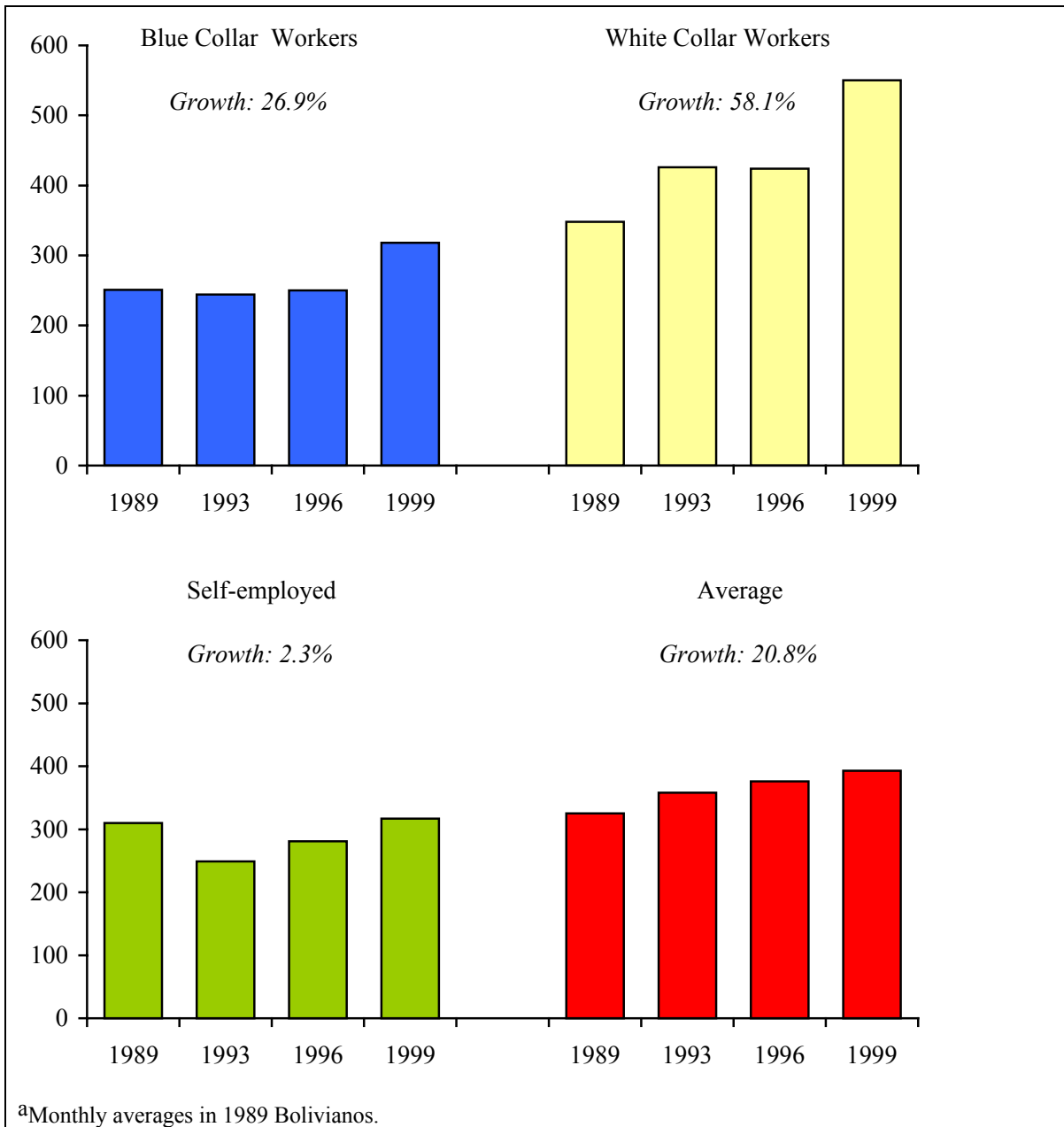
### **2.3 Links Between Economic and Social Development**

Adjustments at the macroeconomic level tend to affect the earning opportunities and the cost of living of individuals, thereby changing their real income. The most well-established link between macroeconomic and social indicators is that running from growth to poverty. A number of cross-country analyses have come up with the result that sustained growth of GDP per capita is, on average, associated with declining poverty (e.g., Dollar and Kraay 2001). This also holds for Bolivia. Empirical studies have estimated a significantly negative elasticity of the headcount index of poverty with respect to growth (e.g., Wodon 2000). However, with levels of around  $-0.6$  to  $-0.7$ , this elasticity is low in international perspective. For a sample of twelve other Latin American countries, for instance, the average elasticity has been estimated to be  $-1$  (ibid.).<sup>2</sup>

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<sup>2</sup> Between growth and inequality, no significant statistical relationship can be identified for Bolivia. This is in line with the evidence for many other countries and reflects the theoretical ambiguities concerning the nexus between the two variables.

**Figure 4: Urban Factor Income by Type of Employment, 1989–1999<sup>a</sup>**



Source: Jemio (2000); own calculations based on the 1999 household survey (INE 2001b).

**Table 3: Poverty Incidence by Sector of Activity, 1999**

Sector of activity	Rural	Urban
Agriculture	85.2	60.2
Mining	55.2	39.7
Manufacturing	74.5	55.1
Electricity, gas and water	/ <sup>a</sup>	43.3
Construction	65.9	44.8
Commerce	46.0	39.2
Transport	45.3	39.0
Finances	/ <sup>a</sup>	24.0
Services	37.6	29.7
Non-traded goods	78.6	45.9
Traded goods	84.6	54.8

<sup>a</sup>Representing less than 0.1 percent of the economically active population.

Source: World Bank (2000).

Changes in the sectoral production structure may also have affected poverty and inequality. Household surveys reveal that the sector of activity is among the main factors determining an individual's probability of being poor. According to the November 1999 survey, the poverty incidence in the service sector, for example, was less than half that in agriculture, both in rural and urban areas (Table 3). It was also lower than that in construction and commerce, suggesting that the process of fiscal retrenchment may have led to a fall into poverty for some of the former public employees.

Altogether, Bolivia's economic growth over the period 1985–99 cannot be called pro-poor. In particular, traditional agriculture and the urban informal sector, where most of the poor earn their living, were largely bypassed. The next Chapter will discuss the prospects for more pro-poor growth in the future.

### **3. PROSPECTS FOR PRO-POOR GROWTH**

#### **3.1. The Bolivian Poverty Reduction Strategy**

In its Poverty Reduction Strategy Paper (PRSP), which was completed in May 2001, the Bolivian government formulated ambitious social goals to be achieved over the period 2001–2015 (Government of Bolivia 2001). Among the improvements the strategy envisages to realize by 2015 are the following targets with respect to income poverty:

- a reduction of the nationwide poverty incidence from 63 % to 41 %;
- a reduction of the urban poverty incidence from 47 % to 32 %;
- a reduction of the rural poverty incidence from 82 % to 52 %.

Success in reaching these and other social targets will to a large extent depend on Bolivia's ability to achieve higher growth. The PRSP calls for average growth in excess of 5 % over the period under consideration, compared with an average growth rate of about 4 % in the 1990s. Faster growth will require additional structural reforms – in particular a more flexible labor market and a more efficient tax system – that enable the country to boost private investment. Moreover, the PRSP acknowledges that for making growth more pro-poor than in the past measures specifically targeted towards poverty groups, such as investments in rural infrastructure, are needed.

So far, the expectations raised in the PRSP have not materialized. Revised projections estimate that actual growth during the first 4 years (2001-2004) will not exceed 2.2 %, but will increase to above 5 % afterwards. Moreover, poverty elasticities with regard to overall growth have been corrected from -0.77 to -0.60 and from -0.54 to -0.26 for urban and rural areas, respectively. Given these estimates, the headcount index is now expected to fall to 54 % nationwide and to 45 % and 75 % in urban and rural areas, respectively, until 2015 (UDAPE 2002).

## 3.2. Evaluating the Bolivian Poverty Reduction Strategy

### 3.2.1 Modeling Framework

We will now describe the main features of the CGE model for Bolivia that is used to evaluate the poverty reduction strategy.<sup>3</sup> The model combines neoclassical and structuralist characteristics. The production structure and goods markets conditions, for example, correspond with the standard neoclassical specification. However, the model takes into account the segmentation of labor markets observable in Bolivia (Lay, Wiebelt 2001). Moreover, the savings and investment behavior of the different institutions is modeled explicitly, which follows the structuralist view on adjustment of other models for Bolivia (Jemio 2001). In particular, the different possibilities of institutions to acquire domestic capital and foreign exchange are captured as well as the limited possibilities of individual institutions to determine optimal portfolios (Escóbar, Vásquez 2002).

Another distinctive characteristic of the model is its recursive-dynamic nature. The model is solved for a sequence of static equilibria for future time periods connected through capital accumulation. The dynamics of the model are based on assumptions concerning exogenous growth rates for different population groups and technological change, as well as savings and investment behavior. A general advantage of a dynamic specification is the possibility to determine, via endogenous savings and investment, the capital accumulation necessary for medium to long run growth. Moreover, structural change over time can be analyzed. Finally, dynamic effects with regard to the financial sector can be investigated. For example, it can be investigated how debt relief through the HIPC initiative reduces interest payments, thereby providing room for additional investment in infrastructure, education and health that may contribute to pro-poor growth.

#### a. Structure of the Model

Characteristic of the Bolivia model are its strong disaggregation of the enterprise and household sector and its specification of the markets for goods, factors and financial assets.

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<sup>3</sup> This presentation uses no mathematics. Wiebelt et al. (2003) includes a mathematical model statement.

The model economy includes as agents enterprises, households, government, and the rest of the world (Table 4). Enterprises comprise private and public producing units and financial institutions. Thus, the model differentiates between government (which among others is responsible for infrastructure investment) and public enterprises (producing enterprises, Central Bank, development banks). The economic activities of enterprises include the production of goods, capital accumulation, and financial intermediation.

There are 12 producing enterprises distinguished by a characteristic but not necessarily homogenous good. Rather, it is assumed for some sectors that domestically sold and exported goods are different goods. Similarly, domestically produced and imported goods of the same category are also treated as different goods. Finally, some sectors produce pure non-tradables, for which there are neither exports nor imports; others do not produce for the export market; and for some domestically produced goods there are no imported substitutes. Thus, with 12 sectors there is a maximum of 36 goods included in the model. This rather strong differentiation in the enterprise sector is necessary to capture the different income earnings possibilities of households in a detailed manner.

**Table 4: Classification in the Bolivia Model**

Activities/Goods and Services	Production Factors	Economic Agents
Traditional agriculture	Unskilled labor	<i>Households</i>
Modern agriculture	Skilled labor	– Smallholders
Crude oil and natural gas	Household capital	– Rural workers
Mining	Enterprise capital	– Urban workers
Consumer goods	Public (infrastructure) capital	– Employees
Intermediate goods		– Urban informals
Capital goods		– Employers
Utilities		Public enterprises
Construction		Private enterprises
Informal services		Government
Formal services		Rest of the world
Public services		<i>Financial institutions</i>
		– Commercial banks
		– Development banks
		– Central Bank
		– Pension Fund

Another distinctive feature of the model is the explicit treatment of traditional agriculture and (urban) informal services as informal sectors. Workers in these sectors are considered self-employed; they are remunerated on the basis of their per-capita output, which depends on demand. Thus, there is no minimum level of income. Over one year, supply is constant for a given number of workers and given factor productivities; and if demand slackens, the adjustment will be through a fall in prices. This treatment of traditional agriculture and informal services reflects the fact that average incomes in these sectors stagnated for years and that most of the poor are engaged in them. By contrast, formal enterprises, which consist of private formal and public enterprises, rather produce with modern, capital intensive techniques and, like the government, hire workers. Both formal and informal enterprises use intermediates for production.

Regional affiliation and factor endowment differentiate the six representative private household groups included in the model. Four of them (smallholders, urban informals, and rural and urban workers) can be considered as poverty groups. Depending on their factor endowment, these households receive labor or capital income as well as (net) interest payments on their financial assets. Moreover, they receive transfer income from the state and from relatives living abroad. They use their gross income to pay for taxes and consumption as well as for savings.

The government finances its current and investment expenditures out of direct and indirect tax revenues, operating surpluses of public enterprises, and capital inflows from abroad. Finally, the rest of the world imports and exports goods from and to Bolivia, undertakes direct and portfolio investments in the country, and provides development aid.

The transactions of the economic agents have been compiled in a Social Accounting Matrix for the year 1997, which captures the most important structural characteristics of the Bolivian economy (Thiele, Piazzolo 2003). Moreover, this micro consistent data set provides the statistical backbone for the calibration of the Bolivia model.

To take account of Bolivian reality and to capture the circular flow of income and the determinants of poverty in a detailed manner, the model assumes two segmented labor markets, one for unskilled (poor) workers and another for skilled (better-off) workers with the former divided into markets for rural and urban workers, i.e. the model contains three labor markets. In all three markets, wage building is assumed to be determined by a Phillips curve with partial indexation to the consumer price level and the economy-wide unemployment rate. The segmentation of the labor market is also taken into account by assuming that urban informals have no access to the urban labor markets.



The model also assumes segmented capital markets taking into account the fact that smallholders and urban informals invest almost exclusively in traditional agriculture and informal services while private and public enterprises accumulate capital in all formal sectors and employers receive capital income from all formal sectors with the exception of utilities. Moreover, the model separates complementary public infrastructure capital, which is assumed to be complementary to private capital and to have a crowding-in effect. Thus, by determining its investment focus, the government can influence the income generation possibilities in different sectors and regions.

*b. Policy Variables and Other Simulation Parameters*

The modeling framework described above defines an economic system characterized by institutions, each with their own behavioral rules, and by a set of markets, some of which are segmented and imperfect. The effectiveness of policy interventions will be influenced by this institutional setting and by the assumed sectoral adjustment behavior. Moreover, the effectiveness of domestic policies will be affected by external events, such as changing world market prices for exports and/or imports and changing international interest rates, as well as the rest of the world's decisions about foreign direct and portfolio investment in Bolivia and the provision of development aid, HIPC debt relief, and/or concessional lending. Key domestic policy instruments in the model are: the nominal exchange rate; the minimum level of Central Bank reserves, which will determine the amount of credit that will be available to domestic financial institutions; the interest rate charged by the Central Bank; the level of government consumption and investment expenditures; and tax rates (Table 5). In the following, we will have a closer look at labor market reforms, tax policies, exogenous shocks such as El Niño, and improvements in credit access for poor households, i.e., policies and events which are supposed to enhance or undermine growth and poverty reduction in Bolivia.

Table 5: Policy Variables and Other Simulation Parameters

Government	Banking System	Rest of the World
Income/corporate taxes	<i>Central Bank</i>	Development aid
Export subsidies	Minimum reserves (in relation to imports)	Foreign portfolio investment
Import tariffs	Central Bank interest rate	Foreign direct investment
Excise tax	Nominal exchange rate	Net credit to government
Value added tax		Debt relief (HIPC)
Transfers to households and enterprises	<i>Private banks</i>	Foreign interest rate
Real government consumption	Access to credit	Factor income from abroad
Real government investment	Flexibility in credit allocation	Remittances from abroad
		World prices for exports
		World prices for imports
		Grants on concessional credits

### 3.2.2 Model Simulations

The following simulations based on the CGE model presented in the preceding section first establish a baseline scenario and then explore the impact of unfavorable weather conditions, as well as the potential role of improved credit availability for poor households in improving income distribution and reducing poverty.<sup>4</sup>

#### a. Baseline Scenario: Continued Reforms at Stagnating Capital Inflows

The baseline scenario assumes that the reform process in Bolivia is continued as recommended by the IMF and the World Bank (e.g., IMF/IDA 2000). More specifically, we

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<sup>4</sup> While evaluating the simulation results, it has to be kept in mind that the CGE model has its own dynamic, i.e. that even in the case when it is not subject to a particular external shock or policy intervention, it will still exhibit a dynamic trend over time, since some exogenous variables are determined endogenously in the simulations of the previous periods. For instance, output is determined by the current physical capital stock, which, in turn, depends on past investment and depreciation. Moreover, company investment is crowded-in by past government investment but is crowded-out by public sector investment in previous years. Finally, most of the financial portfolio decisions in a particular period are determined by current wealth, asset and liability stock values, which, in turn, are determined by past savings, revaluation and net acquisitions of assets and liabilities.

assume that the disentanglement between public non-financial enterprises and the government continues and that the labor market is deregulated. The equal treatment of private formal and public enterprises with regard to taxation and transfer payments is to be realized stepwise until the year 2005 (period 8 in the model). This measure is implemented in the model by increasing/decreasing continuously corporate tax rates for public and private enterprises starting from 1998 (period 1) to 30%, while income taxes for employers (the richest household group) are continuously increased to 10%, the income tax rate that is observable in the data base for employees (the second richest group). Moreover, subsidies to enterprises are reduced step by step to zero over this time period. Compared to the base data, these measures yield a relative redistribution from the government and employer households to enterprises. The labor market deregulation is introduced into the model by partially indexing nominal wages for unskilled workers to the unemployment rate.<sup>5</sup> This implies that unskilled workers take into account changes in unemployment in their wage bargaining. With regard to foreign inflows of development aid, FDI and net government credit, we assume a stagnation after 2000 (period 3) in all simulations.<sup>6</sup> Overall, this reform scenario approximates in our view the current situation in Bolivia, where further massive capital inflows cannot be expected after the capitalization process is almost completed and where further reforms are planned to lift the country to a high and sustainable growth path, thereby providing the conditions necessary for sustained poverty reductions.

The results of the reform scenario are summarized in Graphs a-f of Figure 5. On the aggregate level, real GDP grows at an annual average rate of around 5.5 % (Graph a), a rate that is also envisaged in the PRSP. During the first three years, growth is driven by domestic demand, in particular by growth of investment demand as indicated by high growth rates in construction and the production of capital goods, oil and gas, and other intermediate goods (Graph c). After the third year, with stagnating capital inflows export growth becomes the major driving force for overall growth (Graph a). Additional capital inflows in the first three years lead to a real appreciation, lower exports and higher imports (Graph a), and a widening of the balance of payments current account deficit (Graph b). As a result of overall income growth, the share of domestic savings in GDP increases from about 13% to about 24%, as envisaged in the PRSP. Moreover, the share of investment in GDP increases from about 20%

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<sup>5</sup> In the benchmark, nominal wages of unskilled workers are only indexed to the consumer price level.

<sup>6</sup> The reform scenario does not take into account the debt relief resulting from the HIPC initiative. The impact of the HIPC initiative for Bolivia is discussed in Schweickert et al. (2003).

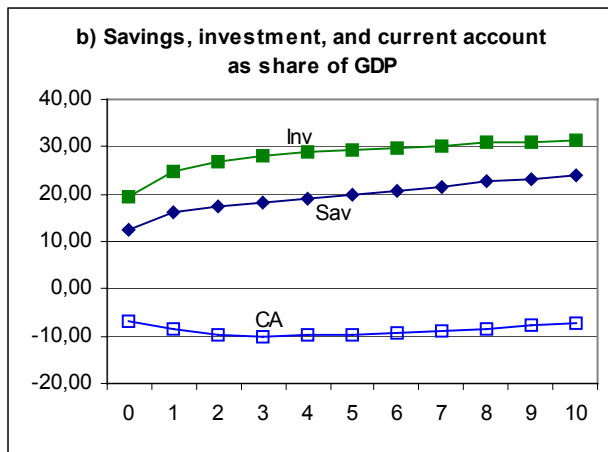
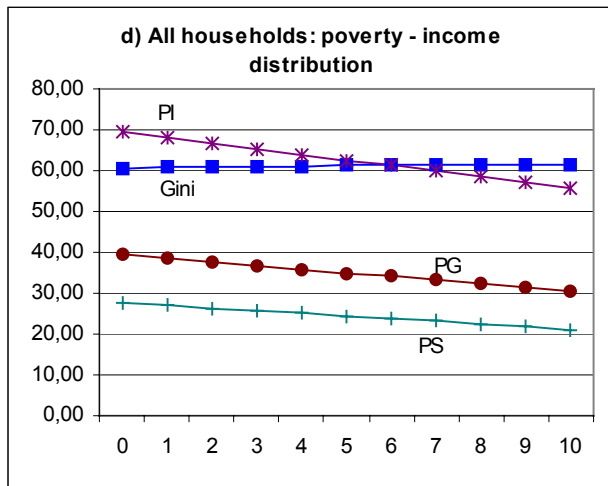
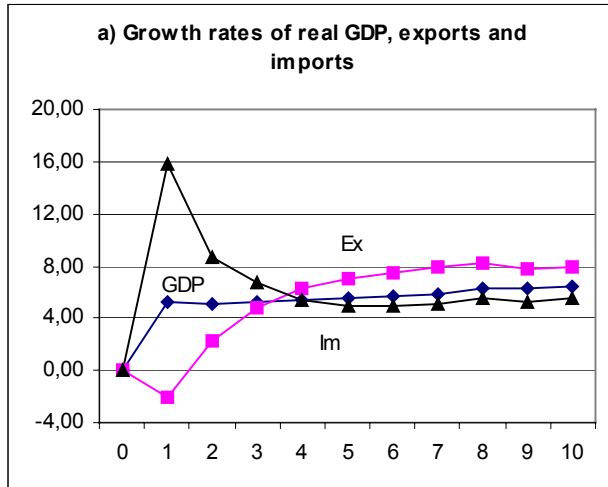
to more than 30% with FDI's importance in financing domestic investment decreasing from more than 10% to less than 7% of investment.

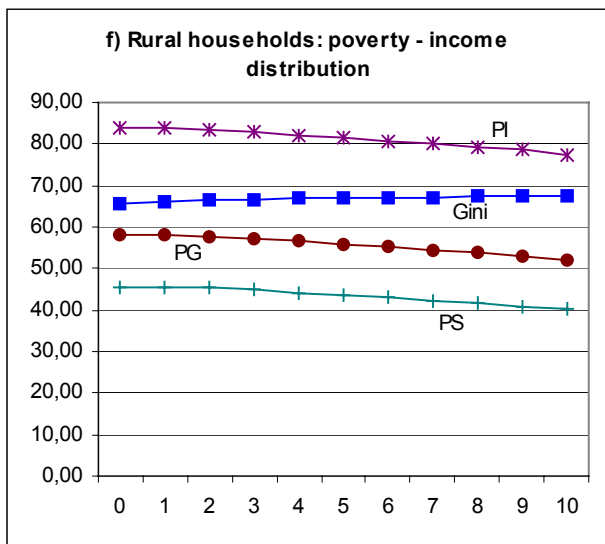
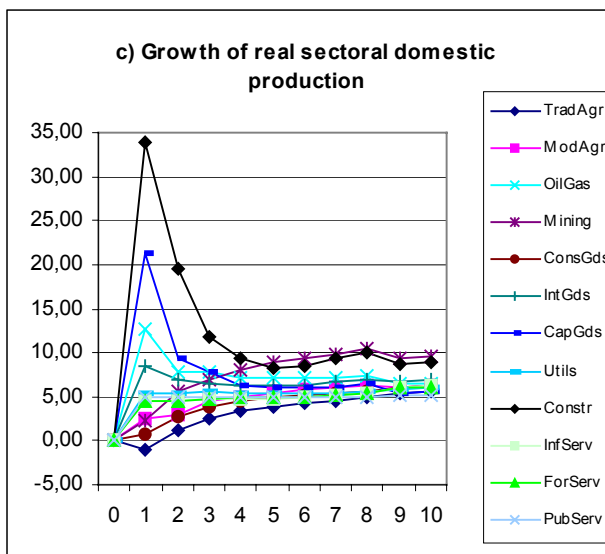
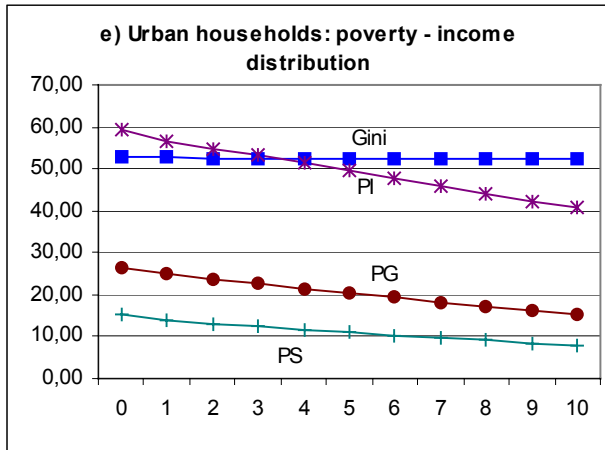
The increases in overall income are not equally distributed over society. In the long-term, per-capita income increases by between 55% for capital owners (employers), urban self-employed and urban unskilled workers and by 20% for smallholders and rural workers, whereas urban skilled workers (employees) realize an increase in per-capita income of 30 %. Even capital owners, who are taxed more heavily, are among the main beneficiaries of the reform program. Urban workers, whose nominal wages are partially indexed to the consumer price level benefit from additional employment, especially in construction and the manufacturing sectors. The same holds true for urban self-employed (informals). These households not only receive income from petty trading in the informal services sector but also from repair and maintenance work in manufacturing and construction.

Rural households benefit the least from the reform measures and are even negatively affected in the short to medium-term by the real appreciation caused by additional capital inflows. Traditional agriculture (including coca production), which is the only source of smallholder's income from production, does not benefit from the expansion of investment demand, yet the sector is affected by increasing costs for intermediates. Moreover, traditional agricultural goods are quite homogenous and therefore can easily be substituted by imports, which become relatively cheaper. Together, increasing production costs and relatively lower demand imply that traditional agriculture increases less than other sectors with negative consequences for income earned in this sector. By and large, the same effects are responsible for relatively low growth rates in modern agriculture where rural workers earn their living.

Assuming that household characteristics remain unaffected by policy measures and external shocks, we can combine the results obtained from the CGE simulations for the different representative households with the full sample results of the 1997 household survey to calculate distributional and poverty indicators. Graphs d-f in Figure 5 show the development of the Gini coefficient (Gini), the headcount ratio or poverty incidence (PI), the poverty gap (PG), and the squared poverty gap, which measures the poverty severity (PS) for both total Bolivia as well as urban and rural areas.

Figure 5: Baseline Scenario<sup>a</sup>





<sup>a</sup>All indicators are in percentages.

Additional capital inflows and macroeconomic measures do not change the Bolivian income distribution (Gini). With similar increases in real per-capita income of rich (capital owners) and poor (urban workers and urban self-employed) urban households but lower increases of the middle income group of urban skilled workers, urban income distribution remains unchanged. In rural areas, there is a marginal change in income distribution towards better-off households, which is reflected in an increase of the Gini coefficient from 65.8 to 67.7. On a national scale, additional capital inflows and macroeconomic reforms are able to reduce the share of people living in poverty from initially almost 70 to 55 % which is close to the revised estimate of the Bolivian government. The poverty gap is reduced from 40 to 30 % and poverty severity from 28 to 21 %. However, it has to be kept in mind that these overall improvements require overall growth rates of at least 5.5 %.

Looking at the regional figures shows that the improvements in national poverty indicators can be traced back mostly to improvements achieved in urban areas. The macroeconomic reforms in the fields of taxation and labor market deregulation lead to an expansion of employment opportunities, which benefit particularly urban unskilled workers. Under the institutional conditions of the model open and disguised unemployment is reduced drastically thereby increasing urban labor incomes. Higher consumption expenditures as a result of higher growth also benefit poor urban informals. As a result, the urban incidence of poverty is reduced from 60 to 41 %, outperforming the target value of 45 % of the revised poverty reduction strategy. Similarly, the poverty gap would be reduced from 26 to 15 % and poverty severity would be almost halved from 15 to 8 %.

The picture is quite different on the countryside. In rural areas, only an additional 6 % of the people would be lifted above the poverty line; more than three fourth of the rural population would stay poor although their income situation would improve somewhat as reflected in the decreasing poverty gap from 58 % to 52 %.

Overall, it can be concluded that with further structural reforms Bolivia might reach a high and sustainable growth path and that the urban poor would benefit from overall growth, whereas the situation of the rural poor would improve only marginally.<sup>7</sup> The widening of the rural-urban income gap observed in the past (see Section 2) is thus set to continue in the absence of specific measures favoring the rural poor (see below).

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<sup>7</sup> An alternative simulation shows that without further structural reforms GDP growth would decrease to about 3.5 % at the end of the simulation period, with almost no impact on poverty alleviation (Wiebelt et al. 2003).

*b. Accounting for External Shocks: The Example of El Niño*

The reference scenario assumes that no external shocks occur during the simulation period, which is highly unrealistic in the Bolivian context. In the 1990s, the Bolivian economy was affected by both external shocks in the form of declining terms of trade and natural phenomena such as El Niño. Their impact was felt particularly strong at the end of the decade when both types of shocks hit the economy in 1999 and 2000. The effect on the agricultural sector of climatic phenomena like El Niño is recurrent given that it occurs approximately every 3 years. Every two periods El Niño occurs with greater intensity. Thus, it is likely that in the current decade this climatic phenomenon will again be affecting agricultural production thereby eroding possible progress in poverty reduction.

In order to gauge the impact of recurrent shocks like El Niño, a simulation was undertaken which assumed that total factor productivity in the two agricultural sectors (traditional and modern agriculture) decreases by 5 % in 1999, 2002, and 2005 (the second, fifth, and eighth periods of the model). The distributional and poverty results are compared to the macroeconomic reform scenario discussed above which acts as a benchmark. Thus, the results show how possible progress in poverty reduction is undermined by external climatic shocks.

The results of the El Niño simulation are shown in Graphs a-f of Figure 6. The recurrent unfavorable weather conditions reduce growth of real GDP, exports and imports in periods two, five and eight (Graph a). On average, real GDP growth is 0.8 percentage points lower than in the benchmark scenario reducing overall income growth by 13%. The external shock reduces growth of production in traditional and modern agriculture (Graph c). Lower household income and tax income of the government reduce overall demand and therefore are also felt in other sectors which depend on domestic demand. By contrast, export oriented sectors like mining and oil and gas are only slightly and indirectly affected by changing climatic conditions.

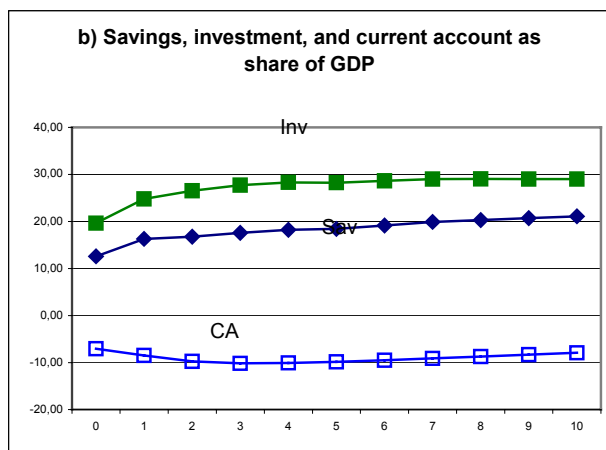
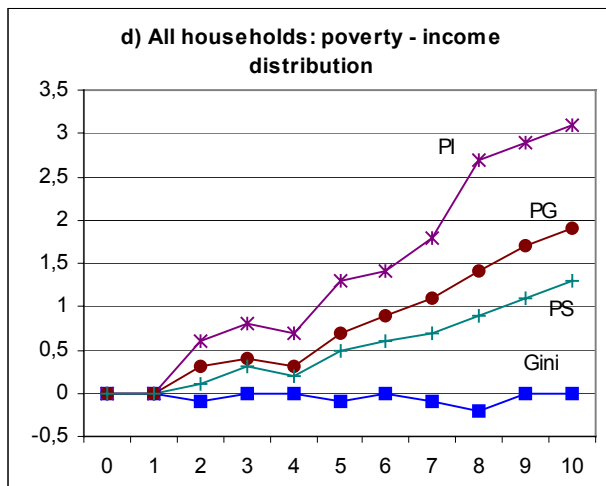
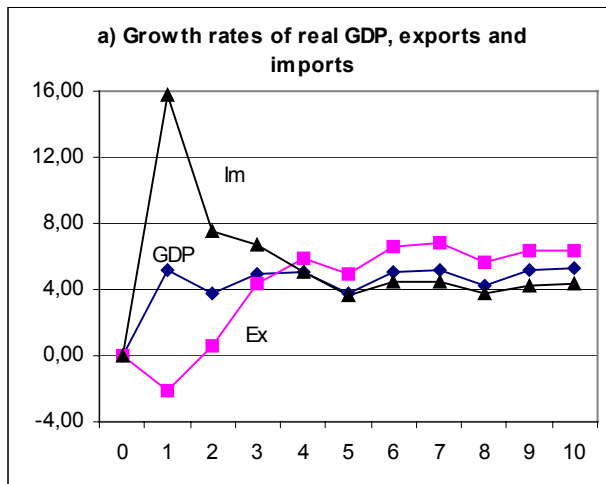
The current account deficit is almost unaffected by the shock as lower exports of agricultural goods are matched by lower imports of consumer and investment goods (Graph b). However, lower overall income leads to lower savings and lower investment compared to the benchmark scenario.

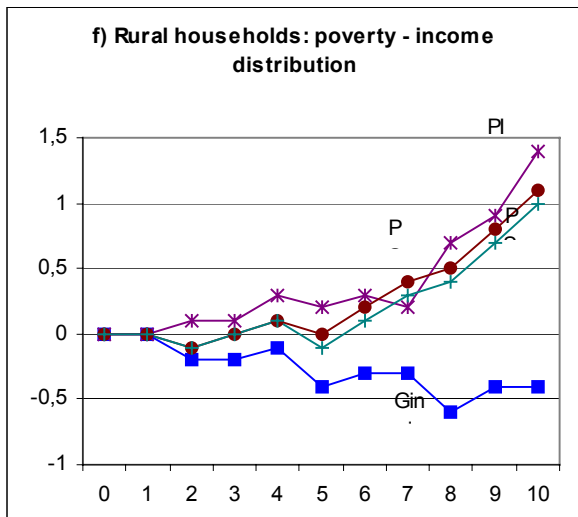
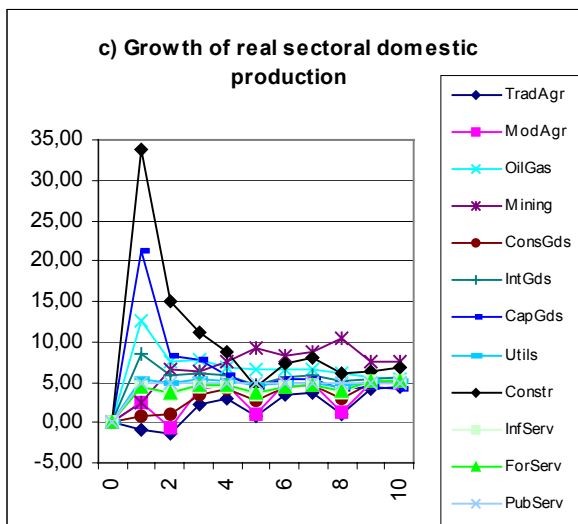
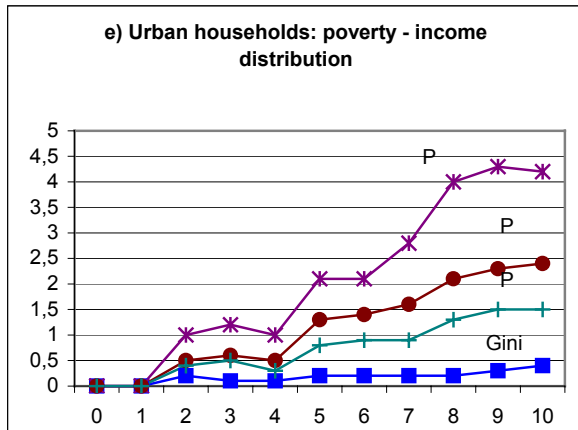


The reductions in agricultural productivities that result from El Niño induce real per-capita income losses ranging from almost 5 % for smallholders and urban skilled workers to almost 20 % for urban self-employed in the final period of the simulation whereas rural workers, capital owners, and urban unskilled workers experience losses of about 7.5, 13 and 15 %, respectively. Thus, although the negative shock occurs in agriculture, those employed in this sector are not the major losers. With regard to smallholder income it has to be kept in mind that smallholders are considered as self-employed, being remunerated on the basis of their per capita output. If there is a negative supply shock, the adjustment will be through an increase in prices, thereby increasing (temporarily) per capita income. Rural workers receive their income from employment in modern agriculture. Yet, their wages are partially indexed to the consumer price level and the overall unemployment rate. The shock is most strongly felt by urban self-employed. They receive the bulk of their income from providing informal services. For the informal services sector the same intra-period adjustment mechanisms are assumed as for traditional agriculture. Thus, the overall reduction of demand will reduce prices for informal services thereby reducing income. Moreover, this household group also receives factor income from construction and some manufacturing sectors, which are also affected negatively by the fall in domestic incomes.

These changes in real per-capita income translate into increasing poverty levels in urban and rural areas, a worsening of urban income distribution and an improvement of rural income distribution, although at lower levels of per-capita income, and an increase in the poverty severity in both regions. The changes in the incidence of poverty are most pronounced in urban areas where an additional 4.5 % of the population falls below the poverty line after 10 years. On the national level, the share of people living below the poverty line would increase by more than 3 percentage points, thereby compensating one fifth of the improvements made by the macroeconomic reforms (Graphs d–f).

Figure 6: El Niño<sup>a</sup>





<sup>a</sup>Indicators in Graphs a)–c) are in percentages; indicators in Graphs d)–f) show deviations from the baseline scenario in percentage points.

Overall, this simulation shows how the recurrent El Niño phenomenon alone can spoil the optimistic projections of the poverty reduction strategy. Other external shocks such as falling commodity prices or recessions in neighboring countries can reinforce this effect, as is forcefully demonstrated by Bolivia's meagre performance since 1999.

*c. Designing Pro-Poor Policies: The Example of Improved Credit Access*

The simulations above indicate that macroeconomic reforms cannot contribute to a significant reduction in rural poverty. Moreover, small improvements made with regard to rural poverty reduction might easily be reversed by unfavorable weather conditions, which hit the agricultural sector from time to time. One reason why the poverty impact of macroeconomic reforms is limited is the fact that there is little support for poverty alleviation from the financial sector (Escóbar, Vásquez 2002). The stabilization of the economy provided the conditions for the remonetization of the Bolivian economy, but the availability of loanable funds remained restricted to large projects, few regions (La Paz, Santa Cruz, Cochabamba) and few sectors, leaving small projects in rural areas and non-traditional sectors still credit-constrained.

An improved access to the credit market can be investigated in the model in two ways. On the one hand, the credit constraint may be relaxed if land and cattle is accepted as collateral. This implies that the level of investment of poor households is determined by rentability criteria rather than being determined residually by the banking system after all other institutions' credit demand is satisfied. On the other hand, credit access can be improved by increasing the flexibility of credit provision, i.e., the banking system's allocation of credits is more sensitive with regard to changes in sectoral rentabilities.

A scenario in which the credit constraint for smallholders has been relaxed and where the substitution elasticity of portfolio selection has been increased demonstrates the income and poverty impacts of a more flexible credit allocation system. Moreover, we assume that a positive temporary terms-of-trade shock in the form of increasing export prices for traditional agricultural products in period 2 provides the stimulus for additional physical investments of smallholders in traditional agriculture.

The results of this scenario are shown in Graphs a-f of Figure 7. The macroeconomic effects of improved credit allocation are almost negligible given the small contribution of

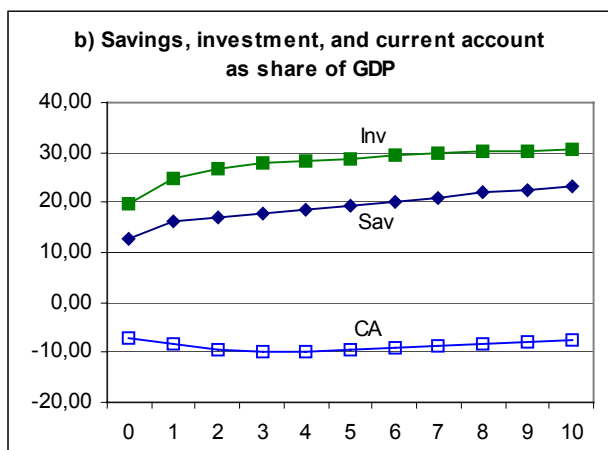
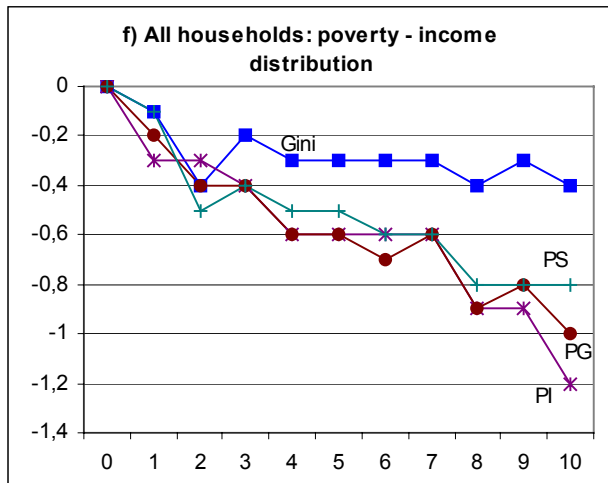
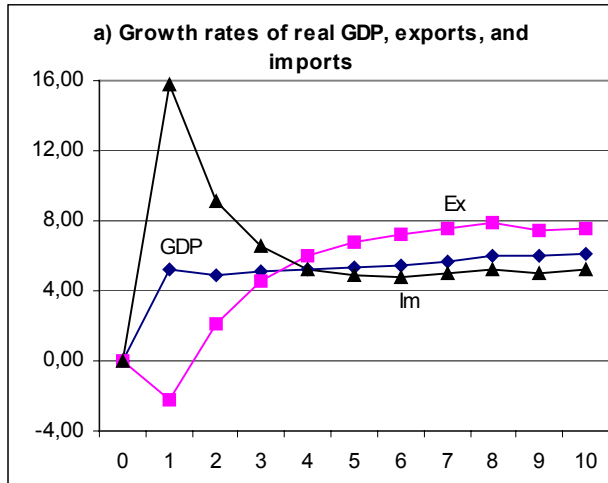
traditional agriculture both to overall GDP and exports. As a result growth rates of GDP, exports and imports are almost unaffected (Graph a). However, the institutional changes in the financial market lead to a slight redistribution of income towards institutions with a lower savings propensity thereby reducing overall domestic savings and investment (Graph b). The positive terms-of-trade shock increases the relative rentability in traditional agriculture and under an improved credit allocation system leads to higher investment compared to a situation with restricted capital market access. As a result, traditional agriculture's expansion is larger in the second period but returns to the old growth path, since the terms-of-trade shock is only temporary (Graph c).

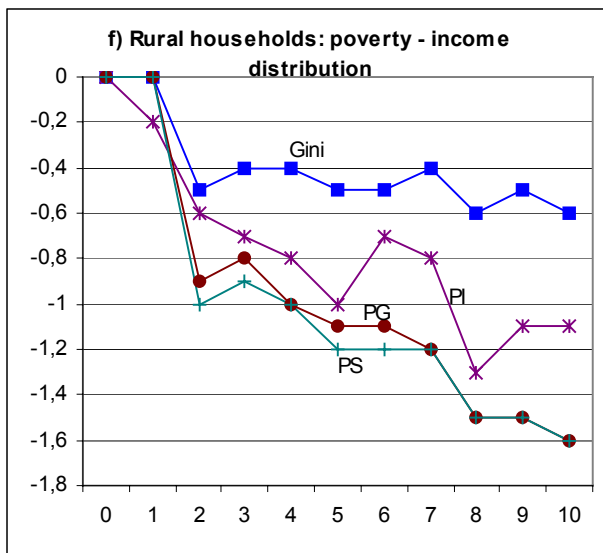
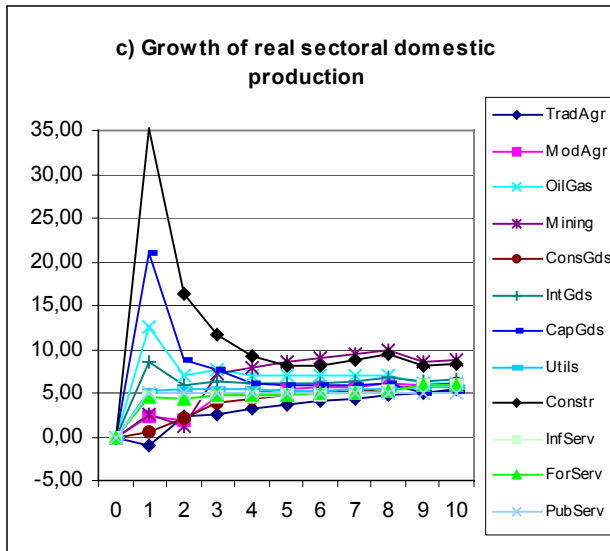
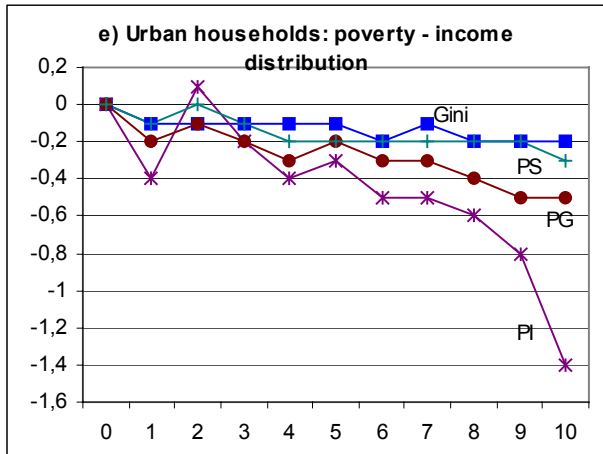
The impact of an improved credit allocation system is mostly felt in income distribution. Whereas the income position of better-off households (capital owners and urban skilled workers) is almost unaffected, all poor households can realize increasing per-capita incomes. Real per-capita income increases by up to between 4 % for unskilled workers and self-employed and 9 % and 13 % for smallholders and rural workers, respectively. In the short to medium-run (periods 2 to 5). Both smallholders and rural workers benefit from the expansion of traditional and modern agriculture. In the medium to long-run (periods 5 to 10), investment is reallocated towards modern agriculture, providing additional employment opportunities in this sector and therefore increasing per-capita income of rural workers. The improvements in the financial system also improve employment opportunities in urban areas thereby increasing per-capita income of unskilled urban workers and urban self-employed.

The institutional changes in the financial system lead to slight redistributions towards poorer households in urban and rural areas (Graph d-f) and to slight reductions of the incidence of poverty in the two areas. Though generally low, the impact of improved credit allocation is mostly felt in the second period of the simulation, when the temporary positive terms-of-trade shock hits the Bolivian economy. The shock immediately reduces the headcount ratio on the countryside by 1 percentage point whereas it increases this ratio slightly in urban areas.

Overall, improved credit availability for smallholders has a moderately positive impact on poverty and income distribution, but it cannot counteract the forces that lead to the rising rural-urban disparities shown in the reference scenario. Perhaps a package of reforms comprising improvements in credit availability, agricultural research and extension, and rural infrastructure, might help the rural poor earn markedly higher incomes.

Figure 7: Improved Capital Market Access<sup>a</sup>





<sup>a</sup>Indicators in Graphs a)–c) are in percentages; indicators in Graphs d)–f) show deviations from the baseline scenario in percentage points.

#### **4. CONCLUDING REMARKS**

This paper dealt with the question of whether Bolivia's macroeconomic and structural reforms have been sufficient to bring about broad-based increases in living standards. The paper reviewed the country's economic and social development over the period 1985–99, and investigated the future prospects for pro-poor growth using a CGE model. It turned out that Bolivia's past economic growth cannot be called pro-poor as it largely bypassed traditional agriculture and the urban informal sector where most of the poor earn their living. Model simulations show that under optimistic assumptions the growth rate and the drop in the headcount ratio envisaged in the Bolivian poverty reduction strategy may be achieved, but that performance will fall short of projections once external shocks such as the recurrent El-Niño phenomenon are taken into account. The evolution of poverty is likely to remain uneven, with considerable improvements in urban areas and a high degree of persistence in rural areas.

The differentiated impact of the overall growth process on household incomes observed for Bolivia is likely to be the rule rather than the exception. This implies that the answer to the question of whether growth in a particular country is pro-poor may be more complex than a simple yes or no. And to arrive at such an answer, a disaggregated analysis such as that presented here should always complement general considerations based on aggregate summary statistics.



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