

**Operation of the Agricultural Sector: Capital Formation  
on and for Agriculture in Bolivia**

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### **Executive Summary**

This case study investigates the performance of the agricultural sector in Bolivia, emphasizing on the capital formation in agriculture and for agriculture. The analysis focuses on the last twenty-five years.

It situates agriculture within the economy, showing the salient features of the sector, it identifies its long-term structural problems, pays attention to land tenure, rural poverty and processes of economic modernization. It analyzes structural dualism, permanence and

weakness of the peasant economy in the Western part of the country, characterized by small farms, in front of the development of the commercial-business agriculture, high land concentration, whose production, especially soybean, is oriented towards exportation.

Research defines, in an analytical manner, the capital formation, investment and capital stock, foundation from which it enters data in order to know about the specific trend of the agricultural investment, specially public investment. It has a statistical approach to the capital formation and capital stock. It addresses the impact of investment on production and agricultural productivity, taking into account some products. Finally, it presents business models and proposes policies.

## **Introduction**

This document is a shorter version of the investigation. The data for the sector does not discriminate the agricultural sector from that of livestock; instead, the data is an aggregate. Throughout the research, the corresponding explanations have been detailed in order to have a better reading of the figures.

Sections: Chapter 1: fundamental economic and political characteristics of Bolivia. Chapter 2: analyzes the agricultural sector, evolution, characteristics, fundamental problems, strategies and policies. Chapter 3: analytical vision of the investment and capital formation in the sector and its impact in production. Chapter 4: investment trends in the sector, both public and private investment. Chapter 5: estimate of capital stock of the economy and the agricultural sector; analysis of the determinants of the investment on the sector. Chapter 6: analysis of some products. Chapter 7: impact of investment on agricultural production and productivity; identifies the harvested surface, performance, productivity and, social variables that influence the latter. Chapter 8: business models and recommendations.

## **1. COUNTRY LOCATION<sup>1</sup>**

### **1.1 Economic Elements**

Bolivia is located in central South America. It has an extension of 1,098,581 Km<sup>2</sup>. It has three agricultural regions: Altiplano (highlands), 23.2% of the territory; Valleys, 14.6%; and lowlands, 62.2%. The agricultural surface covers 34% of its territory. Population, 10,426,154 inhabitants.

GDP 2009, 17,217 million dollars. Income per capita 2009, 1,683 dollars. GDP growth 2010, 4.2%. Minimum wage in 2010, 96 dollars. 70% of the population has informal jobs. Open unemployment rate of 2009, 8.0%.

The weight of agriculture within the GDP for the last decades was 13% to 15%. Weight in total employment, 40%.

Inflation in 2010, 7.1%. Exchange rate for the last three years was of 7.07 Bolivianos per dollar. 2009 Exports, 5.297 million dollars, imports 4.467 millions. Balance of the Trade Scale 2009, 986 million dollars.

Foreign Direct Investment (FDI) in 2009 was of 687 million dollars. Net International Reserves in 2010, 10.000 million dollars. Surplus of the public sector in 2010, 2% of the GDP. Weight of agricultural investment on public investment in 2010, 6.68%.

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<sup>1</sup> Data from database from UDAPE, INE, VIPFE, Ministerio de Desarrollo Rural y Tierras (Encuesta Nacional Agropecuaria 2008), Fundación Jubileo.

Poverty measured by the UBN (Unmet Basic Needs) in 2008, was of 59.2% of the population. Extreme poverty was of 32.7%. The gap between urban poverty and rural poverty is very high.

The agricultural area covers about 34% of the territory. Bolivia is a country with high biodiversity, having 34 different ecological zones. It is situated among the 17 mega-diverse countries in the world. Forests comprise about 48% of the territory.

The potential irrigation area is of 2.1 million hectares; the irrigation area is of 226.500 hectares, only 11% of the total area. Bolivia has 5,000 small irrigation systems; the area equipped for irrigation covers 3.9% of the territory. Irrigation efficiency is less than 35%, which implies a high rate of waste. The cultivated area was of 1.1 million hectares in 1980, which increased to 2.9 million in 2008-2009.

The agricultural sector is characterized by its structural duality: peasant community in the highlands, modern sector oriented towards exports from the lowland of the East.

Peasant agriculture with low technology farming, population dispersion, limited market access and technology. Its poverty levels are high and persistent. It possesses a low supply of resources, human, financial and of infrastructure. It is a subsistence economy.

Commercial agriculture with intensive use of capital oriented towards exports. It has grown through the expansion of the agricultural border.

In the Altiplano (highlands) and semi-arid Valleys there are about 500 and 600 thousand farming units, which translate into about 1.7 million people. They occupy 20 million hectares. The area of cultivation is only of one million hectares.

Deforestation is from 300,000 to 500,000 hectares per year.

Commercial agriculture is limited to 50 to 70 thousand medium and large producers and, in their majority dedicated to crops for export. They face productivity and competitiveness problems, resulting from the uncertainty in land tenure.

## **1.2 Political Elements**

Since the Agrarian Revolution of 1952, Bolivia had a nationalist, Unitarian State with a representative democracy. It held a bicameral parliamentary regime: House of Representatives in proportional representation and a House of Senators with territorial representation.

This State was in effect until the year 1985, when the neoliberal State substituted it. Since 2006, with Evo Morales in office, the nationalist state is reinstalled. Since 2010, there is a Pluri-national State. The Pluri-national Legislative Assembly is bicameral, with a house of

senators and a house of representatives. The MAS political project is oriented towards the construction of communitarian socialism.

## **2. VISION OF THE AGRICULTURAL DEVELOPMENT**

### **2.1 Evolution of the Agricultural Sector**

In the first part of the XX century there were the haciendas (vast rural property), based on the labor from exploited indigenous peoples by the landowners. These were responsible for the production of food. The 1952 Revolution approved the Agrarian Reform in 1953, eliminating the haciendas.

Land distribution to farmers led to the “minifundios” (small holdings of land). The agrarian reform only took place in the highlands and the valleys and, parallel created the “neolatifundios” (neo-land lordships) in the Eastern regions.

This Revolution drove to the “March to the East”. It approved the construction of the highway La Paz – Cochabamba – Santa Cruz, in order to access the land of the East and convert it into an agro-industrial production area.

This colonization process continued during the 1960's and 70's, allowing the development of the sugar industry during the 60's; in the 70's cotton production was included. During this decade, military rule reinforced the concept of neo-land lordships.

Post Agrarian Reform built the structural dualism. Low productivity peasant agriculture production in the West, characterized by the small landholdings and responsible for food production. In the same way, commercial agriculture in the East; large enterprise land property, higher productivity rates in comparison to peasant agriculture.

The economic liberalization from 1985 drove towards the policy of “export or die”, developing the enterprise agriculture in Santa Cruz; production of soybean, sunflower, rice, sugarcane, beef, poultry, eggs, soybean oil, sunflower oil, and others. This agriculture joined the peasant agriculture in pursuit of food security.

During 1985-2000, foreign companies, especially Brazilian soybean producers, also exercised pressure on the land of the East.

Throughout the 70's, major expansion took place in the coca leaf production. Between 1993 and 2003, State policies succeeded in decreasing the area of coca production, from 38,000 hectares to nearly 12,000 hectares, which, were the ones permitted by law. However, since 2003, that production is out of control, reaching to over 40,000 has. Most of which are used as material for illicit products (Urioste and Kay, 2005b).

Since Evo Morales took office (2006), agrarian policies do not give hierarchy to the enterprise production; the intent is that the State and the communities become responsible for the agro-industry. His policies seek land provision to the indigenous people. This implies the reversion of enterprise lands that do not fulfill with the economic and social function. The agricultural-livestock emphasis focuses on strengthening indigenous and communitarian production as for suppressing policies that support enterprise agriculture.

## **2.2 Share of the Agriculture in the Economy**

In 2009, the GDP reached 17.217 million dollars. The Income per capita was of 1.683 dollars. In 2010, exports reach the sum of 5.000 million dollars. There were no inflation problems during the last decade.

The weight of the GDP for agriculture, forestry and fishery, which include livestock husbandry, concerning the total GDP has fluctuated between 13% and 15 % throughout the past thirty years. In absolute terms, it moves a value added of 1.500 to 2.000, million dollars per year.

Agricultural exports situate on the area of non-traditional exports. In 1980, they totaled 85.9 million dollars. They reached 506 million in 2005 and 695 million in the year 2009. Their weight within the total exports in 1980 was of 8%. In the year 2000, they reached 20% due to fact that since the implementation of neoliberal policies, commercial agriculture was reinforced.

In 2005, the weight of exports decreased to 17% and, in the year 2008, it was barely of 10%. This downfall is not because the amounts have decreased, they increased. In 1980, agriculture exported 85.9 million dollars; in 2008, it reached 695 million dollars.

The weighting of non-traditional exports fell from 31% in 2005 to only 21% in 2008. However, after the economic liberalization, the boom of commercial agriculture took place, with its golden product, the soybean.

The weight of the non-traditional exports, which includes the agricultural products, in 1995 was of 42%. Half of this number was explained due to the agricultural exports. Moreover, in 2000, the weight of non-traditional exports was of 52%, explained in 57% by the agricultural exports. This had never taken place before, that the weight of non-traditional exports was so high; in the year 2000, it represented over half of the total exports. Agricultural exports had a weigh of almost 29% within total exports. The operation of the commercial agriculture and the evolution of the soybean exports led to productive diversification.

## **2.3 Specifications of the Agricultural Sector**

For the past thirty years, the weight of the non-industrial agricultural products is higher than the industrial products, reaching a 6.5% of the national GDP (charts No. 1 y 2). This implies that peasant agriculture is important in the provision of products, mainly for the internal market.

The proportion of livestock products is important, although it is lower than the weight of non-industrial agricultural products. Within the vast sector of agriculture, forestry, fisheries and hunting, livestock husbandry has a weight of 28%. Within it cattle from the East is very important.

**Chart No. 1**  
**AGRICULTURAL GROSS DOMESTIC PRODUCT: 1980-2008**  
**(In Thousands of Bolivianos for 1990)**

AREAS/YEARS	1980	1985	1990	1995	2000	2005(p)	2008(p)
<b>National GDP</b>	<b>15.261.228</b>	<b>13.842.011</b>	<b>15.443.136</b>	<b>18.877.396</b>	<b>22.356.265</b>	<b>26.030.240</b>	<b>30.277.826</b>
GDP Agriculture, Forestry, Fisheries and Hunting	2.104.400	2.236.435	2.371.077	2.810.149	3.178.127	3.778.852	4.022.389
Non-Industrial Agricultural Products	887.604	1.180.151	1.112.167	1.245.384	1.412.402	1.695.003	1.794.909
Industrial Agricultural Products	140.200	162.452	231.168	482.079	589.666	753.648	726.136
Coca	95.495	147.860	195.108	161.551	43.355	38.393	41.361
Livestock Products	798.832	637.857	674.410	760.846	936.633	1.057.442	1.188.590
Forestry, Fisheries and Hunting	182.268	108.114	158.225	160.289	196.071	234.365	271.393

Source: Self-preparation based on INE

(p) Provisional information

Three decades ago, the industrial agricultural products were about 1% of the GDP, which during the last years represented 3%. Commercial agriculture explains this.

**Chart No. 2**  
**AGRICULTURAL GROSS DOMESTIC PRODUCT: 1980-2008**  
**(In Percent)**

AREAS/YEARS	1980	1985	1990	1995	2000	2005(p)	2008(p)
National GDP	100	100	100	100	100	100	100
<b>GDP Agriculture, Forestry, Fisheries and Hunting</b>	<b>13,79</b>	<b>16,16</b>	<b>15,35</b>	<b>14,89</b>	<b>14,22</b>	<b>14,52</b>	<b>10,44</b>
Non-Industrial Agricultural Products	5,82	8,53	7,20	6,60	6,32	6,51	4,86
Industrial Agricultural Products	0,92	1,17	1,50	2,55	2,64	2,90	1,91
Coca	0,63	1,07	1,26	0,86	0,19	0,15	0,47
Livestock Products	5,23	4,61	4,37	4,03	4,19	4,06	2,43
Forestry, Fisheries and Hunting	1,19	0,78	1,02	0,85	0,88	0,90	0,78

(p) Preliminary

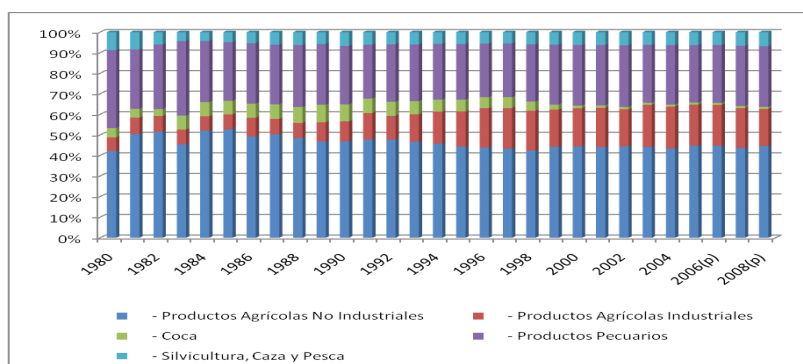
Source: Elaboration based on INE

There is controversy regarding the weight of coca. For 2009-2010, the United Nations talks of an amount of 500 million dollars, 3% of GDP, which does not correspond to the data presented in this summary. Coca plantations are higher than 38.000 hectares, when those

permissible by law are only of 12.000 has. In general, there is a sub valuation of the data for coca.

The subsectors of the non-industrial agricultural products have dominant weight, over 40%, which denotes the importance of peasant economy (Graph No. 1).

**Graph No. 1**  
**Composition of the Agricultural GDP**



Source: Own elaboration based on INE

Since 1980, the agricultural weight in the national GDP (chart No. 3) has not changed; it has remained between 13% and 15%.

The national per capita GDP was of 1.683 dollars in 2009. The GDP per capita of the agricultural sector is only of 441 dollars. This corresponds to only 26% of the national per capita GDP, which shows weakness in the sector.

**Chart No. 3**  
**EVOLUTION THE GDP AND AGDP: 1980-2008**  
**(In thousands of Bolivianos for 1990)**

	1980	1985	1990	1995	2000	2005(p)	2008(p)
National GDP	15.261.228	13.842.011	15.443.136	18.877.396	22.356.265	26.030.240	30.277.826
Agricultural GDP	2.104.400	2.236.435	2.371.077	2.810.149	3.178.127	3.778.852	4.022.389
AGDP/GDP	13,79%	16,16%	15,35%	14,89%	14,22%	14,52%	13,28%
Per capita GDP	3.849	2.320	2.315	2.522	2.688	2.835	3.123
AGDP agricultural per capita	721	763	807	955	1.078	1.280	1.361

Source: Self preparation based on INE

(p) Provisional information

## 2.4 Employment in the Agricultural Sector

The weight of agriculture is of 13% to 15% of the national GDP, which shows that it is one of the most important sectors in the economy. Its importance is even higher from the point of view of employment. Between 1999 and 2007, agriculture accounted for 36% to 40% of the total employment. We are talking of peasant self-employment and not of remunerated employment. It is important to verify that 40% of employment is in the agricultural sector.

In the rural area, the agricultural employment between 1997 and 2007 fluctuates between 78% and 85%; this shows the importance, almost exclusively of this activity in the rural area.

## **2.5 Deficits in Food Security**

Bolivians concentrate their food consumption expenditure on: 20.4% bread and cereals, 20.2% beef, and 12% vegetables. Rural expenditure is higher on bread and cereals. Regarding bread and cereals, 57.9% is accounted for bread, which implies the high importance of wheat in food security. In meat consumption, 63.7% corresponds to cattle meat and 23.1% to poultry, among these, chicken accounts for almost all the sector.

Potato accounts for 6% of these expenditures, being the core product within the rural diet; although throughout time, pastas replaced it. Rice has a weight of 3.9% and pasta for 2.6%. In the rural area, the expenditure in vegetables and tubercles is of 18.8%; 58.7% of that sector is accounted for the expenditure in potato (Ormachea, 2010).

In basic cereals, especially rice and wheat, 57% of the cultivated area is in the Eastern region, which has a weight of 76.7%. Peasant agriculture is weaker in producing these products.

Between 2000 and 2007 there was a higher offer of cattle meat but since 2006, there is a change. Poultry, especially chicken, acquires more value; the price effect is determinant in this change. Between 2000 and 2007, beef increased its production by 34.477 tons; in that same period, poultry did it by 85.277 tons (Ormachea, 2010).

The provision of beef accounts for 44.8% from Beni and 34% from Santa Cruz. The Eastern region of the country concentrates 80.6% of beef production.

Twenty companies, 15 of them located in Santa Cruz and 5 in Cochabamba (Poultry Census 2005), process poultry. This production depends on the supply of feed, produced by the industrial agriculture from Santa Cruz.

According to the DCE (2004), food deficit in 2000 ranged between 19% and 21%. For wheat, between 1996 and 2000, the dependency on imports was of 78.6%, which implied that food self-sufficiency was of 21.5%.

Between 1985 and 2005, wheat production increased by 16%, but imports increased by 4.7 times. Wheat flour imports increased 6.3 times (Prudencio, 2009). FAO/WFA (2008/2009) reiterate that the structural deficit of wheat is serious; between 2007 and 2008 there was the need to import 450.000 tons of wheat and wheat flour, as for similar amount for 2008-2009. Bolivia has an internal demand of wheat of 631.000 tons and the internal production is of 200.000 tons, reason for which 66% of that requirement must be imported.

Between 2007 and 2008, 20.000 tons of maize, 76.000 tons of rice and 230.000 tons of potato had to be imported. During 1998, 349.663 tons of foods were imported, but, between 2006 and 2009, these imports were almost 600.000 tons.

In 1992, wheat and wheat flour accounted for 79.5% of food imports. However, in 2009 the weight of these products was only of 54.3%, currently other foods are imported, such as: beans, rice, potatoes, sugar and dairy products (Cedla, 2010). This highlights the increasing problems on food security.

In 2001, peasant economy produced 36.8% of the food supply, commercial agriculture produced 44.6% and imports reached 18.6%. In 2009, the weight of commercial agriculture exceeded 60.3%.

## **2.6 Main Problems in the Agricultural Sector**

### ***2.6.1 The Land Problem***

The 2001 Census indicates that 62% of the population identifies themselves as indigenous, implying that a high percentile of the population has a connection with the agricultural production.

In 1960, Bolivia had an urban population of 36.8%; in 2008, this number raised to 65.58%, which shows the increasing urbanization. Notwithstanding, rural population is still high and its most conflictive problem is access to land; this is a persistent problem for over a century.

### ***2.6.2 Poverty, Structural Hallmark of the Country and the Rural Sector***

According to the last National Demographic Census from the year 2001, 62.4% of the population lived in urban areas and only 37.6% lived in the rural area. Therefore, Bolivia is mainly urban. For that Census, 58.6% of the population is poor and 41.4% of the population is not poor.

From 1976 to 2001, poverty decreased in 27.2%. However, there are still 58.6% of poor people. This is a structural problem of the economy and society itself. Rural poverty is dramatic. In 1992, 95% of the rural population was poor. In 2001, 91% of rural inhabitants were still poor.

Total poverty decreased by 12.3% between 1992 and 2001, and rural poverty only decreased by a 4%. The gap between urban and rural poverty in 1992 was 42%. This gap in 2001 was even more, reaching 52 percent points.

Discussing agriculture implies making reference to rural poverty. One cannot know the sector and its dynamics without knowing the elements that characterize this rural poverty.

### ***2.6.3 Advances in the Land Problem Solution: Background of the 1953 Agrarian Reform***

In 1866, the State decided to sell its communitarian land. During the Federal War of 1899, a large indigenous movement rose, moved by the recovery of land that was taken from the indigenous people.

The Chaco War (1932-1935) reemerged the land problem, creating the expression “the land belongs to who works it”, background of the Agrarian Reform. In August 1953, the Agrarian Reform was approved. After fifty years, there is consensus that affirmed that it opened the door to neo-land lordships in the East.

### ***2.6.4 Economic Modernization, “March to the East” and the Small Landholding Problem***

The 1952 Revolution presented a project differentiating the role of territories. The West should deal about mining and its industrialization, accompanied by the substitutive industrialization of imports. In the East, the new commercial agriculture should be developed. In order to make the project a reality, the March to the East was promoted. Colonization during the 50's and 60's from last century constituted a State policy.

In 1952, the population was concentrated in the West: La Paz, Oruro, Potosí, and Chuquisaca. The population weight from the East (Santa Cruz, Beni, and Pando) passed from 9% to 25% between 1952 and 2001, resulting from the Revolution policy.

Thirty years ago, Oruro, Potosí and La Paz produced 70% of national exports. In 2006, this changed. The West only exported 30% and the East 70%.

The coca leaf production developed during the 70's. However, in the 90's there was an extraordinary expansion (Urioste, 2005). Law 1008 allows up to 12.000 hectares. However, currently, the amount of plantations border 38.000 has. Most of this is directed towards illicit activities.

The National Revolution did not have a development policy for peasant economy. Therefore, small land plots characterize this economy with very low productivity and with very high poverty levels.

## **2.7 Strategies for the Sector**

Since 1993, moment in which neo-liberalism was in place, several development strategies were formulated. From the revision of the strategies, since the neoliberal times of Sánchez de Lozada (1993-1997), up to the two strategies formulated by Evo Morales in 2006, what highlights is the radical change in political ideas, due to the fact that it transits from neo-liberalism to Statism.

The Strategy for the Productive Transformation of the Agro (Estrategia para la Transformación Productiva del Agro - ETPA, 1996) corresponds to the Government of Sánchez de Lozada. It has for basis the neoliberal institutional and economic reforms started in 1993; and it tries to give continuity within the agricultural sector. These reforms were accompanied by a modernization process of the public sector, combined with the creation of better opportunities for private investment.

The Strategy for Agricultural and Rural Development (Estrategia de Desarrollo Agropecuario y Rural ENDAR – 2005), prepared during the Governments of Carlos Mesa (October 2003- June 2005) and Eduardo Rodríguez (June 2005- January 2006), suggested acting in the following thematic axis: inclusive development and acknowledgment of the diversity of rural actors; respect of the cultural identity and self-determination of the indigenous and native peoples; food security and competitive insertion in markets; convergence of rural development with urban development.

Plan for Rural, Agricultural and Environmental Development, with sovereignty for living well (Plan de Desarrollo Rural, Agropecuario y Medio Ambiente, con soberanía para vivir bien, 2006), constitutes the Sectoral Plan resulting from the National Development Plan (NDP) from President Evo Morales's Government. It is enshrined in the new vision of development proposed by the current Government. Its policies present a separation regarding previous strategies; the main change resides in a major role from the State.

The Agrarian and Forest Revolution (Revolución Agraria y Forestal, 2007) also belongs to the Government of Evo Morales, stating a New Model for Rural Productive Development. It articulates the rural development with environmental management and renewable natural resources, in order to advance towards an integrated rural and agricultural development oriented towards transforming productive patterns. It suggests advancing in the promotion of agricultural development for food sovereignty.

## **2.8 Policies Deployed in the Past Fifteen Years**

Agrarian research, extension and training, as for introduction to new research systems were developed. Increase on investments on education and health in rural areas. There are advances in rural population that studies and finishes elementary school. Policies for modernizing land management systems and inserting the concept of Basins were developed. Small investments on roads and irrigation for expanding markets, reducing risks and enhancing productivity in the agricultural sector took place.

Exchange policies favored food imports. Subsidies on diesel for promoting commercial agriculture. Direct transfer of revenues to rural inhabitants that allow increasing their food demand.

Small investments on rural infrastructure and human resources for improving the labor force in the sector. Small investments on enhanced seeds and the use of fertilizers and pesticides. School feeding programs taking forward the production of national products.

Policies that impulse the productive infrastructure especially silos, aside from loans, training, technical assistance, opening and consolidating markets, development and industrialization strategies for agricultural products.

Banks only opened their portfolios for business sectors. Microfinance aimed to other segments of the agricultural sector. Policies of land handover to the indigenous.

### **3. INVESTMENT AND CAPITAL FORMATION ON THE SECTOR AND ITS IMPACT ON PRODUCTION: ANALYTICAL VISION**

One of the classic concerns of the economy consists in knowing to what point society must invest in order to increase employment levels and create better income levels. Within the Keynesian vision of the economy, the proportion of income that is not allocated to consumption is the proportion that is destined to investment<sup>2</sup>.

The economic growth is correlated to investment and capital productivity, both rates help to get near to the intensity of the economic growth. Dornbusch and Fischer (1988) explain the correlation between investments and gross domestic product. According to this analysis, the relation between investment and product is fundamental, in function to the amount or effort deployed by a society for directing part of their product to investment, the result will be the growth of the economy (Furtado, 1976). The relation between investment and growth of the product is not lineal; the response of growth is not mechanical to the magnitudes of resources oriented to investment. Supposedly, by increasing investment, the product grows in the same direction, but this does not occur in a lineal manner.

The proportion of the product destined towards creating more capacity in production can be analyzed through the relationship between gross investment (gross capital formation) regarding the gross domestic product (Candia y Pinto, 1999). We will follow this analysis path in this document. Nevertheless, the way in which investment rate of the economy behaves depend from other factors, such as trends of consumption from social groups or their tradition to social struggle of the surplus allocation, (Laserna, 2008). The elevated

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<sup>2</sup> Keynes explains this in his General Theory on Occupancy, Interest and Money.

political conflict in Bolivia relates to the trend of society to dispute the distribution of the economic surplus.

Due to these factors, growth rates have been low and unstable. This is correlated with the existence of low investment rates, which do not exceed 15% of the GDP. Even though investment is central for determining growth (Jemio, 2008)<sup>3</sup>, it is not the only from which growth depends on.

A high importance factor for growth is the investment coefficient, or the proportion of the product that increases existent capital stock (Candia y Pinto, 1999b). Capital stock is the set of durable commodities, which are not consumed in one single period but throughout several periods. The wear out generated in a period is understood as depreciation.

Investment is part of the product that adds to the existent capital. Net investment, which has depreciation deducted, is what increases the capital stock (Candia y Pinto, 1999b). Capital stock is an amount measurable in a long period, and therefore, it is a stock variable. Investment, on the other hand, is a flow variable, meaning that it is an amount that can only be measured in only one period. Capital stock is a high importance variable in the macroeconomic analysis, for it opens the possibility of knowing the productive capability of that economy (Guarachi and others, 1991).

Growth also depends of the capital productivity, which is a result of the average product amount emerging from a capital unit that has been invested. Thus, when we raise issues relative to the product/capital relation, we refer to the quantity of product obtained per capital-accumulated unit, meaning that we not only talk about investment but, also of capital stock. The relation product/investment shows the amount of product obtained from investment (Candia y Pinto, 1999a).

Public investment is not only based on economic expectations of economic efficiency, as in the business case. Rather, *mutatis mutandis*, for the State the “expectations of social efficiency” are important, for the State is responsible for the living conditions of the people.

One of the nodal issues in the field of public investment is the decisions to invest. For the Bolivian State, it is more important the income distribution than growth, for which it directs to undertake social investments, without guaranteeing the “productive” investment, without increasing capital stocks.

The total amount of investment results from collective decisions of the Bolivian State, due to its responsibility on public investment and, in the Keynesian sense, due to its responsibility to avoid the effects of the instability of the marginal effectiveness of capital. On the other hand, businesspeople are responsible for the private investment. In Bolivia, businesspeople are scarce, reason why private investment is not fundamental.

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<sup>3</sup> According to Luis Carlos Jemio, between 1970-2006 the investment rate had an average of 13.9%.

Furthermore, state paternalism has led businesspeople to expect that the State is the one that has to invest in everything, both, within the sectors and in the creation of the conditions so that the private business can undertake investments.

What is important is not only the amount of investment but also its quality. One thing is the execution of the investment from a financial point of view and, another, knowing its physical-financial advance. The results of the investment depend on the areas or sectors in which the investments are made; many of these do not possess any institutional capability for managing investment. It is not the same to invest on road infrastructure than on education.

The investment policies, since 1980, were directed towards favoring the increase in the amount; then, the phase of investment quality and productivity took place, which is linked to project management. This implied a step towards technical assistance for municipalities so that they can manage the public investments projects more efficiently.

The issue referred to the investment planned and the investment executed is important; commonly, different governments plan very high investment amounts, which are not executed. This inability is due to problems of institutional weakness within State organizations. The institutional weaknesses are due to the lack of public officials with the necessary *expertise*.

In the productivity of public investment, quality of management systems intervenes. This has to do to the institutional settings in which investment operates. The development of the decentralization process of public investment was a bet for improving productivity of public investment, which has given positive results.

The increase on investment, between 1987 and 1996, was accompanied by increases in the growth rates of GDP. The increase of the investment rates led to improving the economy's growth rates. During this period, the impact on investment rates on growth can be tested.

In agriculture, in a general theoretical manner, we affirm that investment is a key factor for the sector's growth, as sectoral investment rates have an important effect in the dynamics of the sectoral product. The same thing happens with sectoral capital stock.

The agricultural sector is part of the economy as a whole; it does not have reason as to why not sharing its characteristics. There is no reason to having high investment rates in counter position to what is happening with the national economy. There is no reason as to why being extent of rent seeking. The agricultural sector has the characteristics of the national economy.

Notwithstanding, agriculture is marked by the structural dualism, peasant farming in the West and commercial agriculture in the East. There is no private investment on peasant

farming, the growth of their product and the leaps on the productivity depend on the expenditures from public investment. For peasant farming, public investment on the sector is important or, in general terms, investment in the rural area.

In commercial agriculture we can talk about enterprise presence and, therefore, private investment. However, businesspeople are few and their institutionalism is not strong. There are no data regarding their investment; the State does not produce it.

It is necessary to disaggregate public investment on the agricultural sector, focusing investment on the agricultural sector in drainage, extension and training, agricultural support infrastructure, agricultural research, micro-irrigation, irrigation and vegetable sanitation. In livestock, expenditure in extension, training, livestock development, support infrastructure, livestock research and animal health. In forestry, expenditure on fishery development, agro forestry, forestation and reforestation.

The increase on productivity not only depends from direct investments in the sector but also on the investments destined to the rural area, in which agriculture operates. Therefore, it is of interest to evaluate rural investment on roads, especially neighboring roads, rural electrification, rural telecommunications, and rural education and health, which is understood as investment on human capital. We will analyze the corresponding figures in this kind of information, knowing that separating data between urban and rural is not very old.

It is complicated to discuss public investment destined to the mix between urban and rural. The effect of part of this investment is to improve the conditions in agricultural development; but it is not easy to determine how much of that investment is directed to the rural sector.

Another specificity of the agricultural sector is the land factor. In peasant agriculture, this factor does not have a market price. Therefore, we cannot talk about expenditures on land investment, only on improvements. In commercial agriculture, vast land extensions have been obtained almost at no cost and, thus, it is difficult to talk of a land market and, consequently, of its price.

## **4. INVESTMENT TRENDS IN THE SECTOR**

### **4.1 Public Investments**

Agricultural sector investment is a matter of the State and the private sector. It is difficult to differentiate the performance of each of them in the generation of value added, due to scarce private investment information available.

We analyze public agricultural investment in the context of global public investment's behavior. Agricultural investment trend is important, for with it macroeconomic objectives such as poverty relief are sought, and not only goals within the sector. The analysis disaggregates the behavior of agricultural subsectors: agriculture, livestock, forestry and fishing.

Given that our objective is to see the flow of investments channeled to the sector, we shall observe first, the direct investment on the sector, and second, we shall subtract other sectors' investments towards the rural area, those that have an impact in agriculture dynamics.

The analysis is carried out within the framework of policies that generated transformations in agriculture, such as the strengthening of commercial agriculture, since the 90's, because of economic liberalization.

To facilitate information management, investment is divided in four periods: 1987-1992, 1993-1998, 1999-2004 and 2005-2009. The analysis is based on executed investment numbers<sup>4</sup>. In 2009, numbers are estimated with an assumed execution of 74%.

#### ***4.1.1 Total Public Investment***

Because of the important presence of the State in economy, public investment was and shall be the factor of more impulse in the growth of GDP. This may be observed in the behavior of the relationship between Public Investment/GDP and Private Investment/GDP. Between 1987 and 2009, the first was above the second. Between 1987 and 2009, public investment shows two inflection points that originated in the following policies: 1) economic liberalization (1985) and 2) State policies (2006), since the Evo Morales' Government.

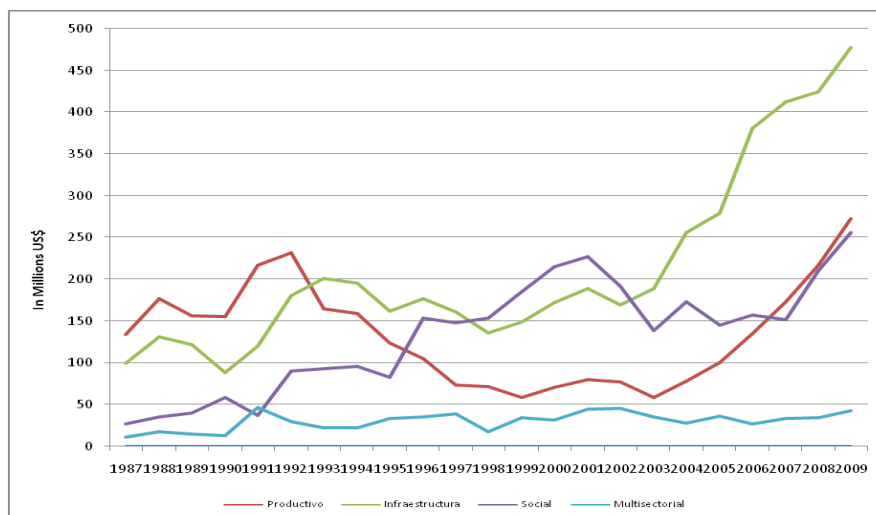
The state model implemented since 1952, was in force up until 1985. During these years, the investment flows were destined to create public companies in energy, mining and hydrocarbon, to turn them into growth agents.

The agricultural sector suffered a deep transformation since the Agrarian Reform (1953), which affected the West of the country. The East joined the development path through agricultural activities in Santa Cruz; sugar in the 60's, and cotton in the 70's.

### **Graph No. 2 Trends of Public Investment Executed per Sectoral Group**

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<sup>4</sup> The executed investment is effectively paid.



Source: Own elaboration based on VIPFE

In this model, the role of the State was fundamental to promote productive activities. The results were: scarce contribution to the consolidation of the productive apparatus directed towards exporting, specially agriculture, limitations to generate income redistribution, and irrational use of natural resources.

During the previous years to 1985 hyperinflation, public investment did not have financial restrictions; it was almost completely financed with external credits. 80% was destined to natural resource extraction sector, social investment was small, and job creation was limited to the “enclaves” of mining and oil exploitation. Public investment did not privilege the agricultural sector.

Agricultural public investment created research institutions to favor peasant farming, strengthening the financial system. Its main contribution consisted in the road connection between La Paz, Cochabamba and Santa Cruz, which led to support the “March to the East” and develop commercial agriculture.

In the first half of the 80’s, strong macroeconomic unbalances were generated, which deteriorated public finances with effects on public investment. Agriculture had a high cost due to anti inflationary measures. However, conditions for the accumulation of fixed capital in agriculture in the East were in place, due to the de-dollarization process.

In the early 80’s the role of agriculture was marginal, focused in food production for internal consumption. The sector was unarticulated from other sectors. Its weakness led it to suffer the impacts of the economic crisis.

Agriculture was not developing due the lack policies to penetrate external markets; furthermore, smuggling invaded the internal market. Public investments did not direct enough resources to create productive conditions for agriculture. In the early 90’s, the

World Bank designed the “Tierras Bajas del Oriente” project (project for the Lowlands in the East), with the goal of solving the agricultural crisis. This is the starting point for the growth of soybean production.

#### ***4.1.2 Public Investment in the 1987-1992 Period***

In 1985 neo-liberalism initiated, its policies led to a less active role of the State in productive activities, restricting it to the creation of infrastructure for private investments, and reducing the dependency of traditional exporting. In addition, in the tax area, the aim was to reduce the fiscal deficit.

Neo-liberalism eliminated subsidy, established freedom of prices, including the competition of imported low-price products with expensive national products. This implied the stagnation of food-consumption production, especially those of peasant farming. Only export crops such as soybean, cotton and sunflower, showed growth. The credit for the sector became more expensive, as consequence of the leveling of interest rates of the sector with commercial rates.

According to VIPFE<sup>5</sup>, sectoral public investment grouped into: productive, infrastructure, social and multi-sectoral, for 1987-1992 was showing the beginning of changes in the orientation corresponding to neoliberal policies started in 1985.

Share of public investment on productive sectors was reduced: in 1987 it represented 49%, and in 1992, 43.5%. During this period, the priority was national and local roads. Investments duplicated, went from 99 million to 180 million dollars. Investments on the social sector went from 27 to 90 million de dollars (a growth of 235%). While they tripled in absolute terms, they kept their scarce share in the total investment, from 10% to 17%.

In the first years of application of neo-liberalism, there were reforms made which affected the management of public investment; reforms in the State purchase procedure to achieve its rationalization, subsidy elimination, and free importing.

In 1989 the second phase of reforms started, oriented to seek economic stability, complemented with measurements to promote productive activity and stimulate external commerce, such as Hydrocarbons Bill, and the Mining Code.

These reforms affected agricultural public investment negatively: in 1987 it represented 7.7% of the total, and in 1992 it was only 6.8%. In those years there was a reduction of public investment due to the institutional changes in the sector, especially in the Ministry of Agriculture and Peasant Affairs (MACA by its acronym in Spanish), which was oriented towards being only a normative entity.

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<sup>5</sup> VIPFE. Viceministerio de Inversión Pública y Financiamiento Externo (Viceministry of Public Investment and External Funding).

#### ***4.1.3 Public Investment in the 1993-1998 Period***

Between 1993 and 1998, the following reforms took place: capitalization (kind of privatization) of State enterprises, sectoral regulation system, reform of the pension system, decentralization and Popular Participation, Forestry Law and Agrarian Reform National Service Law (INRA by its acronym in Spanish). Because of such measures, older trends were consolidated. Policy of public investments established its complementary character with private investment.

The growth of social investment was clear: in 1993 it was 92.8 million dollars, and in 1998 it reached 153 million dollars. Its share went from 19% to 40.5%. Infrastructure investments maintained at 39%. Productive sector investments went down from 34% in 1993 to 19% in 1998.

Implementation of reforms generated uncertainty in agricultural investments, originated mainly in the land tenure and distribution system. This situation was kept in place until 1996 when the INRA Law, from the Agrarian Reform National Service, was sanctioned. The central concern was the legality of property and possession of lands and its equal distribution.

Because of this environment of uncertainty, agricultural investment lowered its share to 5.4 %, comparing to 1987-1992 in which it represented 8%.

Since the creation of the Environment and Sustainable Development Ministry, guided by a concept within the framework of natural resource rational exploitation and environmental protection, a group of regulations and institutions that affected agricultural activity was needed (Sectoral Superintendencies).

#### ***4.1.4 Public Investment in the 1999-2004 Period***

During 1999-2004, free market policy trends remained. The productive sector maintained its tendency to reduction, represented an average 14.5%. Investment on infrastructure represented 39%. Social investment went up to 39%, compared to the 28% of 1993-1998. In addition, multi-sectoral investment maintained its low share.

Agricultural Public Investment during these years had a uniform trend; these were the years of higher investment, 270 million dollars, compared to the 142.5 million in the 6 previous years. Average share of the sector in the total public investment was of 9.2%, superior to prior years. In these years, the sector's production strategies did not have proposals for peasant farming.

#### ***4.1.5 Public Investment in the 2005-2009 Period***

Between 2005 and 2009, public investment was high. 3.967 million dollars were executed. The tendency changed since 2006, year in which Evo Morales' Government is instated, which coincides with the boom of exported raw materials' international prices. With Morales, the development model implies a higher share of the State in productive activities.

The new characteristics were the following: investment on the productive sector confirms its tendency to increase due to higher hydrocarbon resources from the sector, resulting from the nationalization of enterprises. Productive investment on average during these years represented 22%.

Investment on infrastructure rose. Its growth tripled over 2002, rose from 169 million dollars in 2002 to 478 million in 2009. These investments were directed for the construction and maintenance of roads.

Social investment has a downward trend; its share reached only 23% while in the previous years it accounted for almost 34%.

The investment on the agricultural sector grew moderately. During these years 372.2 million dollars were executed, which represent a growth of 21% compared to the previous 6 years. However, its share fell in relation to the total investment, from 9.3% to 8.2%.

The model abandoned the concept of productive clusters, which had an export component; productive complexes were chosen in order to favor small production, incorporating indigenous communities in productive organizations.

Land distribution constitutes the key element in the change since year 2006. Policy favors land titling in favor of indigenous communities.

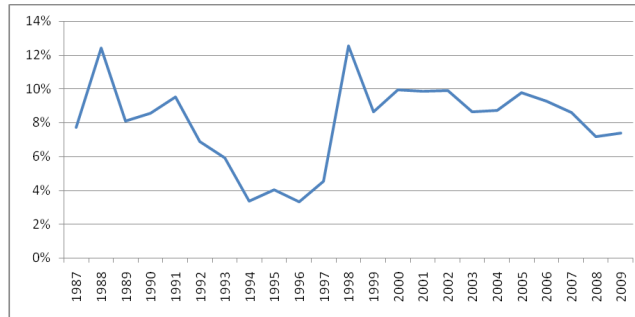
Changes did not translate into dynamic production, especially of foods; instead, food security is questioned.

#### **4.2 Public Investment on Agriculture**

Public investment on agriculture has been below 2% of GDP during 1987-2009, reflecting that agriculture was not prioritized by policies.

In average, the share of agriculture in total investment for these years was of 7.9 %. The State has neglected the sector despite the fact that it guarantees food security.

### **Graph No. 3 Share of the Agricultural Sector in Total Public Investment**



Source: Own elaboration based on VIPFE

The policy intent was accompanied by programming sufficient investment resources. The absorption capacity of these has been limited in the sector. This shows that the institutional sector is not optimal for the implementation of investment.

#### ***4.2.1 Composition of the Agricultural Public Investment***

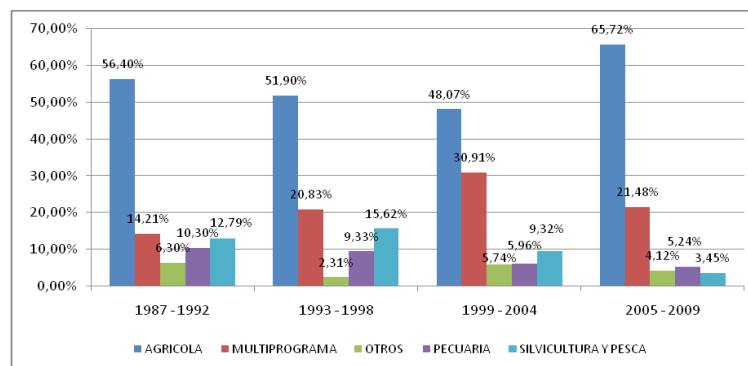
The share of the subsectors: agriculture, livestock, forestry and fishery in the sectoral investment between 1987 and 2009 was of 56.6%, 7.1% and 9% respectively. The total completes with investment on agricultural multi-programs that represent 22.6%, and others with 4.8% of share.

Investments on the agricultural component are the most representative; their average share during the period accounts for 56.6 %. If the agricultural share of the multi-program investment is added to this total, it accounts for over half of the sectoral total. Therefore, the trend of this component defines that of the total investment on agriculture.

This behavior responds to the need of creating conditions for peasant farming. Starting from neo-liberalism, the agro-export activity of the East was strengthened, and thus, peasant farming is not related. No multiplying effects are produced, which will allow increasing agricultural productivity in the West.

The public investments of the agricultural component have been directed towards irrigation and micro-irrigation, extension and training, research, support infrastructure, vegetable sanitation and drainage.

**Graph No. 4**  
**Composition of Public Investment in Agricultural Sector**



Source: Own elaboration based on VIPFE

#### 4.2.2 Trends of Agricultural Public Investment

Peasant farming, during the 70's, had low productivity conditions due to the lack of: irrigation, road access to producing regions, technical assistance and transference of technology. Solutions were not possible with specific support projects and, therefore, integrated rural development projects were prepared; funded with resources from the international cooperation.

Before the implementation of neoliberal policies, peasant agricultural production had negative fluctuations due to hyperinflation throughout the 80's, which, decreased prices and affected its competitiveness. Investment during these years was not important.

Commercial production started developing since the 60's with sugarcane production and during the 70's with cotton. The momentum of public investment for the start-up and the consolidation of the commercial agriculture appeared through the construction of the road between La Paz-Cochabamba-Santa Cruz, the release of loans, the assumption of liabilities from the sector by the State, and the Government procurement for external funding.

In the years following the implantation of the neoliberal program 1987-2004, investments in the agricultural subsector were undertaken within the framework of the reforms. Its particularity consists in the fact that policies were divided into peasant farming policies and policies for the agro-exporting activity of the East.

The investment policy on agriculture was almost completely directed towards serving peasant farming as a policy of fight against poverty. The agro-exporting agriculture began its steady growth in the 90's; private sector projects and programs started with State resources.

During this period, public investment resources were destined to combat poverty, especially in the rural area. Popular Participation Law (1994) enabled municipalities as project

executing entities. From this starting point, municipalities were responsible for creating support infrastructure for the agricultural production.

Parallel to the increase of investment amounts for municipalities, measures for improving the quality of public investment were put in place, such as standardized pre investment and execution procedures, and a monitoring system for local projects.

The impact investments on agricultural production focused on irrigation and micro-irrigation. In 2000, the National Irrigation Project (PRONAR in Spanish) was created with the objective of reducing the risk on agricultural production through the improvement of infrastructure for water use in agriculture.

Municipal Governments allocated resources for minor works on improvement and construction of water catchments for agriculture. From 1987 to 2004, there was an investment of 795.3 million dollars that, in average, represented 57.9% of the total agricultural investments during these years.

Investments on extension, research and training were initiated in the 90's. Between 1987 and 2004, these investments reached 35.7 million dollars, which implied an average of 33.9% of total agricultural investments. These investments favored the development of export products in charge of the private sector, creating phenomena such as *crowding in*.

El “Instituto Boliviano de Tecnología Agropecuaria (IBTA)” (Bolivian Institute of Agricultural Technology) supported the research of traditional products and genetic resources. The “Centro de Investigación Agrícola Tropical (CIAT)” (Tropical Agriculture Research Center) concentrated on export products: soybean, cotton and sunflower, and cattle.

Investments on support infrastructure included minor construction projects of storage infrastructure, training centers, protection works, processing plants, etc. This subsector does not include roads or rural electricity. This explains the low share; it represents only 3.2% of agricultural investments between 1987 and 2004.

The agricultural “multi-programs” during 1987 and 2004 represented an average close to 20% of the investment, adding up to 141.1 million dollars. These investments started to grow in 1997.

The vegetal sanitation component only contemplates some projects executed by the “Servicio Nacional de Sanidad Agropecuaria e Inocuidad Alimentaria (SENASAG)” (National Service of Agricultural Sanitation and Food Security).

The 2005-2009 period includes changes that obey to two factors: first, change in investment policies within the sector, derived from the application of the National Development Plan

for Living Well (NDP, 2006); and second, many programs and projects finished their planning phase and started execution.

During 2005-2009<sup>6</sup>, investments in agriculture reached 215 million dollars, almost half of the investment executed in the last 17 years (1987-2004). This trend is consistent with the dynamics of total public investment of the agricultural sector. It is due to the need of strengthening the production of food and improvement of income for the producers of the West of the country.

During the first years of this last period, production-chain projects were approved. Dairy chains were a successful development in the valleys, quinoa in the highlands, and camelidae in the North of Potosi. Development of these production-chains demanded investment to generate services that would allow operations.

The projects developed for the most depressed areas were supported and maintained, for example, encouragement projects for small production of vegetables, bovine livestock, textiles, etc.

The most dynamic sub-sector was irrigation and micro-irrigation, which represented 66% of total agricultural investments. The significant changes during 2006-2009 happened in agricultural research investments, in past years this represented an average of 38.7% and, then, 19.1%. Vegetable sanitation reached 0.1%; this is a clear sign of the lack of interest that Government has in this activity.

#### ***4.2.3 Territorial Destination of Public Investment***

The State is the main indirect investor in peasant agriculture through its investments in the rural area. It has that function due to its role as promoter of growth, equality and social inclusion. Between 1987 and 2004, the State earmarked to the agriculture and livestock sector an average of only 7.9% of total investment, and to agriculture 4.5%.

Other sectors also invest on the rural area. Public investment in these sectors has a rural component, and an urban-rural mixed component. These two types and amounts of public investments have a positive impact on agriculture development, on product growth and on productivity growth. Nevertheless, it is not possible to quantify the magnitude of the specific investment of each one of them on agriculture.

#### **4.3 Private Investment in Agriculture**

There is no official data of private investment on agriculture. The private agents and their institutions do not present numbers. They possess data on the quantity of cropped hectares,

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<sup>6</sup> The investment executed for the year 2009 in estimated information, with a supposed execution of 74%.

product prices, production, but nothing on the amounts of investment. Therefore, the analysis on private investment will be carried out based on information from other researchers.

The land component is the most analyzed, but, from the perspective of property and not pricing. This happens starting on 1953, when the redistribution of land was the core issue of the sector policies. The component of capital has little and isolated data.

The analysis will focus on the Department of Santa Cruz, nucleus of commercial agriculture and private activity of agriculture. Private agents invested on the expansion of the agricultural border, enabling new lands, improvement of land for cropping of exportable products, including feeding grounds for livestock.

Montenegro (1999) affirms that part of the utilities of agro-industrial entrepreneurs was re-invested on croplands improvement. He shows that until 1998 most of the producers carried out annual activities of land preparation on 10-20% of the lands they possessed. They assigned between 90 to 100% of net utilities obtained per year to reinvestment.

He estimates that land preparation in Santa Cruz requires one thousand dollars per hectare. Between 1988 and 1998, there would have been an investment of 70 million dollars on land preparation for 70,000 hectares of agriculture, especially for soybean. This does not necessarily imply a raise of the agricultural border. This preparation of land mainly happened since 1990, time where the soybean expansion started.

According to the CAO (Agricultural Chamber of the East) (2009)<sup>7</sup>, the cultivated surface in 2009 was 1.954.534 hectares. Following Montenegro's data of 1,000 dollars per hectare, we would come to 1.954 million dollars of investment during 2009. This information gives us an idea of the capital stock, of part of the capital stock for agriculture.

Starting with this data, we could come to an investment of 100 million dollars a year for land preparation. Montenegro (1999) referred to one decade; in our case, due to CAO information (2009), we refer to two decades. We are talking about land preparation and not about land purchase.

This investment allowed the expansion of land for cropping from 482 thousand hectares in 1989 to 1.9 million hectares in 2009. Soybean production in 1990 used 172 thousand hectares, and 975 thousand in 2009. The rest corresponds to cultivations such as sorghum, sunflower, sugar, and rice.

Despite the lack of rule of law, investment on land preparation increased. The most important investments were in Santa Cruz. Nevertheless, with the arrival of President Evo

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<sup>7</sup> Agricultural Chamber of the East (2009). "Evaluación de desempeño del sector agropecuario en el departamento de Santa Cruz – Gestión 2009"

Morales, the problems of lack of rule of law have risen, which would obviously have an effect on agriculture investments in lowlands.

Livestock has a high growth potential, because of proper land availability. Santa Cruz produces 34% of livestock. Out of the 47 million hectares that Santa Cruz has, more than 22 million can be enabled for livestock. This implies ten times more the amount of hectares that are being used for agriculture.

The amount of investment for the preparation of land for agriculture is very different from the amount required for preparing land for livestock. It is estimated that Santa Cruz has an investment of 1,100 million dollars –capital stock- , in 650 thousand hectares in cultivated pastures, and 5 million hectares destined to forest-grassland systems.

Investments on agriculture in Santa Cruz were done due to: land fertility, low prices, and relative economic stability and, in the case of foreign producers, distribution and diversification of risk in two countries.

It is important the investment on the processing of oleaginous plants, on the increase in capacity for grain storage and on the capability of industrial processing. These investments originated a fixed capital stock of 200 million dollars. Wheat mills carried out important investments, reaching a stock of 30 million. The picking industry had a stock of 20 million dollars between 1993 and 1998, which implies an annual investment of 4 million dollars (Montenegro, 1999).

Import of capital goods for agriculture was carried out by the agro-industrial sector. These imports grew during the '90. The tendency towards increase of those imports for agriculture is not linear. During 1990-1995, it was between 16 and 17 million dollars; during 2005-2009, it reached from 39 to 96 million dollars.

Imports of capital goods for the agriculture sector are composed mainly of machinery, tractors, croppers, threshers, milking machines, etc. According to Prudencio (2009), in 1985, Bolivia only had 4.750 tractors; in 1994, 5.200, and went up to 6.000 in 2003. Between 1985 and 1995, there was only one tractor for each 803 hectares per year. Between 1995 and 2003, this relation increased to one tractor for each 583 hectares.

Regarding the use of machinery, in 1990 there were 4.5 machines for each one thousand cropped hectares; 3.5 per one thousand hectares in 1994; 2.83 per one thousand hectares in 1990 and 2.60 per one thousand hectares in 2003. We can see a drop in the use of machinery, which implies that the investment effort of capital goods is not congruent with the increase of cropped land.

**Chart No. 4**  
**Imports of Capital Goods**  
**(in millions US\$)**

	1980	1985	1990	1995	2000	2005 p	2009p
<b>Imports of capital goods (in millions of US\$)</b>	<b>210,4</b>	<b>225,2</b>	<b>253,6</b>	<b>535,0</b>	<b>606,8</b>	<b>611,3</b>	<b>1.281,9</b>
Capital goods for agriculture	15,1	27,4	16,3	17,4	12,9	39,0	96,7
Capital goods for industry	144,7	142,3	173,4	313,8	414,6	441,8	891,9
Share of the imports of capital for agriculture	7,1	1,2	6,4	3,2	2,1	6,6	7,5

Source: UDAPE  
(p) Preliminary

#### **4.3.1 Diesel**

According to Guzman (2010), Bolivia uses 163 million liters of diesel per year; 42% of this amount is assigned to Santa Cruz. The price of diesel in the Bolivian market is 0.52 dollars per liter, which implies that agriculture from Santa Cruz invests 36 million dollars per year on this commodity.

The expansion of the agricultural border in Santa Cruz was possible due to State subsidy on the price of diesel. The price of this commodity has been frozen for 20 years. Urioste (2010) estimates that the average consumption of diesel per hectare of soybean is 40 liters. The subsidy fluctuates between 0.50 and 0.80 dollars per liter, implying that the soybean producers in 2009, cultivating one million hectares, received a subsidy of 20 to 26 million dollars.

The hectares cropped in Santa Cruz are twice as much, thus, the subsidy on agriculture fluctuates between 40 and 64 million dollars per year. The real investment expenses, paid to private sector plus diesel subsidies of diesel, would reach 76 to 90 million dollars a year. This is the quantity of investment allocated to the agricultural sector in diesel.

#### **4.3.2 Fertilizer and pesticides**

Imports of fertilizers and pesticides, together with the imports of agricultural and forestry machinery presented a rising tendency during 1992-2005. In 1992, it added up to 25.7 million dollars; in 2005, it reached 139.1 million dollars.

In 1992 there was a total import of 11.000 metric tons of fertilizer; in 1994 only 5.971 metric tons. During 2004-2005, there is a recovery.

Imports for 2005 are five times as much as 1992 (Prudencio, 2009). Imports of pesticides were 5.7 million dollars in 1992, and increased to 80 million dollars in 2005. On the other

hand, investment on fertilizers was less, in 1992 it reached 4.7 million dollars, and in 2005, 20.5 million. Imports of fertilizers and pesticides show an effort of private investment in order to improve agricultural production.

### ***4.3.3 Human Capital***

The development process of commercial agriculture has created human capital, partly formed by public university, another part formed by private university, plus an addition that came with landowners, especially Brazilian. Together with land purchase, they brought knowledge and technology that made it possible soybean production increase. The Brazilians brought technicians and trained professionals on agricultural production.

### ***4.3.4 Land Factor***

The availability of lands for cultivation has changed according to the process of Agricultural Reform (1953). This reform created the neo-landlordism in the East that implies talking about the price of land next to zero. The military dictatorships of the 70's and 80's reinforced this practice, giving large extensions of land to speculators, entrepreneurs and neo-landlords, with price close to zero.

The idea of land price d, or land purchase transactions in Santa Cruz, is a new phenomenon, emerging during the 90's, which comes accompanied by the boom of soybean. There are no elaborate studies on the price of land, but Urioste (2010) using interviews and following newspaper announcements on land, gave ideas of pricing, although we cannot mention a unique price.

Urioste (2010) shows that 15 years ago land traders purchased land at 15 to 30 dollars per hectare, and sold it to the Brazilians at 100 dollars per hectare. The purchase and sale of land attracted the presence of foreign investors, thus purchasing large extensions. 35% of the surface for soybean, estimated at one million hectares, corresponds to Brazilians.

Currently, the best land extensions for soybean are offered at 2,000 dollars per prepared hectare; there are some at 1,000 dollars per hectare, but these are located at distant places. Land for livestock and forestry, without improvements, fluctuate between 100 and 400 dollars per hectare.

Montenegro (1999) points out that, between 1993 and 1996, the agricultural and agro-industrial sector received between 16% and 18% of total Foreign Direct Investment (FDI), part of this investment is on land purchase.

## **5. CAPITAL FORMATION AND DETERMINANTS OF INVESTMENT**

### **5.1 Capital Formation**

We will now focus on gross capital formation (FBKF); most of the specialists identify it as the gross investment (Candia, Huarachi, 1999<sup>a</sup>). We will treat capital stock as a stock variable, and investment as a flow variable.

Through capital stock, we are able to know the productive capability or the productivity. In addition, this shows the fixed capital assets, and allows us to know if the use of capital factor is intensive (Huarachi and others, 1991).

Due to the difficulty in getting data, few studies carried out calculation of capital stock. Huarachi and others (1991) undertook a disaggregated estimation of capital stock by large economic sectors, using an indirect methodology. In principle, they calculated the mean capital-product relation (K/GDP), then, calculated capital stock through extrapolation. The study reached a mean capital/product relation of 4.0 for the whole economy, 4.4 for the public sector and 3.9 for the private sector. Moreover, if housing-property sector is excluded, the relation reached 3.2 capital units for each product unit, which is valid for the productive sectors that generate value added.

Cupé and others (1995) undertook the estimation of capital stock for the 1988-1992 period. They used the Harberger methodology (1976) and the perpetual inventory method (Goldsmith, 1951). Using the capital stock estimation carried out by Huarachi and others (1991) as a base for the calculation of the following years. They estimated a capital stock of 3.89 capital unit per product unit for 1989.

Most of the studies that use capital stock resort to Huarachi and others (1991). In view of its reliability, we use the capital/product relation of 3.2 for the whole economy, and calculated the same relation and the rest of the variables for all the previous and future years, as shown in chart 5, where we show the 1980-2008 series.

**Chart No. 5**  
**Gross Capital Formation and Capital Stock of the Bolivian Economy 1980-2008<sup>8</sup>**  
**(In thousands of Bs from 1990)**

	1980	1985	1989	1995	2000	2005	2008
GDP	15.261.228	13.842.011	14.758.943	18.877.396	22.356.265	26.030.240	30.277.826
FBKF	1.963.222	1.499.459	1.706.846	2.780.084	3.927.006	3.437.559	5.022.365
FBKF as % of the GDP	12,86%	10,83%	11,56%	14,73%	17,57%	13,21%	16,59%
Stock of K (1)	46.697.218	46.558.773	<b>47.228.617</b>	52.512.609	63.797.122	69.857.520	76.003.039
FNKF (2)		9.895	201.994	1.136.034	1.947.829	1.241.857	2.675.896
FRKF (3)		1.489.564	1.504.852	1.644.050	1.979.177	2.195.701	2.346.469
Aprox ICOR (K/GDP)	3,06	3,36	3,20	2,78	2,85	2,68	2,51
Productivity K (GDP/K)	0,33	0,30	0,31	0,36	0,35	0,37	0,40

<sup>8</sup> GDP official data and Gross formation of fixed capital data generated by INE and UDAPE were used. The Social and Economic Policies Analysis Unit (UDAPE) is a public institution that renders technical support of the Executive power. The National Statistics Institute (INE) is a technical entity in charge of producing official statistics.

Savings rate (s=FBKF/GDP)	0,129	0,108	0,116	0,147	0,176	0,132	0,166
Multiplier of savings (1/s)	7,77	9,23	8,65	6,79	5,69	7,57	6,03
Guaranteed rate (s/ICOR)	0,0420	0,0322	0,0361	0,0529	0,0616	0,0492	0,0661
GDP Potential		14.531.406	14.733.899	18.988.457	23.151.793	26.154.726	30.408.926
GDPpot - GDPobs		689.395	-25.044	111.061	795.528	124.486	131.100
GDPobs / GDPpot		95,26%	100,17%	99,42%	96,56%	99,52%	99,57%

Source: UDAPE. Based on calculations prepared by Rodney Pereira

(1) Capital stock calculated by Rodríguez (2007) for the year 1989

(2) FNKF: Net formation of fixed capital = Stock Kt - Stock Kt-1

(3) FRKF: Formation of reposition of fixed capital: FBKF-FNKF

GDP/K = Potential productivity of capital (Domar)

GDP = (GDP/K)\*Stock de K

FBKF/GDP = 1/Y, S=I, is considered as savings rate

GDP = Savings rate \* FBKF (real product, Domar)

1/(FBKF/GDP) = 1/s = Keynesian multiplier

ICOR or RICAP = Increasing relation Var K/Var Product

Guaranteed rate (Gw) = Savings rate/K/GDP or s/(VarK/VarGDP)

Potential Product = Based on the guaranteed rate of increase

We will see the investment coefficient of the economy. There is agreement as to the higher the coefficient is, the higher the possibilities of economic growth. In Bolivia, this relation is in average 10.58% for the period prior to 1985. During the next decade, it jumped to 13%. Between 1995 and 2000, it increased to 18%, and decreased, during the crisis of the beginning of the century, to almost 14%. For the 2005-2008 periods, it was greater than 14%. As an average of almost 30 years, the effort of investment is close to 14% of GDP. That magnitude is relatively low. Furthermore, according to Jemio (2008) it has shown an increased volatility, being a fundamental factor for explaining the low growth rates.

According to CEPAL (2002) (UN Economic Commission for Latin America and The Caribbean), the investment rates for the region in the 70's were 25% of GDP, decreasing to 20% during the 80's and 90's. Bolivia only had 14.4%, which is evidence of the delay that affects its growth in the medium and long term. According to CEPAL (2009), in order to grow 6% per year, there is an investment need of 24 to 27 points in GDP.

Due to the crisis at the beginning of the 80's<sup>9</sup>, economic activity fell (-2%) and investment collapsed until the middle of the decade. Starting on 1985<sup>10</sup>, investments increased as well as the product. Until 1990, investments were not more than 12% of the GDP, but in the decade of the 90's it reached 23%. For the 1995-2000 periods, with the capitalization policy, FDI increased; in 1998 FBKF reached more than 5 billion Bolivianos, approximately one billion dollars. From then on, it decreased both in amount and in relation to GDP. Since 2004-2005, it increased again, reaching in 2008 5 billion Bolivianos. Nevertheless, the percentage of GDP from 2005 on does not go over 15%.

<sup>9</sup> At the beginning of the 80's, there was a debt crisis. There was a meltdown of the Bolivian economy, with inflation rates of up to 24,000% in 1985 (Arze, 1999), and an important fall in products.

<sup>10</sup> Due to the crisis and hyperinflation, the NPE was implemented in 1985; this was a package of measures for stabilizing the economy.

With these levels of FBKF, capital stock increased during almost 30 years, except for the beginning of the 80's. Even though, the growth rate of capital stock was positive between 1985 and 1995, it was still low, a bit over 1%. Since 1997, the growth rate went over 4%, even reaching 6%. Due to the contraction of investments since 2001, capital stock returned to an average growth rate of 1.8%. Recently, in the last three years, it has gone over 2%, reaching 3.65% in 2008.

When comparing the growth rate of capital stock with the growth rate of the population, around 2.1%, we are able to see that the aforementioned is insufficient to ensure capital to new workers. The growth rate of the population is larger than that of capital stock; therefore, the quantity of capital for workers had a tendency towards decrease. Jemio (2008) suggests that the low investment rate between 1970 and 2006, resulted in the fact that work productivity remained stuck at very low levels, with a negative annual growth rate of the product (-0.08%). Furthermore, the endowment of capital per worker remained constant, with a negative average per capita capital stock growth rate (-0.17%).

The reduction of the capital/product relation was due to the growth of the product, which has a larger rate than that of the physical capital stock. The annual capital stock growth rate (1.77%) has been lower than that of the product (2.52%). The increase of such relation in the first years of the 80's was due the contraction of GDP, and not due to an increase in capital stock. Between 1998 and 2000, the increase of the capital/product relation is due to the entry of foreign capital, especially hydrocarbons, this due to the capitalization process. The investment coefficient between 1987 and 2000 had a yearly average of 20%.

Productivity capital at the beginning decreased, then increased during the following years, reaching a relation of  $GDP/K=0.40$ . This shows that the growth rate of the product (2.52%) was higher than the capital (1.77%); this reflects a better use of the installed capacity, more efficiency in the use of capital.

According to Jemio (2008) that increase is due to the technological process. Because the growth rate of the product was less than the employment growth rate, productivity was reduced (-2.78%) which could be explained by the reduction of capital endowment per worker (-5.9%). The quantity of capital per worker decreased due to low levels of investment and to growth of the work force. The low levels of investment only allowed the repositioning of the depreciation of capital and new capital for the new workers. With the current investment rates, more or less 13.9% of GDP, 65 years will be required in order to double the product per worker.

### ***5.1.1 Total Productivity of Factors (TPF)***

Rodríguez (2007) carried out an estimation of the TPF. Total payment to the work factor (from the point of view of the producer) as a percentage of GDP ( $\alpha L$ ) has been calculated based on employment database and mean remuneration. Payment to the capital factor is

obtained through the difference  $(1-\alpha L)$ , which assumes perfect competition and constant performance. The result of the estimation suggests that the magnitude has relation to empiric literature ( $\alpha L=0.64$ ). The tendency is decreasing, which could be the result of the capitalization period. Thirdly, the author highlights a change of scope in 2004-2006 periods, which can be explained by the migration observed in the past few years.

**Chart No. 6**  
**Bolivia: Accounting the Growth 1961-2004**

Period	Average Annual Growth Rate			Contribution to Growth of the GDP				
	GDP	Physical Capital	Labor Force	GDP	Physical Growth (1)	Labor force (2)	Total Factors (1)+(2)	TPF1
1961-1965	5,2	8,1	2,3	5,2	2,8	1,5	4,3	0,9
1966-1970	6,1	8,0	2,3	6,1	2,8	1,5	4,3	1,8
1971-1975	5,8	11,8	2,5	5,8	4,1	1,6	5,7	0,1
1976-1980	2,6	-2,1	2,4	2,6	-0,7	1,6	0,9	1,8
1981-1985	-1,9	-4,1	2,1	-1,9	-1,4	1,4	0,0	-1,9
1986-1990	2,2	5,4	2,3	2,2	1,9	1,5	3,4	-1,1
1991-1995	4,1	7,9	2,3	4,1	2,8	1,5	4,3	-0,2
1996-2000	3,5	8,7	2,2	3,5	3,0	1,4	4,4	-1,0
2001-2004	2,6	-4,7	3,2	2,6	-1,6	2,1	0,5	2,2
<b>1961-2004</b>	<b>3,4</b>	<b>4,5</b>	<b>2,4</b>	<b>3,4</b>	<b>1,6</b>	<b>1,5</b>	<b>3,1</b>	<b>0,2</b>

Source: Humérez y Dorado (2006)

The author suggests a potential product dynamic slightly larger to population growth. In an economy with a high degree of poverty, this raises some attention because the results of the study suggest that, if the growth of the population were 2%, we would need 87 years to double the actual per capita growth.

Only exceptionally, the growth rates of GDP have been close to 5 or 6 %, this happened in 1961 and 1975. The norm indicates that the average growth rate in four decades, between 1961 and 2004 was 3.4%. If we discount the population growth rate, we can reach per capita income growth rates close to zero in that period.

The mean values of annual growth rates of physical capital and labor force are 4.5% and 2.4% respectively. In the same way, we may observe an annual growth rate of 0.2% of human capital in the period. These data show the contribution to growth of physical capital and labor force. The average growth of GDP of those 48 years was 3.4%; 1.6% is explained by physical capital, 1.5% by labor force, and human capital contributed with the remaining 0.2% (Rodríguez, 2007).

In relative terms, physical capital contributed with 47% of the average growth of GDP, this is the factor with the highest incidence in growth; its weight reaches almost half of the total. Labor force makes up to 44%. In the future, the country has to make larger efforts towards growth of physical capital, which happens when increasing the investment coefficient and assign more resources towards investment in order to improve human capital and in order to achieve incidence in product growth.

## 5.2 Capital Formation in the Agricultural Sector

Huarachi and others (1991) estimated the capital stock per sector. In the case of agriculture, the estimation included the components of the capital stock by type of goods for 1989, and then they estimated the capital/product relation. The components included in this calculation, besides machinery and equipment, constructions and land improvement, were the ones referred to self-propelled capital, in other words, value of livestock – cattle, sheep, pigs, llamas and alpacas- which is obtained by multiplying the number of heads of each type of livestock by the price of each one. The result of the calculation for 1989 was the capital/product relation of the sector by 2.3 units. This implies that the agricultural sector is not capital intensive.

Cupé and others (1995) carried out a calculation of capital stock by agricultural sector, using the Huarachi and others study as a basis. The differences between the two studies are the prices of self-propelled capital. In this case, the capital/product relation was even lower, 1.35 for 1989, and decreasing during the following years. This was because the product growth was higher than the capital. The fall of performance of 40% compensated the increase of the cropped surface by 200%.

Given the calculations and the soundness of Huarachi and others (1991), this study includes the 2.3 capital/product relation of the sector for 1989, and then we estimated the rest of the variables. In general, all the studies that refer to capital stock in Bolivia use the Huarachi and others figure. The disaggregate information for the sector is more limited, the analysis period is restricted to 1988-2004, with official data of INE and UDAPE.

Chart 7 and the methodological annex, present the FBKF in the agricultural sector. The analysis begins in 1988-1989, which coincides with the launching of commercial agriculture in lowlands.

**Chart No. 7**  
**Gross Capital Formation and Capital Stock in the Agricultural Sector 1989-2004**  
**(In Thousands of Bs in 1990)**

	1989	1990	1995	2000	2004
GDP	2.266.548	2.371.077	2.810.149	3.178.127	3.599.495
FBKF	59.487	97.582	126.413	98.789	98.980
FBKF as % of the GDP	2,62%	4,12%	4,50%	3,11%	2,75%
Stock of K	<b>5.213.060</b>	5.143.824	4.961.328	4.823.389	4.594.629
FNKF (1)	-110.879	-69.236	-33.419	-57.396	-49.637
FRKF (2)	170.366	166.818	159.832	156.185	148.617
Aprox ICOR (K/GDP)	2,30	2,17	1,77	1,52	1,28
Productivity K (GDP/K)	0,43	0,46	0,57	0,66	0,78
Savings Rate (s=FBKF/GDP)	0,026	0,041	0,045	0,031	0,027
Multiplier of savings (1/s)	38,10	24,30	22,23	32,17	36,37
Guaranteed rate (s/(K/GDP))	0,0114	0,0190	0,0255	0,0205	0,0215

GDP potential	2.327.956	2.309.546	2.841.858	3.134.291	3.667.947
GDPpot - GDPobs	61.408	-61.531	31.710	-43.836	68.452
GDPobs / GDPpot	97,36%	102,66%	98,88%	101,40%	98,13%

Source: Prepared based on information from INE  
(1) FNKF: Net capital formation = Stock K<sub>t</sub> – Stock K<sub>t-1</sub>  
(2) FRKF: Fixed capital reposition formation: FBKF-FNKF  
GDP/K = Potential Productivity of capital (Domar)  
GDP = (GDP/K)\*Stock of K  
FBKF/GDP = I/Y, S=I, is considered as the savings rate  
GDP = Savings rate \* FBKF (Real product, Domar)  
1/(FBKF/GDP) = 1/s = Keynesian multiplier  
ICOR or RICAP = Increasing relation Var K/Var Product  
Guaranteed Rate (Gw) = Savings Rate/K/GDP) ó s/(VarK/VarGDP)  
Potential Product = In base of the guaranteed growth rate

The investment coefficient or FBKF, as a percentage of the agricultural GDP between 1988 and 2004, was of 3.85%, which presents evidence of the lack of investment on the sector. During 1990-2000, it was a bit higher, in a yearly average of almost 4.5%. Although insufficient, it reflects the investment undertaken in the soybean sector of the agro-industry.

Soybean had 75.000 hectares of cropped surface in 1988, and increased to 580.000 hectares in 2000. In 2001, the investment was less; it did not reach 3%, because of the crisis Bolivia went through at the beginning of the century, with roadblocks and illegal land occupation, which generated legal uncertainty.

Investment on the agricultural sector was not enough to pretend an agile development, especially in peasant agriculture. When we speak about investment on the sector, the reference is commercial agriculture, and not peasant agriculture. Investment on the sector, as a percentage of the GDP, does not reach 1%.

The growth of the agricultural GDP had a volatile trend, some years it grew over 8% (2003) or 9% (1991), and other years were more modest. Some of them had a negative growth (1989, 1992, and 1998). In average, during the period of analysis, the agricultural production grew by less than 3%.

This low levels of investment on the sector (3.85% of the GDP for agriculture), added to the volatile and low growth rates (2.91% annual), reduced capital stock to an average rate of 0.92%. This decrease of capital stock in the sector implies that the gross physical capital formations were trounced by fixed capital consumption or reposition of investment. Due to the technological advance of this sector in the rest of the world, the relevant capital of the sector reduced; fixed capital experienced a process of becoming obsolete.

The growth rate of the rural population was less than 1%, an average of 0.53%, because of rural-urban migration<sup>11</sup>. Much like the economy in general, capital stock resulted insufficient in order to present new capital to the new work force, thus work productivity decreased.

<sup>11</sup> In 1980, the rural population represented 54% of the total population, 1990 it was 44%, and in 2008, it represented only 34%, a clear urban growth process.

The capital/product relation declined, which means that the product growth rate (2.91% annual average) was higher than the capital stock growth rate, which resulted negative (-0.92% annual average). In 1990 the product grew by 4.61% while investment as on 4.12% of agricultural GDP, which resulted in the decrease of the sector capital stock of -1.33%. In 2003, the growth of agricultural GDP was 8.71%, but investment only represented 2.80% of GDP of the sector, therefore capital stock decreased at -1.06%.

The capital/product relation, which is an approximation of the ICOR rate, for 1988 was 2.31 and in 2004 it declined to 1.28, in other words a negative growth rate of -3.57% annual average; the fall is explained by a reduction of product. The years of growth, 1992 and 1998, were a consequence of the fall in production, as an effect of adverse climatic effects, and not due to an increase through investment.

The capital productivity grew, it rose from a relation of  $GDP/K=0.43$  in 1998, to 0.78 in 2004. This shows efficiency in the use of this factor, in other words, a higher and better use of the installed capacity.

If development of agriculture can help overcoming poverty and extreme poverty, and if food security depends on it, policies must aim to increase investment, increase the investment coefficient, if this does not happen, growth will remain the same.

Following the same analytic line, Candia and Pinto (1999b) sustain that investment and capital stock accumulated in agriculture sector have not had, in any period between 1979 and 1986, a relevant share in the economy.

### **5.3 Determinants of Public and Private Investment**

At statistical or causality level, it is not easy to establish a clear relation between investment and product within the agricultural sector. On one side, we have the causal relation and the definition of investment on agriculture, and, on the other, the difficulty in disaggregating and identifying that investment within national accounts and, in consequence, calculating it. Data from INE and UDAPE only show the Gross Capital Formation at an aggregate level to market prices, and only present the information at a sectoral level and constant prices, without the same level of disaggregation of the general level. This is the reason why, another calculation is carried out in order to be able to compare the gross capital formation at the national level at market prices with the gross capital formation at a sectoral level. This shows that there is difficulty in identifying what the investment on agriculture is and its estimation. The factors that influence investment on the sector may be external, public and private.

#### **5.3.1 External Factors**

The external factors refer to the context, and they support or interfere with the investment on the sector, such as: natural resources, demographic growth, technology and the context of international commerce. In reference to natural resources, the fertility of the soil, investment whether public or private, have a close relation with it, favoring the well endowed regions. Bolivia's geography, extension of its territory, dispersion and low population, distance to market places, topography, and landlocked characteristic, are factors that affect investment negatively, increasing transportation costs.

Population growth may have positive or negative effects on agriculture growth. The positive effect on one hand, population growth represents higher demand and supply of labor force, much of this population has migrated during last years generating an urban growth process. Urban growth takes place due to the pursuit of wage security in the cities. The negative effect on the other, malnourished population that has an effect on labor efficiency, or when the number of inactive people is larger than the active population, or when the lack of technology damages the environment.

International commerce influences investment, it generates opportunities and creates threats when inserted into global economy. According to Prudencio (2009), during the last 30 years, policies for agriculture and food were "neoliberal", they allowed the market to allocate resources, which contributed in reinforcing the duality of the agricultural sector. The commercial openness of the 80's and food aid subjected peasant agriculture to unfair competition. On the other hand, the commercial agreement with CAN (Andean Community) allowed the access of Bolivian soybean to markets such as Colombia and Venezuela.

The technological advances on research may generate opportunities of investment and growth of agriculture. But, the basic research has decreased; investment on agricultural research decreased from 43 million dollars between 1987 and 1992 to 12 million dollars between 2005 and 2009. The technological disadvantage is intensified by the lack of investment on research.

### ***5.3.2 Public Factors***

The role of the public sector is to create conditions for stimulating investment of the private sector. This implies macro policies and investment on infrastructure and human capital. Political stability, a stable and foreseeable institutional framework and a macroeconomic balance are necessary conditions to create a favorable climate for investments.

The stable institutional framework refers to the security of land owning and protection of contracts and property. The New State Political Constitution has limited the maximum size of hectares to 5.000 hectares, furthermore, some expropriations and illegal appropriation of

land have occurred thus generating uncertainty of property in Bolivia. This negativity affects investment on agriculture and livestock.

Regarding commercial policies, tax return to exporters would incentivate investment. In 1993, CAN became a free trade area, which meant zero tax for all products. With these preferences, soybean and derivatives exports increased from 56 million dollars in 1992 up to 505 million in 2008.

On the other hand, the State subsidizes diesel imports, a large asset for agro-industry.

The policies regarding poverty reduction and equal access to opportunities are fundamental to create social and political stability, thus creating a favorable environment for investment. In the last couple of years, the Government opted for direct transfers to population, which means that the households have more resources for food.

According to the Human Development Report, Bolivia is the most corrupt country of Latin America, with an index of 18%, affecting investment decisions.

Peasant agriculture faces infrastructure problems: distances to market places, bad roads, land is not abundant and not very fertile, lack of water, lack of technology and low labor force and land productivity. Investment on infrastructure has direct and indirect impact on development and economic growth. Direct impact relates to the raise of productivity of the factors that increase the product. On the other hand, the indirect impacts related to the benefits that the services of infrastructure generate for companies and families.

The infrastructure for commercialization is scarce: in 2008, there were only 80.000 kilometers of roads, only 7.8% paved, 30% gravel and 54% dirt. In 2004, only 226 thousand hectares of land benefitted by irrigation systems.

The coverage of electricity in the rural area was 44%, hence more than 50% of the population did not have direct access to this service, and this decreases production.

There were great results in microcredit within the rural financial markets, but it has not reached all the rural-agricultural area. In 2001, the share of agricultural sector in the portfolio (by destination of loan) was 10%, but in 2009 it decreased by half. This implies the loss of importance of the sector in the banking system. Loans from the banking system for the agriculture and livestock sector are directed almost completely to the entrepreneurial sector. Microcredit has grown in the last 10 years; it rose from more or less 6% in 2001 to more than 16% in 2009. Nevertheless, it cannot be disaggregated and the verification if microcredit went to agriculture cannot be done.

## **6. ANALYSIS OF SOME CASES**

## **6.1: Soybean: Monica Group**

The case of soybean is the biggest paradigm of Bolivian agriculture, specifically in the commercial agriculture of Santa Cruz. The greatest transformation took place in early 90's, time where soybean boom started, this conducted this cereal towards becoming the great export product of Bolivian agriculture.

The cropped surface for soybean was 363 thousand hectares in 1995, and increased to 930 thousand in 2005 and reached 985 thousand in 2009. The production in 1995 was 809 thousand metric tons, in 2005 increased to 1.6 million tons, and in 2009 reached 1.8 million tons.

Returns are not spectacular, they are below Brazil. In 1995 they were 1.86 tons per hectare, increased to 1.73 tons per hectare in 2005 and 1.83 tons per hectare in 2009.

There are large variations in prices of soybean. Price per ton in 1995 was 155 dollars, and increased to 160 dollars in 2005, and it doubles in 2009, rising up to 320 dollars. This is a great incentive to produce this cereal.

The value for production in 2000 was 196 million dollars; it rose to 258 million in 2005, reaching 577 million in 2009. The exports in 2000 were 122 million, and increased to 573 million in 2009.

The Monica Group works as a mixture of a soybean-producing hacienda -company style-connecting to the production of soybean by-products. It is a Brazilian company and works in Bolivia since 1991. They started working with 350 hectares. In 2003, it was the main soybean producer in Bolivia, having 42.000 cropped hectares. The Group had a sustained growth that allowed it to be larger in area than other groups or entrepreneurs that were the largest producers of this cereal.

During the first years of work in Santa Cruz, it made investments of 25 to 30 million dollars, an average investment of 2.5 million dollars per year.

It does not only focus on soybean, it also produces sunflower, sorghum, cotton, maize and wheat. It emphasizes on the production of high genetic quality seeds. It has a seed industry in Pailón, and receives genetic material, classifies them and then packages them.

The Group organized the “Fundación de Desarrollo Agrícola Santa Cruz” (Fundacruz) (Foundation for the Development of Agriculture of Santa Cruz), which became the vital support in the development of soybean production in the country. The results consisted in the incorporation of new varieties of seeds with excellent results in the increase of production. Towards 2003 close to 50% of the cropped surface in Santa Cruz used varieties of seed achieved by Fundacruz.

The Monica Group is the largest producer of soybean in Bolivia, their production in the summer reaches 70.000 tons.

## **6.2 Quinoa: ANAPQUI (Asociación Nacional de Productores de Quinoa / National Association of Quinoa Producers)**

Quinoa is an Andean cereal produced in the Andean Region of various countries in South America. Bolivia is the largest producer worldwide. Quinoa is produced in the Highlands (Altiplano), and has an importance for the peasant economy of Potosi and Oruro; around 70.000 farmers' units produce it.

Cropped surface is approximately 45.000 hectares, and the annual production is 26.500 tons.

Bolivia produces quinoa grain and flour for the preparation of pastas. Quinoa is rich in protein; its protein content allows it to substitute meat.

Since 2005, there has been a boom in the production due to the elevation of international prices (PIEB, 2010). Out of the different varieties of quinoa, the product with the highest demand is Quinoa Real.

In 1995, there were 36.7 thousand hectares planted, and increased in 2007 to 45.5 thousand hectares. The production was 18.8 thousand tons in 1995 and 26.6 thousand tons in 2007. The returns were 0.51 tons per hectare in 1995 and only 0.59 tons per hectare in 2007.

The exports were around 1.6 million dollars in 1995, but in 2009 increased to 43.1 million. In comparison with soybean, this figure is modest. The importance lies not only in the fact that the amount increased by 27, but also that it happens in the West of the country, were peasant economy and small land holding primes.

Quinoa is one of the few products of peasant economy, from the Western part of the country, with the capability of being a successful commodity; it already is, but the scale production is not large.

### ***The ANAPQUI Case***

The “Asociación Nacional de Productores de Quinoa” (ANAPQUI) (National Association of Quinoa Producers) was founded in 1983 and operated in Oruro and Potosi. It groups one thousand small traditional producers congregated in seven regional associations of peasant. The associated peasant producers that plant this cereal are the owners of Anapqui. It is a social organization owned by small producers of quinoa real. It directly benefits 3.000 families and indirectly another 10.000.

The objectives are promoting and expanding the quinoa real production, articulating regional economic development processes with the involvement of all producers. They do

not want the value of quinoa to remain in the hands of the intermediaries, and they aim towards organic production, seek value added, and development of mechanisms for commercialization that are more efficient. They seek technological advances without giving up their traditions.

Anapqui participates in almost the whole production chain: support to production, hoard of the product, organic certification, processing, transformation and commercialization, both internal and external.

It exports quinoa in grain, flakes, and flour, organically certified by international regulations. Their markets are Germany, France, Italy, Switzerland, England, Belgium, United States, Japan, Malaysia, Brazil and Chile.

In the case of processing and transformation, it has two processing plants, operated by members, children of the members and non-associated staff. They use machinery for washing, classifying, selecting and transforming the grain. In 2006, they implemented new technology for the processing, classifying and packaging system, with the capability of processing one metric ton per hour and 2.000 tons per year. This technological innovation implied an investment of 150.000 dollars.

The exported quantity reaches 500 tons per year. Since 1992, it has a Natural Quinoa Production Program (Proquinat), which is in charge of registering, control and monitoring of production parcels for the internal and external certification and the promotion of ecological agriculture of quinoa.

### **6.3 Sunflower and Sorghum: Oil Companies**

The boom of commercial agriculture in Santa Cruz is not only represented by soybean, it comes together with sunflower and sorghum. Each one of the large haciendas or agricultural companies do not only produce soybean, but also produce these products. Sunflower possesses importance because it is integral for the industrial production of vegetable oil. On the other hand, sorghum, servers as foliage and balanced foods, it links to the production of animal meat. Sorghum has the capability of substituting maize. The planting of sorghum is mechanic, and some more happens with mechanic harvesters.

In 1995, the surface area used for producing sunflower reached 41.000 hectares, but increased to 235.430 hectares in 2009. The area for sunflower is 25% of the total corresponding to soybean. Production of sunflower was 33.000 tons in 1995, reaching 310.185 tons in 2009. The returns per hectare in 1995 reached 0.8 tons per hectare, and 1.32 tons per hectare in 2009.

In 1995, the price was 155 dollars per ton; in 2009, 300 dollars. The production was 19.5 million dollars in 1995, and reached 93 million dollars in 2009. In 1995, exports were 1.6

million dollars; in 2007, they increased to 68.4 million dollars. The production of sunflower is one of the keys for several agricultural companies that chain their production of vegetable oil.

Sorghum is another grain complementary to the production of soybean and sunflower. Its importance lies in the provision of foliage and balanced food for the production of animal meat, bovine and poultry.

In 1995, the planted surface was 20.000 hectares, increasing to 92.000 in 2009. This surface is equal to 10% the area planted with soybean. The production of sorghum reached 56.000 tons in 1995 and 360.000 hectares in 2009. Its returns in 1995 were 2.8 tons per hectare in 1995, and 3.9 tons in 2009.

The price per ton was 124.4 dollars in 1995; 78 dollars in 2005, and reached 85 dollars in 2009. The production value in 2000 reached 8 million dollars, rising to 30.6 million dollars in 2009. The figures of exports are not the best, in 1995 11.000 dollars, in 2007 2.2 million dollars. Most of the sorghum production is utilized for the internal market.

#### ***Vegetable Oil: Sociedad Aceitera del Oriente (Oil Society of the East), SAO***

The Sociedad Aceitera del Oriente S.A (SAO) was founded in Santa Cruz in 1975. The purpose was processing cotton, obtaining crude vegetable oil, and refined oil. The company was equipped with modern technology, with an investment of 11 million dollars.

At the end of the 70's, it started processing soybean grain. Due to the increase of soybean and sunflower, the company included these productions. Between the 80's and 90's it invested on technology in order to raise its capacity of extraction and refining of oil.

Since 1994, it implemented an integral strategic plan of company modernization, with the objective of developing competitive advantages in the long run.

In 1998, the Archer Daniels Midland Company (ADM) purchased 50% of the stock package, conforming ADM SAO S.A. It is owner of 90% of the company. ADM SAO is the leader of non-traditional exports with annual amount of 100 million dollars.

The agricultural department of ADM SAO S.A. is staffed with qualified professionals in different areas. They possess a system of future sales of grain.

It has thirteen hoard centers directly communicated with the central office. ADM SAO has a hoard of 440.000 tons of soybean grain and sunflower per year.

#### ***Aceitera Fino***

FINO Vegetable Oil Industry founded in the 70's; it is one of the most important agro-industrial and food companies. It produces soybean and sunflower grain, and sunflower oil.

It commercializes crude oils, hydrogenated oils, and soybean and sunflower paddies for the industrial sector. It provides refined soybean **and sunflower oils, butters and margarines.**

**Fino's area for agriculture is an independent business unit that administers several crop fields where it grows soybean, sunflower, sugar cane, maize, sorghum and wheat.**

### ***GRAVETAL***

Gravetal Bolivia S.A founded in 1993 in Santa Cruz. Its founders, a group of investors from Osorno, Colombia, decided to establish an oleaginous industry in Puerto Quijarro, border between Bolivia and Brazil.

The industrial complex started operations in 1994; it focused on accumulation, transportation and commercialization of soybean. **Based on modern technology and innovation on logistics it became a prosperous industry.**

**It was designed to process soybean as a raw material and extract crude oil, flour pellets, and as a sub-product, soybean shell pellets. It focuses on the processing of soybean grain for crude oil production and soybean flour destined to export. It processes 770.000 tons per year.**

Its cumulative exports since **foundation were more than 625 million dollars. It annually generated 4.500 direct jobs and 25.000 indirect jobs. It invested on infrastructure in order to facilitate exports.**

### **6.4 Rice: Cooperativa Agrícola Integral San Juan de Yapacani (Integral Agriculture Cooperative San Juan de Yapacani) (CAISY)**

Rice is one of the basic products in Bolivian diet. Its production is not concentrated in large properties; it is spread out through different types of producers. Small production includes more or less 25.000 families. They use a manual system of production; this production is for self-consumption and for commercial purposes. There are also small commerce producers. Between them, they make up 97% of the total producers. They use some machinery and day workers. They work between 2 and 20 hectares. For more than 3 hectares, they hire day workers. The system is mixed, manual and mechanized and operates in areas no larger than 20 hectares.

Medium sized producers – added to the large ones- sum up to 3% of the producers. In total, there are more or less 43.000 families included in this production. This last group crops in 51 to 500 hectares.

Rice grows in several Departments. In 1995, the surface for this crop was 87.850 hectares, and it increased to 144.000 in 2005. Production in 1995 was 80.650 tons, increasing to

403.200 in 2005, dropping to 270.000 tons in 2009. The production deficit estimated for 2010 is 70.000 tons.

In 1995, the average per hectare was 2.38 tons, increasing to 2.70 tons in 2009. The price per ton in 1995 was 141.5 dollars and 230 dollars in 2009. The production value in 1995 was 32.7 million dollars; in **2009, it increased 62.1 million. Exports for 1995 were 70.000 dollars and in 2007 increased to 775 thousand.**

### ***Cooperativa Agrícola Integral San Juan de Yapacani CAISY***

The co-ops do not generally face productive work collectively, but on the contrary, the Japanese co-ops do. The Japanese co-ops that stand out are: Cooperativa Agrícola Integral San Juan de Yapacani (CAISY) and Cooperativa Agropecuaria Integral Colonias Okinawa Ltda (CAICO).

Japanese immigrants founded CAISY in 1957. The Co-op has this name because it settled in San Juan de Yapacani in Santa Cruz. The objectives are to develop productive activities in an associated manner, collective commercialization, access to technology and access to basic services.

During the first years, it worked with traditional methods, without access to machinery. They currently work with machinery. In 1999, it went into rice development by irrigation.

The colony has 1.000 inhabitants, out of which 103 are active partners of the Co-op. 60 members, with a surface of 9.800 hectares develop the production of rice out of which 8.000 are cultivated by irrigation. Besides rice, they also produce eggs, soybean, and macadamia nuts. They also have their own plant for balanced food. Since 2002, together with the Technological Center for Agriculture in Bolivia, they built a cattle-breeding ranch for the reproduction of pure livestock of Nelore race. CAISY uses high quality seeds (Ortiz & Soliz, 2008), and uses its own research center.

## **7. INVESTMENT IMPACT ON PRODUCTION AND PRODUCTIVITY**

### **7.1 Production, Cropped Surface, Yield and Productivity**

This part will analyze the existing relation between investment and its impact on production and productivity. We will observe the increase (or not) of production, increase and share of cropped surface according to product, the performance of different products, and productivities of land, capital and work.

Performance of the products and productivities are two important variables related to investment that would influence decision of investing or not. Chart 8 presents data of the harvested surface. In comparison to the national level, the performance of production of the

highlands and the valleys are very low. On the other hand, in the agro-industrial production the difference is overwhelming.

### 7.1.1 Harvested Area and Production

As can be observed on chart 8 and graph 5 (see annex 5), the cropped surface grew from 1.2 million hectares in 1980 to more than 2.8 million hectares in 2008. At an average annual growth rate of 3.5%

**Chart No. 8**  
**Harvested Surface, Production and Shares**  
**1980-2008**

Activity	Unit	1980-1985	1986-1990	1991-1995	1996-2000	2001-2008	1980-2008
Cereals (1)	Thousands of Hectares	597.248	626.624	674.936	755.453	804.651	696.468
	%	48,69%	45,68%	41,68%	35,79%	33,06%	40,69%
	Thousands of Metric tons	730.342	818.607	997.756	1.196.771	1.570.958	1.087.301
	%	12,34%	13,51%	13,30%	13,12%	13,74%	13,21%
Stimulants (2)	Thousands of Hectares	29.163	35.230	33.079	30.692	31.632	31.836
	%	2,40%	2,57%	2,06%	1,45%	1,31%	1,93%
	Thousands of Metric tons	24.807	31.499	28.215	31.043	31.470	29.390
	%	0,43%	0,52%	0,37%	0,34%	0,28%	0,38%
Foliage (3)	Thousands of Hectares	93.756	112841	104447	102958	113018	105532
	%	7,79%	8,23%	6,47%	4,88%	4,67%	6,33%
	Thousands of Metric tons	407.894	364.039	321.458	320.405	419.848	371.993
	%	6,93%	6,04%	4,28%	3,50%	3,70%	4,88%
Fruits (4)	Thousands of Hectares	73.749	95.776	101.076	111.525	121.095	101.144
	%	6,05%	6,98%	6,26%	5,29%	5,01%	5,86%
	Thousands of Metric tons	444.865	645.678	682.246	892.694	1.136.993	776.115
	%	7,62%	10,63%	9,11%	9,73%	10,03%	9,40%
Vegetables)	Thousands of Hectares	86.982	112.703	104.870	116.079	130.535	110.853
	%	7,04%	8,22%	6,50%	5,50%	5,39%	6,47%
	Thousands of Metric tons	201.510	244.673	262.958	358.838	555.642	336.818
	%	3,39%	4,04%	3,51%	3,90%	4,89%	3,99%
Industrial (6)	Thousands of Hectares	143.668	181.895	413.957	797.221	1.044.228	540.606
	%	11,79%	13,27%	25,15%	37,62%	42,39%	26,70%
	Thousands of Metric tons	3.064.570	2.768.954	4.103.944	5.125.740	6.332.473	4.382.426
	%	52,40%	45,30%	54,53%	56,30%	55,27%	52,93%
Tuber (7)	Thousands of Hectares	199.186	206.492	191.818	199.532	197.559	198.830
	%	16,24%	15,05%	11,87%	9,46%	8,18%	12,02%
	Thousands of Metric tons	1.009.250	1.209.197	1.118.505	1.202.617	1.364.588	1.187.829
	%	16,90%	19,96%	14,89%	13,11%	12,08%	15,21%

(1) Includes rice, barley, maize, wheat and other cereals

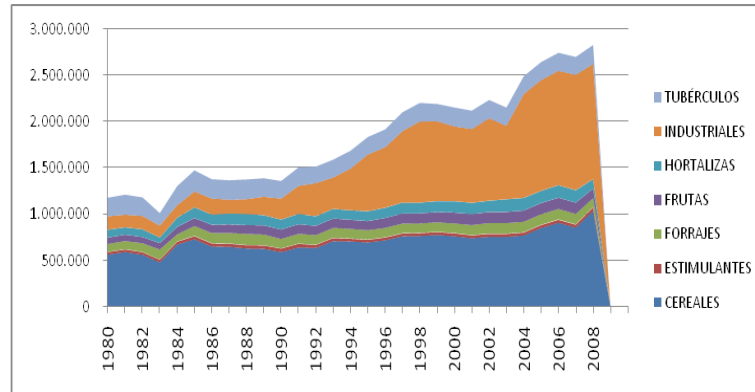
(2) Includes cocoa, coffee and tea

(3) Includes alfalfa, barley and other foliage

(4) Includes banana, peach, tangerine, orange, pineapple, grape and other fruits

(5) Includes garlic, pea, onion, black beans and bean, maize, tomato, carrot, and other vegetables  
 (6) Includes cotton, sugar cane, soybean, sunflower, sesame  
 (7) Includes potato, occa, and other tubers  
 Source: prepared based on UNDAPE data

**Graph No. 5**  
**Surface Cropped by Type of Product 1980-2008**



Source: Own elaboration based on UDAPE

The evolution of cropped surfaces according to type of product shows that traditional product, tuber, foliage, fruits, stimulants and cereals, decreased their share in total production surface, from 88% to 53%. The decrease of surface for cereals and tuber may have consequences on food security, this due to the fact that cereals are key products, as well as tuber, especially potato.

Potato reduced its share of total harvested surface from 14% in 1980, to less than 5% between 2005 and 2007; this shows weakened peasant agriculture. Regarding vegetables produced by peasant agriculture, even though there was a 20% increase in harvested surface, it reduced its total share, from 7.21% in 1980 to 3.57% in 2008. The same thing happened for fruits that increased the harvested surface by 50%, but reduced its share from 6% to less than 4% between 1980 and 2008.

The industrial products increased share in harvested surface, from 12% in 1980 to 46% in 2007, including soybean and sugar. Soybean increased from 37.000 hectares in 1980 to more than 950.000 in 2005. Sugar cane decreased from 7% in 1984 to 4% in 2007. Sunflower rose from 6% in 2000 to 10% in 2008. Even though part of this production is exported, agriculture in the East is important for food security.

Maize and wheat should be highlighted. Maize reduced its share of 25% in 1980, to 12% in 2007. Wheat reduced from 8.5% in 1980 to less than 4% between 2004 and 2005.

Wheat flour is a basic product, its production in 2008 was 200.000 tons, according to CEDLA (2010), and the requirements of internal demand were around 631 thousand tons.

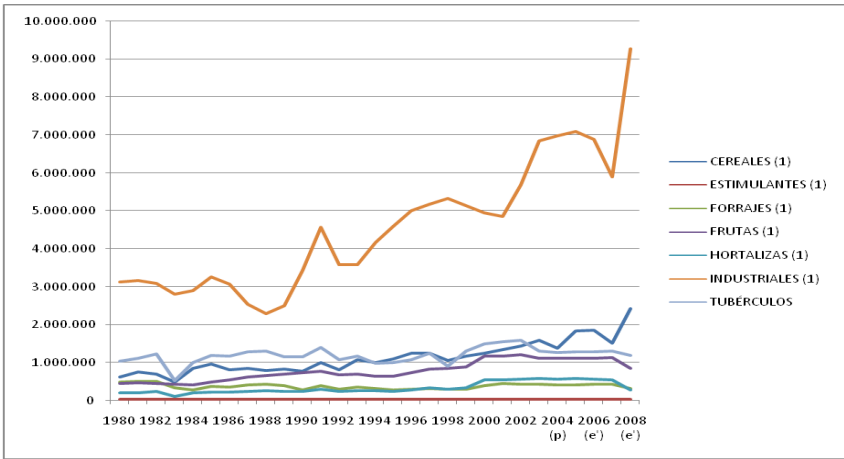
Production only covered 32% of what was required. Imports increased to 70 thousand tons in 2003, and more than 301 thousand tons in 2009.

The products of the peasant economy reduced their share in the harvested surface area against the industrial products, showing that peasant agriculture is less important.

Production in the last 30 years registered significant increases in the majority of the products because of the expansion of the harvested surface area and not because of an increase in performance. Rice (358%), quinoa (222%), grained maize (223%), cocoa beans (93%), black beans and beans (882%), sorghum (1634%), wheat (232%), occa (122%), garlic (155%), onion (152%), and fruits such as the tangerine (439%), pineapple (496%).

Other products that increased their production in minor percentages are potato (19%), yucca (11%), coffee (33%) and some fruits and vegetables. The products with major increases are the industrial products: soybean (2734%) and sugar (142%). Cotton in fiber decreased its production with respect to 28 years ago, as well as forage.

**Graph No. 6**  
**Agricultural production 1980-2008 (In metric tons)**



Source: Own elaboration based on UDAPE

Since 2000, few products have increased their production: sunflower seeds (313%), sugarcane (107%), black bean and beans (187%), sorghum (408%), grain maize (89%), wheat (91%) and some fruit and vegetable. Potato (1%), yucca (-53%), and other fruits and vegetables had a minor growth or even decreased. Soybean only increased 10% in the last 8 years.

Products of main production growth were those of agro-industry or mixed agriculture: soybeans, sugarcane, grain maize or rice.

According to CEDLA (2010), the major levels of production of the corporate and semi corporate sectors are a result, in part, of the international demand but also from a change in the pattern of internal consume. In the past, the peasant agriculture contributed with 70% to 80% of national food production, but decreased to 36.8% in 2000. Agro-industry now contributes with 44.6% and imports with 18.6%.

According to CEDLA (2010), in 2000 the peasant production was still important in: fruits (95%), potato (90%) and milk (67%). In wheat, rice and maize, peasant production shared the total with corporate and semi corporate production. However, it did not have any share in the agro-industrial products such as oil and sugar, and its contribution in the production of meat was minority (30%). These three products became the main components of the diet at expense of potato, which is of peasant production. Oils and sugar were destined for exportation but presently they satisfy a large part of the internal market.

There is a larger prominence of the industrial agriculture over the peasant agriculture. Between 1985 and 1987, the value of peasant production was 60%, whereas for 2000-2002 periods it only represented 40%. In 2002, the corporate sector concentrated 60% of the production value (CEDLA, 2010).

There are peasant sectors that incorporate processes of productive specialization, moreover, they conform small peasant productive units that gradually incorporate machinery and wage-earning work in certain stages of production.

### ***7.1.2 Yield and Productivity of Land***

One of the major problems of agriculture is the low productivity, whether of labor, capital or land. This is common in peasant and commercial sectors. The low productivity of the peasant sector is determinant for the persistence of rural poverty. This low productivity is a consequence of the lack of investment, lack of technological investment, technical education, and roads infrastructure and irrigation.

Productivities of peasant and commercial agriculture are very different. Chart 9 shows the performances in metric tons by harvested hectare and the rate of growth of certain cultivations.

In the peasant production, the yield of potato increased to 12%. Between 1990 and 2000, it has a growth of 35% and from then dropped 25%. Yucca decreased in 30%. Fruits such as tangerine and pineapple grew in 15% and 8% respectively. Other fruits had variable behavior: peach (15%), orange (-16%), grapefruit (-12%) or banana (-1%).

Cereals: the yield of the rice crops increased in 70%, maize in 105%, wheat in 117% and barley in 33%. The yield of sorghum decreased in 23%.

The yield of quinoa did not improve in 28 years. In 1990-2000 periods, it had a growth of 56%. In previous years, it had decreased in 27% and in the subsequent years, its yield decreased in 12%.

Commercial agriculture: Cotton increased its yield in 95% and the sugarcane in only 8%. Soybean increased its yield in 40% mostly between 1980 and 2000. Sunflower seed had a growth of 76% in the 90's.

**Chart No. 9**  
**Yields (MT/Ha) and Growth Rate of Selected Crops (%)**

Crops	Unit	1980-1985	1986-1990	1991-1995	1996-2000	2001-2008	1980-2008
Rice	TM/Ha	1,5	1,82	1,92	2,03	2,25	1,93
	%	0,02	0,05	0,02	0,02	0,05	0,03
Grain barley	TM/Ha	0,71	0,72	0,7	0,66	0,71	0,70
	%	0,05	-0,06	0,06	0,03	0,03	0,02
Quinoa	TM/Ha	0,5	0,46	0,52	0,61	0,57	0,54
	%	0,05	-0,01	0,07	0,09	-0,01	0,03
Grain maize	TM/Ha	1,49	1,54	1,78	2,06	2,31	1,87
	%	0,05	0	0,05	0,04	0,04	0,04
Wheat	TM/Ha	0,69	0,74	0,92	0,85	1,10	0,88
	%	0,05	-0,02	0,14	-0,01	0,06	0,05
Tangerine	TM/Ha	8,57	10,88	10,42	10,78	10,46	10,19
	%	0,11	0,01	0	0,02	-0,04	0,01
Pineapple	TM/Ha	10,21	9,03	11,03	10,27	12,16	10,69
	%	-0,05	0,02	0,05	-0,01	0,01	0,01
Black bean/beans	TM/Ha	1,15	1,26	1,1	1,07	1,06	1,12
	%	0,1	-0,02	-0,04	0,01	0,11	0,04
Cotton fiber	TM/Ha	0,44	0,4	0,53	0,42	0,45	0,45
	%	0,16	0,06	0,25	-0,05	0,14	0,12
Sugarcane	TM/Ha	41,76	41,09	43,45	44,88	45,95	43,63
	%	-0,02	0,05	-0,02	0	0,02	0,01
Soybean	TM/Ha	1,57	1,94	2,04	1,87	1,84	1,84
	%	0,05	0,02	0,08	0,02	0,03	0,04
Potato	TM/Ha	4,53	5,3	5,67	5,74	6,20	5,53
	%	0,06	0,02	0,02	0,13	-0,03	0,03
Yucca	TM/Ha	11,14	10,47	9,45	10,52	10,69	10,50
	%	-0,05	0,04	-0,05	0,09	-0,04	-0,01

Source: Elaboration based on UDAPE

In addition to the lack of investment on physical capital, infrastructure and human capital, there are structural aspects like the impoverishment of soils, excessive pasturage, mono cultivation, over production, and low access to productive credit. Those are the reasons why the yields of the most important crops were insufficient.

### **7.1.3 Productivity of Labor**

Prudencio (2009) estimated work productivity by separating food products and those destined for exportation (Chart 10). In the classification by type of product, the majority of workers increased their labor productivity. That is the case of rice, corn and wheat. The case of soybean is highlighted. From an apparent work productivity equal to 9.38 in 1985, it increased to 12.41 in 1995, later decreasing again to 10.73. This happened because the objective of the soybean sector was the extension of the agricultural border.

The products that have major labor productivity are those from the East: rice, soybean or sugarcane. Products of minor productivity are those from peasant economy: quinoa, cocoa beans and coffee. There are cooperatives of producers for these products. Within the products of peasant economy, potato increased its productivity per worker in 28% between 1985 and 2005, which maybe explained from the point of view of the migratory process rather than from a real increase of labor factor productivity.

**Chart No. 10**  
**Productivity of Main Food Crops and Exportation Crops**  
**1985-2005**

Crops	1985		1995		2005	
	Apparent Productivity of Work (TM/PEAA)	Land cultivated by worker (Has/PEAA)	Apparent Productivity of Work (TM/PEAA)	Land cultivated by worker (Has/PEAA)	Apparent Productivity of Work (TM/PEAA)	Land cultivated by worker (Has/PEAA)
<b>FOODS</b>						
Potato	7,7	1,63	8,37	1,63	9,91	1,63
Corn	7,14	4,49	8,6	4,5	11,29	4,52
Wheat	5,33	7,19	7,03	7,2	7,93	7,22
Broad Bean	3,93	3	4,32	3,11	5,58	3,18
Pea	3,79	2,9	3,79	2,9	4,77	2,28
Rice	7,89	5,14	10,45	5,14	12,28	5,26
<b>EXPORTATION</b>						
Sugarcane	91,37	2,25	96,74	2,24	110,52	2,28
Soybean	9,38	6	12,41	5,99	10,73	6,22
Coffee	1,56	1,85	1,6	1,85	1,82	1,88
Black Beans/Beans	4,99	3,59	3,53	3,6	5,37	3,6
Cocoa beans	-	-	1,2	1,65	1,32	1,79
Quinoa	2,03	4,61	2,36	4,61	2,65	4,65

Source: Prudencio (2009)

Regarding land cultivated by workers there was no progress, nor in the commercial agriculture or in the peasant economy. In most of the cases there was stagnation with barely quantifiable growth in products such as rice (from 5.14 has/PEAA in 1985 to 5.26 has/PEAA in 2005), soybean (from 6 has/PEAA in 1985 to 6.22 has/PEAA in 2005), or cocoa beans (from 1.65 has/PEAA in 1995 to 1.79 has/PEAA in 2005). The quantity of land cultivated by worker has not increased (hectares by population economically active in the sector).

#### **7.1.4 Productivity per Region**

In 1985 labor productivity in the agricultural sector of Santa Cruz increased from 1.71 in 1995 to 6.7. The reason is that in the 90's the boom of industrial production begun. In 2005 such productivity was 11.15. It increased by 6.5 times in 20 years.

In La Paz such productivity was 0.78 in 1985 and 20 years later was 1.05. Its relative increase was only 34%. In Cochabamba such productivity was 2.42 in 1985 decreasing to 1.38 in 2005. In Chuquisaca in 1985 the productivity of agriculture was of 0.83 in 2005

increasing to 1.17. That increase was only of 40%. The increase of productivity in the regions of peasant agriculture is due to migratory processes.

Labor productivity in export areas is greater than that of peasant agriculture. In Santa Cruz, that productivity is ten times greater than the productivity in La Paz

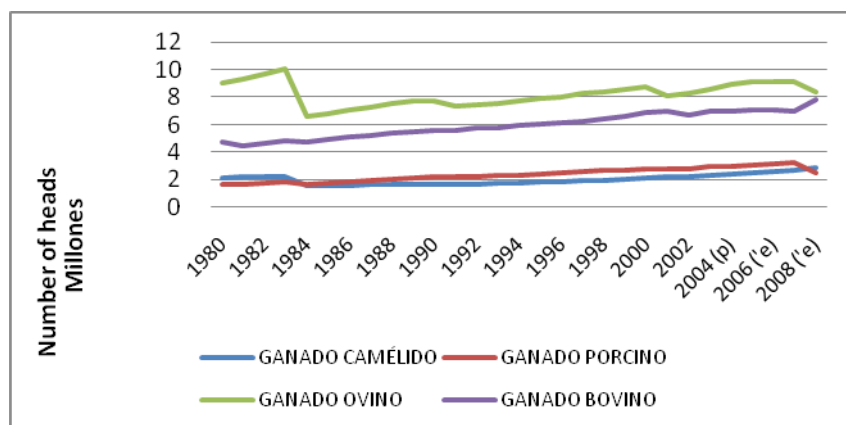
### 7.1.5 Production and Productivity of Livestock Sector

Santa Cruz and Beni have bovine cattle; there are ovine cattle and camelidae in the Altiplano (highlands) and part of the valleys. As chart 7 shows, the number of bovine, pork and camelidae cattle always increased.

Out of the national total bovine cattle, almost half is located in Beni (48%), located in the zones of flood savannahs. The major increase in meat production in relation with the number of cattle is explicable by the increase of productivity because of genetic improvement.

The production of bovine meat increased from 111.781 tons in 1980 to 184.850 in 2007, with an average annual growth rate of 2.3%. Production of leather increased in an average annual rate of 2.3%, from 548 thousand units to more than 975 thousand between 1980 and 2008.

**Graph No. 7**  
**Livestock Production by Species 1980-2008**



Source: Own elaboration based on UDAPE

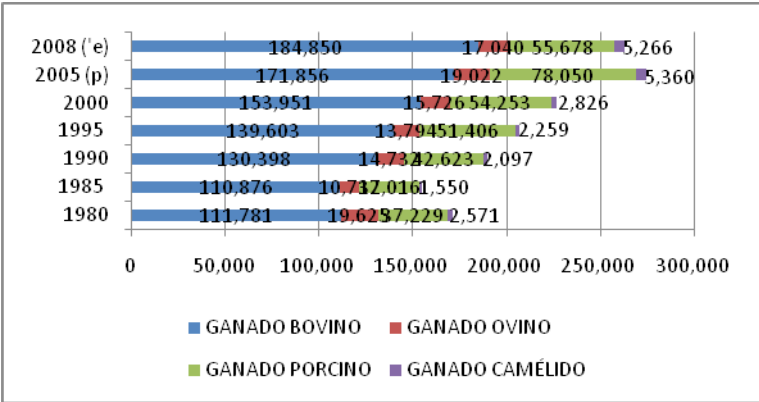
Ovine cattle are located mainly in the Altiplano and the Valleys. The production of ovine meat and wool decreased in 13% and 8.5% during the period. The production of wool reached 4 thousand tons while the production of meat increased to 19 thousand tons.

The breeding of pigs is destined mainly to obtain meat for massive consume and for industrial production of sausages. The number of heads increased in 56% in these 28 years, from 1.6 million heads in 1980 to more than 3.1 million heads in 2007. The production of

pork meat has increased in almost 50% since 1980, due to genetic improvement. From 37 thousand tons to more than 55 thousand tons between 1980 and 2008.

Camelidae (llamas, vicunas and alpacas) are located in the altiplano. Bolivia has 92% of the worldwide population of llamas, which are distributed in the central and southern altiplano. Alpacas are located in the Andean higher grounds. No agriculture is developed in this type of ground and the economy is exclusively based on livestock.

**Graph No. 8  
Meat Production (Metric Tons)**



Source: Elaboration based on UDAPE

The quantity of camelidae heads has increased in 33% between 1980 and 2008, from 2.1 million to 2.8 million. In the case of llamas the commercial destination of its meat acquires significance (fresh or dehydrated). The importance of alpacas is their fiber which is destined to the market. The breeding of camelidae is not yet exclusively directed fiber or meat to production, both consequence of circumstances and necessities of seasonal nature of the producers.

**7.2 Social Variables that Influence Agricultural Productivity**

We present variables, mostly social, that affect productivity. We focused the data on the rural area so we can observe how these factors affect labor productivity in the agricultural sector, especially the traditional one, which is over-determined by the rural component. These factors: basic services, education and health, elevate productivity of workers through different ways.

**7.2.1 Basic Services**

We observe the access to basic services: water, sewage, electricity and access to telephone services. Between 1999 and 2007, there was a slight improvement in the access to water; in 1999, 67% accessed this service and in 2007, 71% of the population did. In 1999, 67% of

the rural area did not have access to water. In 2007, 52% of the rural population still did not. This generates negative impacts over productivity of rural work.

In 1999, only 32% accessed to sewage systems and in 2007, 38% did. Two thirds of the Bolivian population has no sewer systems. In 1999, 99% of the rural population had no access to sewers. In 2007, 96% of the rural population still did not have access to this service reducing the possibilities of increasing productivity.

In 1999, 71% accessed to electric services, in 2007, 80% did. In the rural area in 1999, 74% did not have access to such service, and in 2007, only 53% did. More than a half of the rural population has no access to this service yet reducing the possibilities of increasing productivity.

### ***7.2.2 Education***

By mid 90's, the Education Reform was undertaken introducing an inter-cultural and bilingual education. Its results have been positive in coverage and years of schooling. The population of 15 years of age or more in 1996, had an average of 5.1 years of schooling, in 2007 it reached 8.7 years. In the urban area, schooling years increased from 9 in 1996 to 10.2 years in 2007. In the rural area years of schooling increased from 3.8 in 1999 to 5.6 in 2007. Schooling years for the urban area almost double the years corresponding to the rural area. Such gap affects productivity of rural labor negatively, which is where agriculture is mainly located.

The rates of public and private coverage of the basic education between 1996 and 2007 exceed 100%. Coverage has been the focus, but the quality issue has been left aside.

There are some advances in public and private coverage of secondary education. It increased from 49.7% in 1999 to 74% in 2007. However, it is upsetting that 25% does not have coverage.

### ***7.2.3 Health***

According to UDAPE, in 1998 the mortality rate of children under one year of age (out of one thousand newborns) in the urban area was 50 and in the rural area was 90. By 2008 these rates decreased to 36 in the urban area and 67 in the rural area. The urban-rural gap remains wide.

In half a century, life expectancy increased from 42.7 in 1960 to 65.7 in 2008. The mortality rate in 1990 was 80/1000 born alive, and in 2009 it was only 45.7. The mortality rate in minors of 5 years of age was 122.1/1000 and after two decades it dropped only to 54.2.

## **8. BUSINESS MODELS AND RECOMMENDATIONS**

### **8.1 Business Models**

In this part, we show some forms and models of business in agriculture resulting from different ways of organization of the agricultural activity.

#### ***8.1.1 CORACA Irupana: Farmers' Association***

The “Corporaciones Agropecuarias Campesinas” (Peasant Agricultural Corporations) (CORACA) are peasant associations. CORACA Irupana founded in 1983. With the support of a NGO, it encouraged the organizational and productive process of coffee in order to sale it at fair prices in international markets. Presently, there are 600 partners, 55% produce organic coffee and 45% coffee in transition to organic production. In 1993, it obtained the organic certification. In 1996, it started to sale organic coffee in the market at fair prices.

In 1987, they identified the comparative advantage of the western indigenous communities, Amazon and Chaco, in order to take advantage of the growing international demand of natural products. Irupana Andean Organic Food S.A. started its agro-industrial activities with the objective of creating markets for the production of small indigenous communities.

They begun with coffee to then diversify with Andean cereals (quinoa, cañahua, amaranth, corn and tarhui). Presently, there are 1.500 suppliers of Irupana, native indigenous families from the Andean heights and the Amazon.

#### ***8.1.2 El Ceibo: Cooperative***

The Head Office of El Ceibo Cooperative is located in South Yungas working in the Department of La Paz. Its creation was to benefit agricultural families of organic cacao, which are the owners. Since its creation in 1977, they produce with organic and Fair Trade certification in cocoa beans, chocolates, liquor and cocoa butter.

El Ceibo is a “second floor cooperative” conformed by several small cooperatives. It has more than 1.200 associates, all of them small farmers, generating jobs for more than 100 persons. 38 associations of producers organized as cooperatives constitute it.

It holds 3.850 hectares of organic cacao, consolidated and in transition. It sales its products in Bolivia and exports since the 80's. The 38 associations generate almost two million dollars annually in cacao.

### ***8.1.3 Model of Communal Enterprise with Quinoa Producers in Quillacas. APROQUILLACAS: Communitarian Enterprise.***

It is an experience of indigenous peasants of the “Asociación de Productores de Quinoa y Camélidos de Quillacas” (Quinoa and Camelidae Producers Association of Quillacas), APROQUILLACAS, Department of Oruro.

Since 2004, it produces quinoa. Its commercialization is linked to the Irupana Company. It is an organization of 74 families that produce organic quinoa. Its production in 2009-2010 was 410 tons.

### ***8.1.4 Business Model for Soybean Production. Capitalist Enterprise.***

The soybean complex is a business activity conformed by soybean producers and industrial producers that process it as oil and soybean tablet. The soybean cultivation is its main activity. The cultivated area is almost one million hectares.

There are producers of different origins, ethnics, Amish, Japanese, local, Venezuelan, Brazilian and others. The growth on the area subject to cultivation is a result of the extension of the agricultural border and not because of technological innovations.

The most relevant cases of business are those from Brazil. The North Group controls 50.000 hectares, peasant 7.900 hectares of soybean and 1.700 hectares of corn.

Land suitable to harvest soybean at low prices was provided a couple of decades ago. They also accessed to irregular resources of lands. They have articulated with local elites.

They incorporated modern inputs, improved production techniques, advancing in the identification and consolidation of new markets. They have undertaken investments in order to increase the capacity of storing and processing.

They have national and foreign technicians and temporary agricultural day workers. They drive tractors, mechanical harvester and thus one of their basic supplies is diesel subsidized by the State. They use fertilizers and pesticides. They undertake genetic modifications to their products. They connect their activities with the commerce of tractors, fertilizers and pesticides.

They export soybean by means of railroads and hydro-channels and they often add their exports to the Brazilian exports.

Their investment criterion bases itself on profitability. They invest because they have assured the market in the Andean Community, which provides customs advantages for exportation of Bolivian soybean.

They invest due to the low prices of the land, the nonexistence of land taxes, lack of export taxes, State subsidies on diesel, and lack of environmental controls for their production (Urioste, 2010).

### ***8.1.5 Model of the Farmer Economy***

There are almost 600.000 families living of peasant economy located in the West of the country and the valleys. They have obtained lands by means of the Agriculture Reform in 1953. The average quantity of lands that they own is 13.2 hectares, not all of them suitable for agriculture. They are seasonal lands without access to watering systems.

Each one of these units has certain rationality linked to the need of survival and thus with the generation of their own food security. They seek to minimize risks and they do not rely on a unique production diversifying their products. Their production is destined to self-consumption; however, a part thereof is destined to commercialization undertaken in nearby local markets for obtaining monetary resources used to complete their family shopping basket.

The factors used are land, their own work, and collective work of the community that does not receive monetary remuneration. They use the Egyptian plow. In rare occasions, they have access to programs of improved seeds. They access to some services financed with public investment: roads, education, health, but in very precarious conditions.

They add diversification of activities to diversification of production. They undertake non-agricultural work in towns. The improvement in housing is scarce and so is construction of corrals for cattle.

Reciprocity relations are fundamental for the operation of peasant economy. The creation of networks of social assistance in order to collaborate with the needy or assisting some community members in moments of economic or familiar distress is very frequent.

## **8.2 Some conclusions and recommendations**

In Bolivia, two main factors affect studies on agricultural investments and their impact on sectoral production. First, the scarcity and sometimes the unreliability of the statistics available, especially with regard to private investment. Second, maintaining an imprint in the historical development of the country, the persistent political, macroeconomic and social instability of the period covered by the study limits or even prevents the use of accurate and quantitative analysis; the greater stability in recent years will possibly eliminate this complicating factor.

Among others, doubts can be expressed about estimates that indicate an inverse relationship between agricultural net investment and GDP during 1989-2004. This would have resulted

in a capital-output ratio in agriculture of 1,28 by the end of the period, which seems very low by international standards and also compared to the 2,68 for the whole economy.

However, statistics clearly show insufficient public investment in the sector, though it has tended to increase in recent years following a long stagnation during 1985-2000. Public investments in peasant traditional areas have been concentrated in activities to combat poverty and malnutrition, including micro-irrigation, water catchments, and rural roads, storage and other small infrastructures. Since the 1990s, public investment to promote the expansion of commercial export agriculture (mainly oilseeds and sugar) addressed particularly bigger roads and irrigation, while the attention given to other essential public goods was inadequate.

In peasant agriculture, a number of factors such as the small and subsistence nature of the farms and the limitations of natural resources including climate, have discouraged private investment. Instead, considerable investments in land clearance and preparation, mechanization, irrigation and other farm, transport and agro-industrial infrastructures supported livestock and particularly crop expansion in Santa Cruz and other eastern lowland commercial agriculture.

Positive linkages have been found between investment and agricultural production in commercial, export-oriented agriculture. Total cropped area grew from 1,2 million in 1980 to more than 2,8 million hectares in 2008, and was the main factor of production increases. Fast growing products were those of the agro-industry or mixed agriculture: soybeans, sugarcane, maize and rice. Instead, peasant agriculture in the western highlands that in the past provided 70% to 80% of national food supply decreased its contribution to 36.8% in 2000. Agro-industry now contributes with 44,6% and imports with 18,6%. Peasant production was still predominant in fruits, potatoes and milk.

An obvious recommendation stemming from the above is to improve the systems for collecting and compiling basic agricultural statistics. Efficient use of sampling and other modern tools would allow doing so without the need of substantial resources.

Agricultural development in Bolivia should be essentially based on rapid increases in productivity, whether of labor, capital or land. The State should therefore assign more resources to public goods that play a fundamental role in improving business climate and stimulating private investments at farm, commercialisation and agro-industrial levels.

Among critical public goods for rural and agricultural development, high priority should be assigned to improvement of: human capital (basic and technical education); road, transport and communications infrastructure; irrigation systems, in particular micro-irrigation; research and transfer of technology (support to SIBTA and CIAT, and alliances with public and private universities); crop and animal health; and post-harvest services, including marketing. Similarly, legal certainty regarding ownership and exploitation of land and other farm and agro-industrial investments should be strengthened.

Agricultural sectoral policies intended to provide economic incentives to private actors also require strengthening, better coordination and stability. This is particularly needed with regard to pricing, domestic and foreign trade, credit and tax policy instruments.

In order to improve their productive and distributional impact, sectoral policies and the provision of public goods should be prioritised and differentiated according to the specific characteristics of the rural areas and farming types. To do this, further decentralization of sectoral policies should be pursued, hopefully in combination with territorial based approaches to integrated agricultural and rural development, driven by public-private local groups or partnerships. The latter require focusing on specific places and on their territorial scale, and to prepare and implement endogenous development strategies and projects strongly based on the territory's natural and socio-cultural assets.

Finally, in addition to special programmes to combat rural poverty, the State should support some agricultural business models (farmers' associations, cooperatives, communal enterprises) and productive chains that have shown successful results in order to increase and diversify agricultural production.

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