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Bolivia's green national accounts through a commodity super cycle

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Institute for Advanced Development Studies



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Bolivia's Green National Accounts through a Commodity Super Cycle[⊗]

by

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La Paz, October 2017

Abstract:

This paper calculates and analyzes key indicators from Bolivia's Green National Accounts during the period 1990 – 2015, which covers an entire Commodity Super Cycle. The first half includes the Great Commodities Depression while the second half of the period is characterized by an unprecedented commodities boom. We show that the contribution of ecosystem goods and services to the Bolivian economy remain relatively stable over the cycle, while the contribution of non-renewable resources increases by a factor of four between the bottom of the cycle (1993) and the top of the cycle (2011). Similarly, the differences between Net Capital Formation and Environmentally-adjusted Net Capital formation is small at the bottom of the Commodity Super Cycle (2.3% of GDP) but much larger at the top of the cycle (7.7% of GDP).

JEL classification: Q56, Q01, Q32, Q51

Keywords: Green Accounting, Natural Resource Rents, Bolivia.

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1. Introduction

Green national accounting, also referred to as integrated environmental-economic accounting, attempts to take into account the role of the environment in generating output and income in the economy. In early versions of the System of National Accounts (SNA), the contribution of the environment (in terms of natural resources and ecosystem goods and services) was completely ignored. This carried the implicit assumption that the amount of natural resources and the capacity of nature to process our waste were both infinite and free. All Value Added (VA) was either allocated to labor or to capital. However, as shown in Jemio and Andersen (2010 and 2013) the contribution of nature to Bolivia's GDP is highly significant and increased substantially during the commodity boom.

In order to provide a standardized methodology and guidelines to incorporate the role of nature into the systems of national accounts, the United Nations et al. (2003) have developed the System of Environmental-Economic Accounting (SEEA). The methodologies developed by the SEEA explicitly measure the contribution of nature to generate output and income in the economy. Thus, the contribution of nature to the generation of value added in all sectors of the economy can be measured, and compared with the amount of production taxes and royalties the State obtains from those sectors. By comparing these two numbers, we can measure the proportion of the resource rent captured by the state through taxes in each of the sectors of the economy.

Furthermore, the methodology proposed by the SEEA for calculating environmental accounts, comprises the measuring of natural resource stocks, both renewable and non-renewable, as means of measuring the sustainability of natural resource exploitation and resource based economic growth in the long term.

By doing so it corrects one of the flaws in conventional national accounting, which is not considering natural resources as a source of value into the production processes and thus the economy. As Lange (2014) argues, one of the objectives for the early development of environmental accounting during the mid-1980's was the concern that rapid economic growth in some developing countries was based on the exploitation of natural capital, which boosts GDP in the short term, but does not assure sustainable growth in the long term. Although ten years ago only few countries fully implemented these accounts in accordance with international practices, currently more governments all over the world are making efforts to incorporate the role of the environment into national accounts. As of 2016, more than 70 countries have been implementing or attempting to implement green national accounting, with the majority of them following the SEEA framework (Reuter et al., 2016).

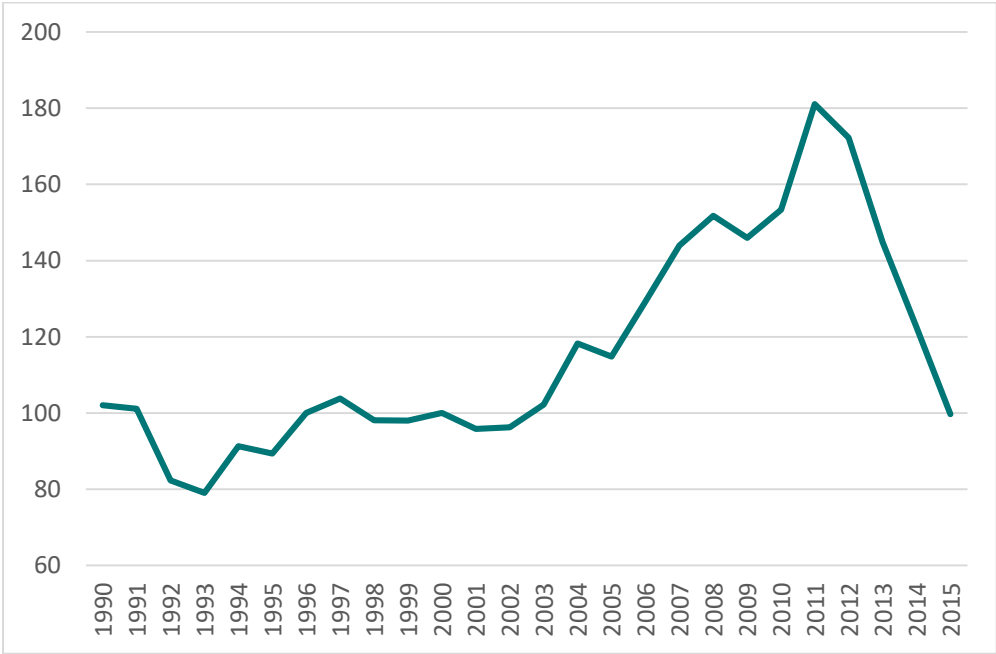
In Bolivia, the Institute for Advanced Development Studies has recently compiled the second set of integrated environmental-economic accounts for Bolivia following the SEEA methodology of United Nations et al. (2003). Here, it is worth noting that although the United Nations has developed a new version, called *2012 SEEA Central Framework* (SEEA-CF), which does not

include a valuation of ecosystem services and environmental degradation, but provides improved statistical standards (United Nations et al., 2014), this paper does not use this new framework in order to provide results that are compatible with previous studies (Jemio, 2010; Jemio, 2011; Jemio and Andersen, 2013).

This paper builds on Jemio (2010 and 2011) and Jemio and Andersen (2010 and 2013) and presents data updated from 2008 to 2015. The main objective of this paper is to highlight the usefulness of compiling periodic environmental accounts, and analyze how the difference between conventional national accounts and integrated environmental and economic accounts change over the Commodity Super Cycle.

The green national accounts calculated and analyzed in this paper spans the period 1990 to 2015, which covers an entire Commodity Super Cycle. As can be seen in Figure 1, Bolivia’s Net Barter Terms of Trade Index was low during the first half of the period, during what has been termed the “Great Commodities Depression of the 1980s and 1990s”, while it was high in the second half, during the “2000s Commodities Boom”. The lowest point in the cycle was the year 1993, when the Terms of Trade Index fell to 79, while the highest point was reached in 2011 with a value of 181. By 2015, the Terms of Trade Index is back around 100 where it was found several years during the Great Commodities Depression.

Figure 1: Bolivia’s Net Barter Terms of Trade Index, 1990 – 2015
(Year 2000 = 100)



Source: The World Bank’s World Development Indicators
(<https://data.worldbank.org/indicator/TT.PRI.MRCH.XD.WD?locations=BO>).

The remainder of the paper is organized as follows. Section 2 shows the contribution of environmental inputs in generating value added in seven productive sectors for which natural resources (non-renewable and renewable) constitute a major production factor, namely hydrocarbons, mining, modern agriculture, traditional agriculture, livestock, forestry, and water. We compare the calculated contribution at the bottom of the Commodity Super Cycle (1993) and also at the top of the cycle (2011), and also the contributions of environmental inputs in the whole economy for the period 1990-2015. Section 3 compares the level of natural resource rents in each sector with the level of producer taxes in order to see if the Bolivian government manages to capture the rents from the state-owned natural resources. Section 4 analyses the evolution of the different types of productive capital to assess whether Bolivia's development model can be considered sustainable. Finally, section 5 provides some suggestions on how the Green National Accounts can be extended to provide further insights.

2. The contribution of nature to sectoral and national production

The contribution of nature in producing output and income tends to vary depending on the specificities of each sector. In some sectors, environmental inputs are very important (e.g. forestry, farming and fishing), while in others they play a minimal role (e.g. banking, commerce and education). In each sector, natural capital interacts with the two other conventional production factors, i.e. labor and capital, to produce the total value added (VA) for the sector, albeit in different proportions for each sector.

Figures 2a and 2b present the contribution of the different factors of production to total VA in seven different sectors both at the bottom of the Commodity Super Cycle (1993) and at the top of the cycle (2011).

In extractive sectors, dependent on non-renewable natural resources, e.g. hydrocarbons and minerals, natural capital is of course essential for the production of output and incomes, but labor and produced capital constitute necessary complementary inputs, without which the natural resources could not be extracted and sold to the markets.

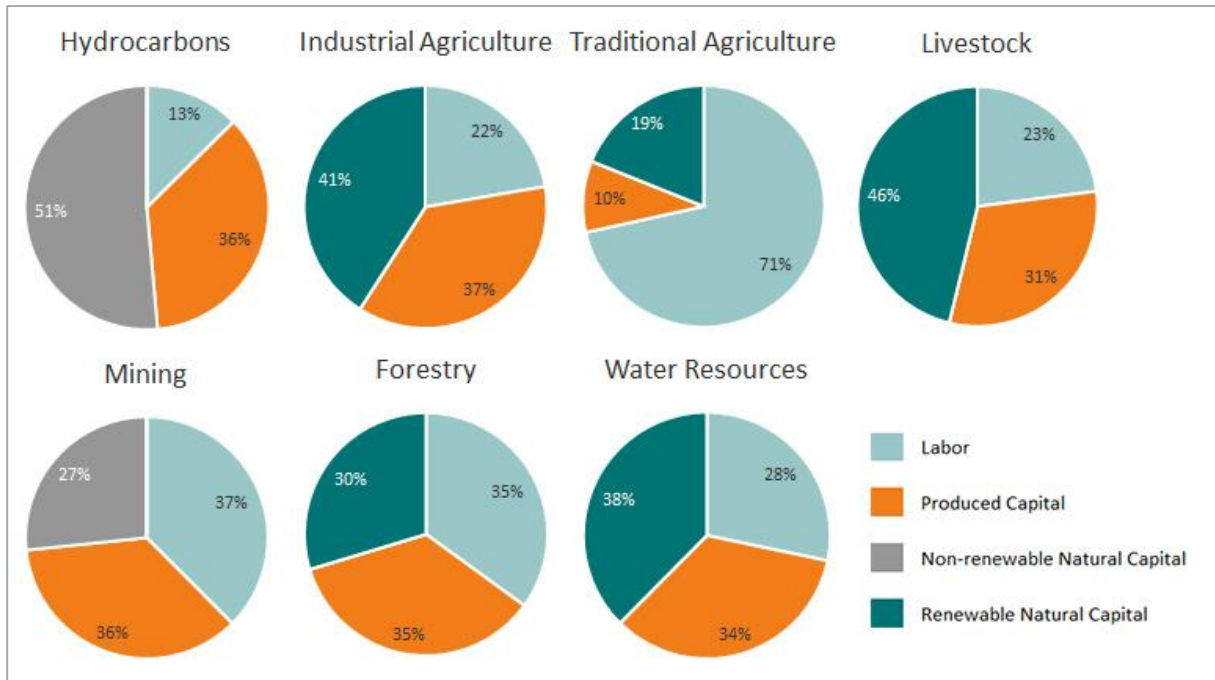
The same holds in the other sectors dependent on renewable natural resources. Fertile soils and water are necessary for agriculture, livestock and forestry, but these have to be complemented by labor and produced capital (seeds, equipment, transportation, etc.) in order to produce agricultural output for consumption.

The mining sector is the sector which has experienced the biggest differences in contributions across the Commodity Super Cycle. At the bottom of the cycle (1993), non-renewable natural resource rents accounted for only 27% of Value Added in the sector, with the remaining 73% divided almost equally between labor and produced capital. At the top of the cycle (2011), the

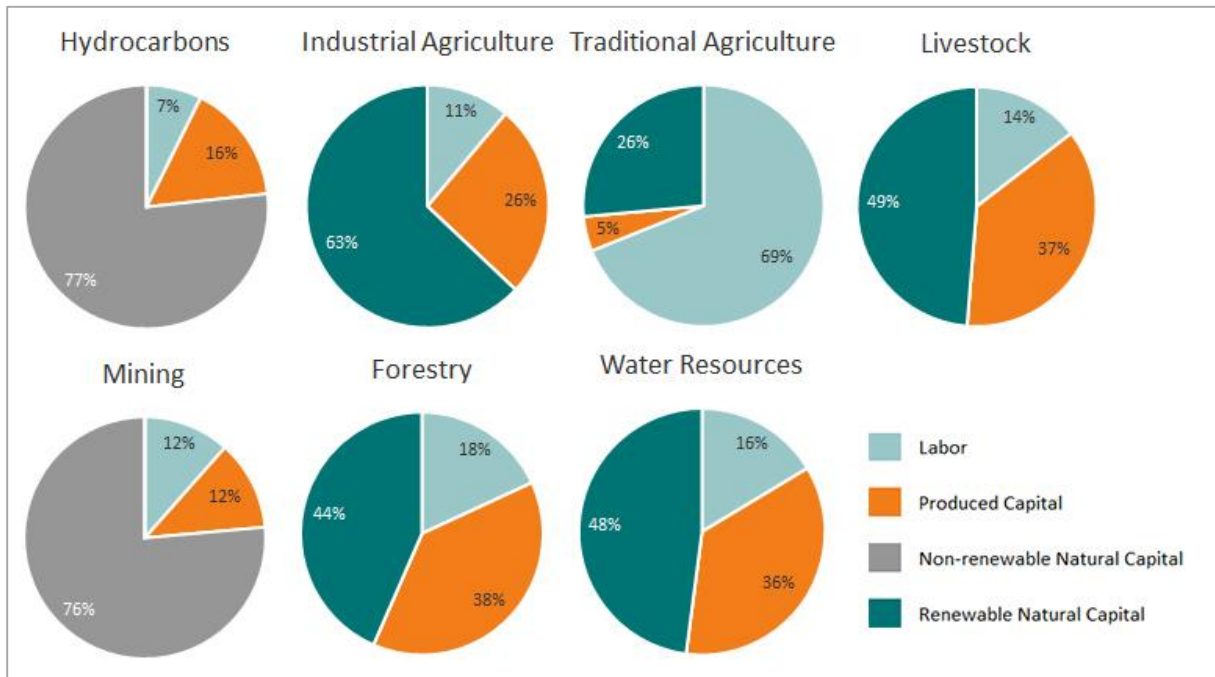
non-renewable natural resource rent share increased to 76%, while labor and produced capital shared the remaining 24% equally.

Figure 2: The relative contribution of different factors of production to sector GDP, 1993, 2011

(a) Relative contributions at the bottom of the Commodity Super Cycle (1993)



(b) Relative contributions at the top of the Commodity Super Cycle (2011)



Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

The other six sectors also saw substantial increases in the natural resource shares between the two years, although to a smaller extent. In the hydrocarbons sector, for example, the share increased from 51% in 1993 to 77% in 2011, and in the Industrial Agriculture sector it increased from 41% in 1993 to 63% in 2011.

While the three types of inputs are clearly complementary, they can also to a certain extent be substitutes. Labor and physical created capital can be substitutes, and the relative quantities of these two factors used in the production process will depend on the technology utilized. This can, for example, be seen by comparing the VA pies of industrial and traditional agriculture in Figure 2. Industrial agriculture uses a lot of environmental and capital inputs, but very little labor, while traditional agriculture uses mainly labor. Produced and natural capitals can also be substitutes, as when chemical fertilizers are used to restore land productivity after exhaustion of natural soil fertility.

The chosen input mix depends above all on the relative scarcity of the various factors of production. In the highlands of Bolivia, where traditional agriculture is mainly practiced, producers have very little land and capital available, so their main input has to be labor. In the Bolivian lowlands, on the other hand, the modern agricultural industry takes advantage of easy access to new agricultural land and subsidized complementary inputs (diesel), while minimizing the use of relatively scarce labor inputs.

Relative scarcity can change over time and can be manipulated through public policy. For example, a policy that stimulates labor migration from the highlands to the lowlands would make labor relatively less abundant in the highlands and relatively less scarce in the lowlands, implying that the two pies would tend to grow more similar over time. Similarly, a policy to control illegal deforestation would make environmental inputs scarcer in the lowlands, thus encouraging more intensive farming methods, with less use of environmental inputs, and more inputs of labor and capital.

On the other hand, in extractive non-renewable sectors, natural capital and the other types of factors are necessarily complementary, since sectoral output is determined by the quantity of natural resources extracted from nature.

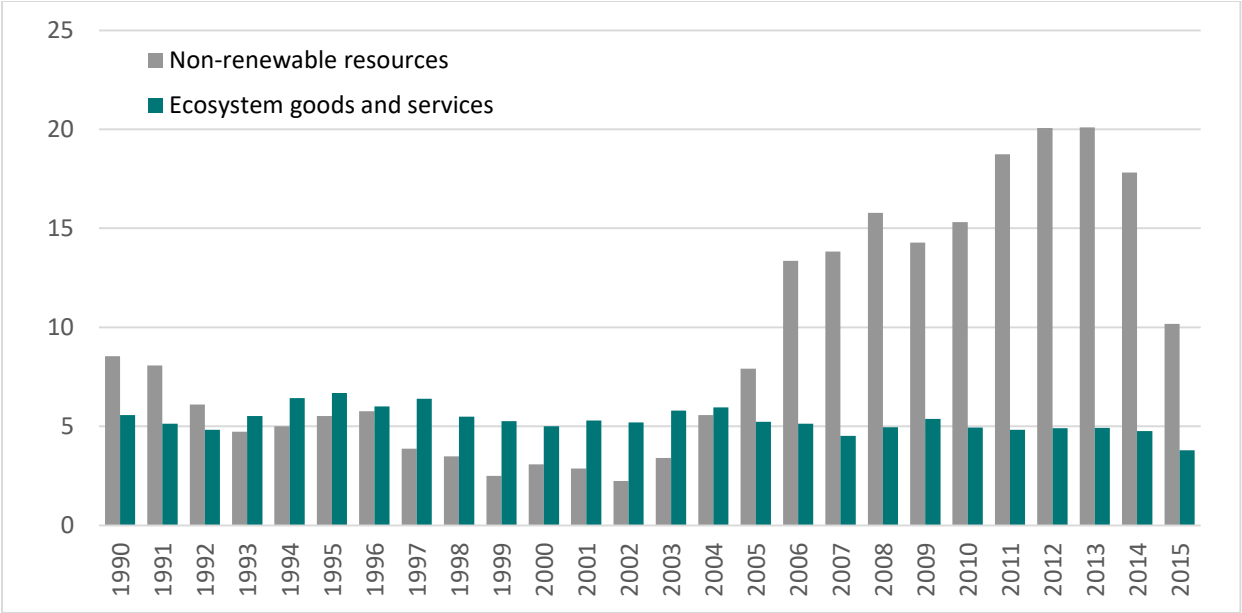
The sectoral VA structures presented in Figure 2, are for those sectors where natural capital has a significant contribution in sectoral VA. At the macro level, when VA of non-intensive natural-resource sectors are included, the contribution of environmental inputs to the total GDP tends to be smaller. Figure 3 shows the contribution of both non-renewable natural capital and ecosystem goods and services to total GDP from 1990 to 2015.

During the period 1990-2015, the contribution of renewable ecosystem goods and services was relatively stable, fluctuating around 5% of total GDP. The contribution of non-renewable resources on the other hand, has presented large fluctuations over time. During the Great Commodities Depression, they were generally low, fluctuating around 5% of GDP as well. But during the commodities boom, their contribution was substantially higher and reached almost 20% of GDP in 2013.

The unusually low values found for non-renewable natural resources during the period 1997 to 2002 is due to the very low oil prices, which reduced the share of the resource rent in sectoral value added, vis-à-vis other production factors, including labor and created physical capital. During the commodity price boom, the resource rent increased its share in sectoral value added because of higher prices.

While the contribution of non-renewable natural resources had fallen to about 10% of GDP by 2015, this is still a very high share by international standards. This suggests that the Bolivian economy is still highly dependent on non-renewable natural resources. The sustainability of this pattern will be discussed in a later section.

Figure 3: The contribution of non-renewable natural resources and ecosystem goods and services to total GDP (%), Bolivia 1990 – 2015



Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

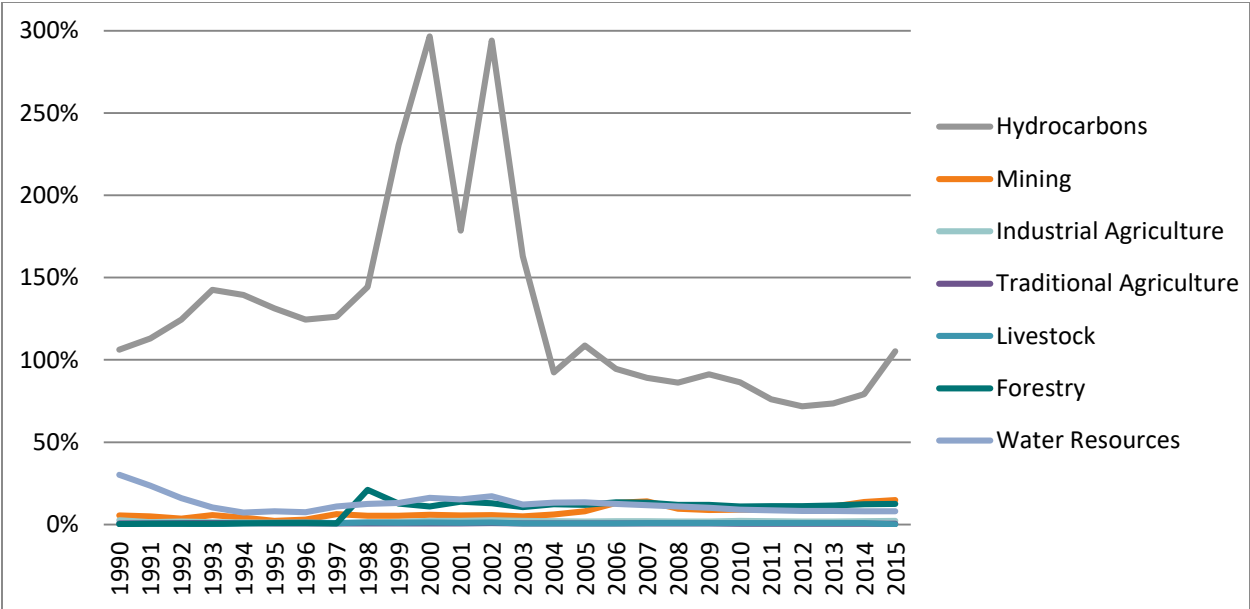
3. Natural resource rents and taxes

The contribution of non-renewable natural capital and ecosystem goods and services (the grey and green slices of Figure 2 or the grey and green bars of Figure 3) are called natural resource rents. The benefits from these rents should theoretically go to the owner of the corresponding productive asset, which according to the Bolivian Constitution would be the State. The State should try to recover these rents in the form of royalties or taxes, because otherwise producers would capture these rents in addition to the normal, fair payments for the labor and capital they have contributed.

The Green National Accounts allow us to judge whether the State manages to recover the resource rents in the form of royalties or taxes in each sector. Figure 3 shows the percentage of the sectoral natural resource rents, which is paid in producer taxes in each sector between 1990 and 2015. The aim should be to recover close to 100% of the natural resource rents in each sector, but the figure shows that this is only accomplished in the hydrocarbon sector. Indeed, in most years previous to 2004, the State has managed to capture considerably more than 100% of the natural resource rents in the hydrocarbon sector, suggesting that the production companies (state and private) were not getting fairly compensated for the labor and capital invested. This could affect long-term sustainability of the hydrocarbon sector, as the affected companies will be reluctant to make the necessary investments.

Since 2004, however, the recovery of resource rents in the hydrocarbon sector, due to higher volumes and prices, has been quite close to the target of 100% and the percentage has been relatively stable compared to previous periods with wild fluctuations.

Figure 4: Producer taxes as percent of natural resource rents in each sector, 1990 - 2015



Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

In all the remaining sectors, the State has not been successful at recovering the natural resource rents. In the mining sector, for example, the State has only managed to recover about 12% of natural resource rents on average since 2006, indicating that producers obtain exceptional profits in this sector. Before 2005, the state obtained an even smaller amount of the resource rent, 7% on average, as royalty rates vary positively with mineral prices (Sanabria Rocha, 2009). The forestry sector paid less than 1% of resource rents to the State until 1997, after which a new forestry law managed to increase this percentage to about 13%, which is still far from the target of 100%.

Agriculture and livestock sectors still only pay approximately 1% of the natural resource rents, suggesting that the State is subsidizing producers in these sectors, allowing them to get profits over and above what is warranted by the amount of labor and capital they are putting into the production. Such a subsidy would tend to encourage the expansion of the agricultural frontier at the expense of natural forests.

Green National Accounts are great for identifying rents that can be taxed without discouraging hard work and productive investment, and they are particularly useful for assessing the correct level of taxes/royalties. The Green National Accounts for Bolivia suggest that producers in the mining, agriculture, livestock and forestry sectors are benefitting unfairly from free access to natural resources that supposedly belong to all Bolivians. This implies that the Government of Bolivia would be entirely justified in increasing taxes on mining and modern agriculture and in cracking down severely on illegal logging and deforestation. The proceeds should then be used for public investments that benefit the whole population (like infrastructure, health and education).

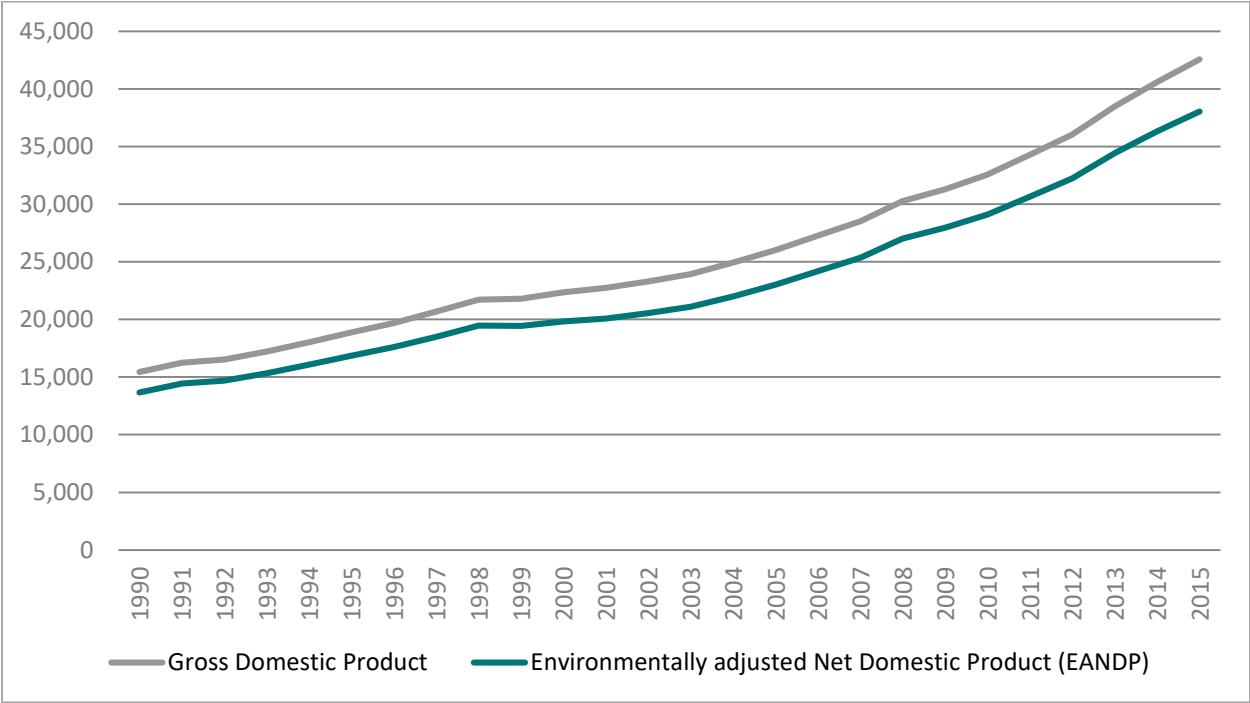
4. Adjusted GDP, productive capital and sustainability

In accounting, it is very important to understand the difference between income and assets. If you have savings invested in a bank-account, in a department building, or in any other productive asset, these will provide you with regular interest/rent, which can be considered income. However, if you take out a chunk of your savings or sell your assets, this should not count as income, but rather as a transfer of assets. Although such withdrawals may temporarily increase your spending capacity, they will reduce your productive capital and your future income earning capacity. Thus, if you have to “spend your assets” your spending pattern is not sustainable. Sustainable living requires that you at least maintain your total amount of productive assets, although you may change between different types of assets.

The same principle applies at the level of countries. However, the conventional GDP measure does not distinguish between “real income” and “depredation of assets.” If we extract and sell our non-renewable natural resources and harvest and export all our timber, this will count directly towards an increase in GDP, while ignoring that our “savings” have been reduced.

The main objective of environmental accounting is to correct this flaw by including the calculation of an Environmentally Adjusted Net Domestic Production (EANDP), which is calculated by subtracting the depreciation of produced capital as well as the deprecation and degradation of natural capital from the usual GDP. Figure 5 shows that in Bolivia EANDP is about 10% lower than GDP.

Figure 5: GDP versus EANDP, (in millions of constant 1990 Bolivianos), Bolivia, 1990 – 2015



Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

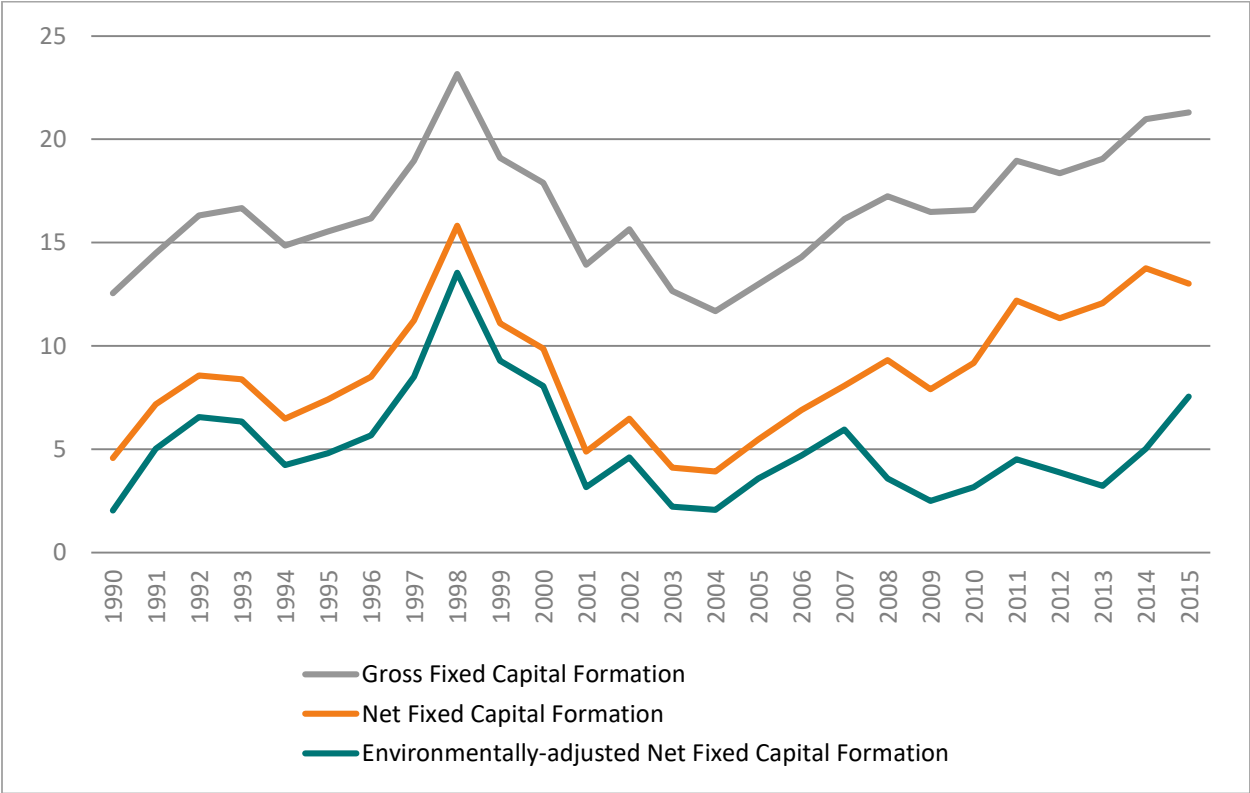
The deprecation of natural capital is not necessarily a problem if these natural assets are converted into other types of capital, so that the total level of productive capital in the economy is not decreasing. Environmental accounts are paramount for policymaking because they allow the assessment of whether this is the case.

If we depart from the standard national accounting variable, Gross Capital Formation, and again subtract both the depreciation of produced capital and the deprecation of natural capital, we get the Environmentally-adjusted Net Capital Formation (ENCF), which is very interesting because it tells us if the economy has been able to generate new capital to compensate for depleted natural or produced capital. The maintenance of total productive capital is a minimum requirement for sustainability.

Figure 6 shows that ENCF has been positive, although small, during the whole period of analysis. This indicates that the total stock of productive capital in Bolivia is increasing slowly, despite the strong reliance on non-renewable natural resources and the deprecation of renewable natural capital. However, it is important to note that during the commodity boom the wedge between Net

Capital Formation and Environmentally Adjusted Net Capital Formation increase dramatically. At the bottom of the Commodity Super Cycle (1993) it was only 2.3% of GDP, while at the top of the cycle (2011) it amounted to 7.7% of GDP. It even increased to a maximum of 8.9% of GDP in 2013 after commodity prices had started falling.

Figure 6: Gross Capital Formation, Net Capital Formation and Environmentally Adjusted Net Capital Formation (% of GDP), Bolivia, 1990-2015



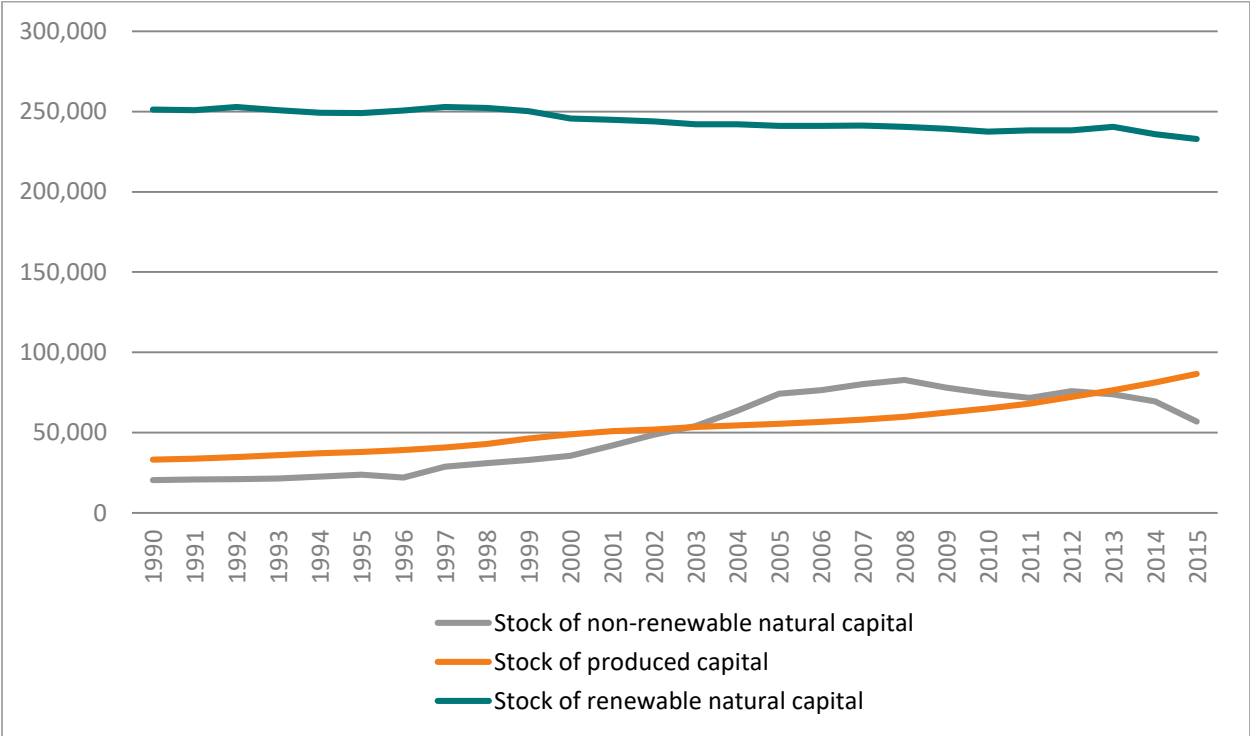
Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Figure 7 shows the changing composition of Bolivia's stock of productive capital, with renewable natural capital shrinking while produced capital stock is increasing and non-renewable natural capital is increasing until 2008 but subsequently decreasing.

It may seem counter-intuitive that the real value of the stock of non-renewable natural capital can increase, despite positive extraction, so it is worth explaining the technical details behind this phenomenon. One obvious part of the explanation is that there are regularly new discoveries of hydrocarbons and minerals, which add to the physical stocks. But in the graph below, this is not the most important effect, especially not in the period after 2002, which has seen very few new discoveries. Most of the increase since 2002 is rather due to the way the value of the capital stock is calculated, namely as the net present value (NPV) of future extractions, assuming a constant rate of extraction until the resource runs out.

Once the natural gas pipeline to Brazil was completed in 1999, both export volumes and prices started increasing substantially (Andersen et al., 2007), and since stocks were still abundant, this caused an increase in the value of hydrocarbon stocks. However, this situation has changed lately, as the remaining stocks have now become a binding constraint (Del Granado et al., 2016).

Figure 7: Evolution of the total stock of productive capital, Bolivia, 1990-2015 (in millions of constant 1990 Bolivianos)



Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

5. Conclusions and recommendations for future research

Green national accounts give a more precise impression of the status and health of the Bolivian economy than the conventional national accounts because the important contribution of environmental inputs is taken into account.

The analysis shows that there are very large natural resource rents in many of the productive sectors in Bolivia, but that only in the hydrocarbon sector has the Government been able to capture these rents in the form of taxes and royalties. In the mining, agriculture, livestock and forestry sectors, these rents instead accrue as exceptional profits to producers.

The analysis also shows that Bolivia's development model, although heavily dependent on the mining of minerals, hydrocarbons and soil nutrients, can be considered sustainable in the weak

sense, as total productive capital has been increasing throughout the period of analysis (1990-2015), which spans an entire Commodity Super Cycle.

Obviously it would be much better if investments were substantially higher and depreciation lower, so that the total stock of productive capital would increase faster, thereby permitting an increase in incomes and a faster reduction in the still very high levels of poverty in Bolivia.

So far, these Green National Accounts are quite crude and entirely unofficial, serving only to encourage the National Statistical Institute to take up the challenge of formally developing a system of Green National Accounts. It is important that methods and procedures get institutionalized, because the development of integrated environmental-economic accounts (just like regular national accounts) requires massive amounts of data, and quite a lot of assumptions as well. While we have tried to make reasonable assumptions, each one of them are necessarily ad hoc and unofficial. With a formal system, all these necessary assumptions would at least be discussed, documented and official.

There are many ways in which these accounts can and should be extended. First, the whole component related to contamination has so far been ignored. This could potentially be very important in the mining sector, which is a source of severe water contamination in Bolivia. Figueroa et al. (2010) have estimated the real economic income generated by the Peruvian metal mining sector using a methodology that not only considers the depletion of the non-renewable resources exploited, but also the environmental degradation costs of the mining activities and the value of the new mining resource discoveries. Their methodology could be used for the Bolivian case.

EU member countries compile air emissions accounts in accordance with the SEEA-CF framework (European Parliament, 2011). These accounts record emissions to the atmosphere of six greenhouse gases, including CO₂ emissions, and other air pollutants. For the Bolivian case, taking carbon emissions into account could also be potentially important, especially for the forestry sector and the industrial agriculture sector. Andersen et al. (2016) show that it is possible to calculate very precise CO₂ emissions from these activities in Bolivia. They have estimated net carbon emissions from land use change in Bolivia during the periods 1990-2000 and 2000-2010. Hence, this component could be included into the Green National Accounts quite easily.

Moreover, given the tendency for regional autonomy in Bolivia, and the highly diverse development strategies of each region, it would be interesting to calculate Green National Accounts at the Department level. Suño (2017) is a pioneering study in this regard, as it calculates the sub-national green accounts for the Department of Pando. It would be very interesting to calculate the integrated environmental-economic accounts for the other departments of Bolivia to facilitate comparison of the very different development models within Bolivia, and possibly to provide arguments for regionally differentiated tax policies.

Finally, while the Green National Accounts include natural capital as part of total productive capital, human capital is still ominously missing. Given the enormous investments in education during the last few decades¹, this implies that total productive capital is very likely increasing faster than suggested by the Green National Accounts. An effort should be made to include human capital in national accounts, along the lines suggested by, for example, Bartelmus (2008) and Christian (2010).

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¹ According to the World Bank's World Development Indicators, public expenditure on education amounts to about 6.3% of GDP (2006), but in addition to that there would also be substantial private investments.

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Annex

Table 1: Resource Rents (millions of current Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydrocarbons	1,020,8	1,299,7	1,032,6	947,3	947,1	1,027,9	1,327,1	686,3	742,1	404,1
Mining	299,4	246,4	312,2	209,9	437,6	753,8	836,7	925,2	891,2	800,7
Non Renewable Resources	1.320,2	1.546,0	1.344,8	1.157,2	1.384,7	1.781,7	2.163,8	1.611,5	1.633,3	1.204,8
Industrial Agriculture	77,4	148,6	87,4	165,4	287,7	385,8	489,6	749,5	532,7	510,4
Traditional Agriculture	205,9	280,7	294,0	311,0	382,7	425,3	498,0	558,9	539,4	603,8
Livestock	436,7	384,5	430,9	482,5	596,5	712,3	693,2	822,1	859,6	865,2
Forestry	65,8	61,2	71,2	83,3	97,5	114,5	115,4	137,5	190,2	177,1
Water Resources	72,9	105,3	177,9	307,2	412,0	516,8	460,0	396,8	446,7	380,4
Renewable Resources	858,8	980,3	1.061,3	1.349,3	1.776,4	2.154,6	2.256,2	2.664,8	2.568,7	2.536,8
Total Resource Rent	2.179,0	2.526,4	2.406,1	2.506,5	3.161,1	3.936,3	4.419,9	4.276,3	4.202,0	3.741,6
Income share of RR (X/RR).RR	1787,84	2.114,3	1.962,2	2.006,2	2.540,9	3.097,6	3.357,2	3.143,8	3.133,6	2.865,3
Depredation share of RR (1-(X/RR)).RR	391,19	412,1	443,9	500,3	620,2	838,7	1.062,7	1.132,5	1.068,4	876,3

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hydrocarbons	404,1	791,9	442,4	1.081,4	2.527,1	4.617,9	9.152,1	10.407,5	11.901,9	11.126,1
Mining	822,0	750,1	826,0	1.023,0	1.347,2	1.479,3	3.105,3	3.833,4	7.147,2	6.255,1
Non Renewable Resources	1.226,0	1.542,0	1.268,3	2.104,4	3.874,3	6.097,2	12.257,4	14.241,0	19.049,1	17.381,2
Industrial Agriculture	531,4	620,0	641,0	1.016,8	1.281,1	1.072,3	1.165,8	1.153,2	1.536,5	1.918,9
Traditional Agriculture	603,3	637,2	634,5	728,3	866,8	880,3	1.069,8	1.142,7	1.484,3	1.552,0
Livestock	882,9	965,2	1.032,1	1.120,2	1.235,6	1.251,7	1.463,5	1.226,4	1.560,0	1.461,4
Forestry	170,7	192,8	203,6	211,9	238,6	245,3	279,1	307,7	438,1	508,1
Water Resources	406,4	433,2	429,9	510,2	521,4	581,6	729,0	819,0	956,5	1.100,3
Renewable Resources	2.594,8	2.848,3	2.941,1	3.587,3	4.143,5	4.031,2	4.707,2	4.649,0	5.975,4	6.540,7
Total Resource Rent	3.820,8	4.390,3	4.209,4	5.691,7	8.017,9	10.128,3	16.964,6	18.890,0	25.024,5	23.921,9
Income share of RR (X/RR).RR	3.246,8	3.467,6	3.144,9	4.523,8	6.723,0	8.670,2	14.951,7	16.714,4	18.109,4	17.339,0
Depredation share of RR (1-(X/RR)).RR	943,1	922,6	1.064,5	1.168,0	1.294,8	1.458,1	2.013,0	2.175,6	6.915,1	6.582,9

	2010	2011	2012	2013	2014	2015
Hydrocarbons	12.314,2	18.031,2	26.923,8	33.020,7	31.058,3	16.564,0
Mining	8.810,4	13.123,3	10.636,6	9.571,2	9.562,4	6.627,9
Non Renewable Resources	21.124,7	31.154,5	37.560,4	42.591,9	40.620,7	23.191,9
Industrial Agriculture	1.461,2	1.876,6	2.244,6	2.497,0	2.446,2	1.857,1
Traditional Agriculture	1.656,6	1.913,7	2.243,6	2.841,3	3.061,9	3.450,9
Livestock	1.635,6	1.830,4	1.984,9	2.152,4	2.271,9	0,0
Forestry	638,2	737,5	882,1	890,9	826,1	839,3
Water Resources	1.414,9	1.648,9	1.834,1	2.044,4	2.243,8	2.509,7
Renewable Resources	6.806,5	8.007,2	9.189,2	10.426,0	10.850,0	8.657,0
Total Resource Rent	27.931,1	39.161,8	46.749,6	53.017,9	51.470,7	31.848,9
Income share of RR (X/RR).RR	19.644,7	26.413,6	32.759,4	34.276,1	31.563,1	19.357,0
Depredation share of RR (1-(X/RR)).RR	8.286,4	12.748,2	13.990,3	18.741,8	19.907,6	12.491,9

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 2: Resource Rents (millions of constant 1990 Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydrocarbons	1.020,8	1.028,4	1.037,9	1.062,7	1.153,8	1.192,1	1.218,8	1.391,1	1.570,2	1.503,2
Mining	299,4	309,4	314,4	340,4	340,5	375,0	357,0	357,8	356,1	338,9
Non Renewable Resources	1.320,2	1.337,7	1.352,3	1.403,0	1.494,3	1.567,1	1.575,8	1.748,8	1.926,3	1.842,1
Industrial Agriculture	77,4	111,8	96,2	116,7	144,3	161,5	192,6	207,5	194,0	186,9
Traditional Agriculture	205,9	230,8	220,8	224,7	235,2	230,6	243,7	251,7	235,7	251,4
Livestock	436,7	443,8	452,1	464,6	486,3	492,7	506,0	529,9	540,7	580,5
Forestry	65,8	65,0	60,6	6,4	6,5	66,7	68,7	70,7	73,0	76,9
Water Resources	72,9	78,0	81,6	94,3	104,9	114,0	117,8	123,4	126,5	132,5
Renewable Resources	858,8	929,3	911,4	906,7	977,2	1.065,5	1.128,9	1.183,2	1.169,9	1.228,3
Total Resource Rent	2.179,0	2.267,0	2.263,7	2.309,7	2.471,5	2.632,6	2.704,7	2.932,0	3.096,2	3.070,4
Income share of RR (X/RR).RR	1.722,0	1.792,1	1.793,1	1.875,3	2.007,4	2.094,1	2.143,8	2.337,0	2.485,6	2.439,1
Depredation share of RR (1-(X/RR)).RR	391,2	409,9	409,9	428,0	457,6	471,9	492,2	524,3	537,6	554,3

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hydrocarbons	1.678,3	1.677,5	1.756,6	1.912,3	2.375,0	2.721,6	2.846,8	2.996,0	3.057,1	2.645,0
Mining	343,9	333,4	333,7	335,6	307,3	340,0	362,6	398,8	623,2	684,9
Non Renewable Resources	2.022,2	2.010,8	2.090,3	2.247,9	2.682,4	3.061,5	3.209,5	3.394,8	3.680,3	3.329,9
Industrial Agriculture	197,5	210,3	199,5	247,1	246,4	252,5	262,7	255,5	243,3	266,4
Traditional Agriculture	261,5	268,9	272,0	293,7	289,1	313,9	326,4	316,6	332,4	335,1
Livestock	606,5	624,9	640,7	656,2	673,6	684,8	718,8	744,2	769,7	800,0
Forestry	81,6	84,9	87,4	90,7	93,6	97,5	101,4	107,2	112,9	119,6
Water Resources	134,9	135,8	138,8	142,8	147,3	151,3	157,4	164,1	170,0	180,4
Renewable Resources	1.282,0	1.324,6	1.338,3	1.430,5	1.450,0	1.499,9	1.566,6	1.587,7	1.628,2	1.701,5
Total Resource Rent	3.304,2	3.335,5	3.428,6	3.678,4	4.132,3	4.561,4	4.776,1	4.982,5	5.308,6	5.031,4
Income share of RR (X/RR).RR	2.635,9	2.648,6	2.727,7	2.936,2	3.346,6	3.735,2	3.911,1	4.087,0	4.377,5	4.092,4
Depredation share of RR (1-(X/RR)).RR	586,8	602,0	613,5	651,5	692,1	728,7	763,5	788,4	818,2	819,4

	2010	2011	2012	2013	2014	2015
Hydrocarbons	3.014,0	3.228,8	3.703,1	4.220,3	4.462,3	4.401,2
Mining	657,0	679,1	645,3	663,9	703,8	694,0
Non Renewable Resources	3.670,9	3.907,8	4.348,4	4.884,3	5.166,2	5.095,2
Industrial Agriculture	218,4	233,9	257,1	285,0	300,2	334,7
Traditional Agriculture	340,6	347,5	355,1	365,3	376,6	391,1
Livestock	827,9	851,8	887,0	925,0	966,8	1.003,4
Forestry	127,6	129,4	133,4	137,6	140,1	143,2
Water Resources	193,6	207,8	219,9	231,2	246,0	261,4
Renewable Resources	1.708,1	1.770,3	1.852,6	1.944,1	2.029,7	2.133,9
Total Resource Rent	5.379,1	5.678,1	6.201,0	6.828,4	7.195,8	7.229,1
Income share of RR (X/RR).RR	4.407,3	4.668,1	5.126,1	5.678,9	5.993,5	5.993,7
Depredation share of RR (1-(X/RR)).RR	844,2	880,6	941,5	1.011,9	1.062,3	1.092,2

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 3: Resource Rents (percent of GDP)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydrocarbons	6,6	6,8	4,7	3,9	3,4	3,2	3,5	1,6	1,6	0,8
Mining	1,9	1,3	1,4	0,9	1,6	2,3	2,2	2,2	1,9	1,7
Non Renewable Resources	8,5	8,1	6,1	4,7	5,0	5,5	5,8	3,9	3,5	2,5
Industrial Agriculture	0,5	0,8	0,4	0,7	1,0	1,2	1,3	1,8	1,1	1,1
Traditional Agriculture	1,3	1,5	1,3	1,3	1,4	1,3	1,3	1,3	1,2	1,3
Livestock	2,8	2,0	2,0	2,0	2,2	2,2	1,8	2,0	1,8	1,8
Forestry	0,4	0,3	0,3	0,3	0,4	0,4	0,3	0,3	0,4	0,4
Water Resources	0,5	0,6	0,8	1,3	1,5	1,6	1,2	1,0	1,0	0,8
Renewable Resources	5,6	5,1	4,8	5,5	6,4	6,7	6,0	6,4	5,5	5,3
Total Resource Rent	14,1	13,2	10,9	10,2	11,4	12,2	11,8	10,3	9,0	7,8
Income share of RR (X/RR).RR	11,6	11,1	8,9	8,2	9,2	9,6	8,9	7,5	6,7	5,9
Depredation share of RR (1-(X/RR)).RR	2,5	2,2	2,0	2,0	2,2	2,6	2,8	2,7	2,3	1,8

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hydrocarbons	0,8	1,5	0,8	1,7	3,6	6,0	10,0	10,1	9,9	9,1
Mining	1,6	1,4	1,5	1,7	1,9	1,9	3,4	3,7	5,9	5,1
Non Renewable Resources	2,4	2,9	2,2	3,4	5,6	7,9	13,4	13,8	15,8	14,3
Industrial Agriculture	1,0	1,2	1,1	1,6	1,8	1,4	1,3	1,1	1,3	1,6
Traditional Agriculture	1,2	1,2	1,1	1,2	1,2	1,1	1,2	1,1	1,2	1,3
Livestock	1,7	1,8	1,8	1,8	1,8	1,6	1,6	1,2	1,3	1,2
Forestry	0,3	0,4	0,4	0,3	0,3	0,3	0,3	0,3	0,4	0,4
Water Resources	0,8	0,8	0,8	0,8	0,7	0,8	0,8	0,8	0,8	0,9
Renewable Resources	5,0	5,3	5,2	5,8	6,0	5,2	5,1	4,5	5,0	5,4
Total Resource Rent	7,4	8,2	7,4	9,2	11,5	13,1	18,5	18,3	20,7	19,7
Income share of RR (X/RR).RR	6,3	6,4	5,5	7,3	9,7	11,3	16,3	16,2	15,0	14,2
Depredation share of RR (1-(X/RR)).RR	1,8	1,7	1,9	1,9	1,9	1,9	2,2	2,1	5,7	5,4

	2010	2011	2012	2013	2014	2015
Hydrocarbons	8,9	10,8	14,4	15,6	13,6	7,3
Mining	6,4	7,9	5,7	4,5	4,2	2,9
Non Renewable Resources	15,3	18,7	20,1	20,1	17,8	10,2
Industrial Agriculture	1,1	1,1	1,2	1,2	1,1	0,8
Traditional Agriculture	1,2	1,2	1,2	1,3	1,3	1,5
Livestock	1,2	1,1	1,1	1,0	1,0	0,0
Forestry	0,5	0,4	0,5	0,4	0,4	0,4
Water Resources	1,0	1,0	1,0	1,0	1,0	1,1
Renewable Resources	4,9	4,8	4,9	4,9	4,8	3,8
Total Resource Rent	20,3	23,6	25,0	25,0	22,6	14,0
Income share of RR (X/RR).RR	14,2	15,9	17,5	16,2	13,8	8,5
Depredation share of RR (1-(X/RR)).RR	6,0	7,7	7,5	8,8	8,7	5,5

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 4: Stocks of Natural Capital (millions of current Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydrocarbons	15.823,8	19.941,2	15.587,7	13.941,8	13.229,6	13.652,0	15.919,1	8.436,3	9.376,4	6.626,8
Mining	1.868,0	1.525,6	1.926,1	902,5	1.544,1	2.855,1	3.207,3	4.466,5	3.856,4	4.463,6
Non Renewable Resources	17.691,8	21.466,8	17.513,9	14.844,3	14.773,7	16.507,1	19.126,4	12.902,8	13.232,8	11.090,5
Industrial Agriculture	551,4	1.885,3	804,0	1.643,9	3.731,0	4.718,7	5.444,3	7.589,7	5.241,1	4.317,2
Traditional Agriculture	3.222,8	4.433,5	4.622,2	4.853,8	5.984,0	6.652,2	7.836,7	8.794,4	8.464,8	9.426,7
Livestock	2.905,8	2.605,5	2.929,5	3.246,9	3.960,1	4.695,8	4.562,9	5.395,0	5.601,4	5.612,5
Forestry	243.355,4	228.073,2	283.312,9	312.233,9	356.161,0	408.492,3	398.145,7	458.261,4	386.843,7	537.957,5
Water Resources	1.210,9	1.749,7	2.955,6	5.105,2	6.846,4	8.587,7	7.643,3	6.594,5	7.422,8	6.321,4
Renewable Resources	251.246,3	238.747,2	294.624,3	327.083,7	376.682,5	433.146,8	423.633,0	486.634,9	413.573,9	563.635,4
Total Resource Rent	268.938,1	260.214,0	312.138,2	341.927,9	391.456,2	449.653,9	442.759,4	499.537,7	426.806,6	574.725,9

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hydrocarbons	12.842,9	13.143,1	7.348,7	17.924,8	41.654,3	75.670,0	149.498,4	168.851,8	147.653,0	143.985,8
Mining	4.650,8	3.789,8	3.653,5	4.327,9	6.359,5	7.755,1	22.065,6	24.166,3	22.381,7	16.523,7
Non Renewable Resources	17.493,7	16.933,0	11.002,1	22.252,7	48.013,9	83.425,0	171.564,0	193.018,1	170.034,6	160.509,5
Industrial Agriculture	4.272,7	6.633,9	5.394,6	11.278,5	15.442,4	10.529,2	10.472,2	10.521,8	12.066,2	15.746,0
Traditional Agriculture	9.418,2	10.017,5	9.991,1	11.543,9	13.631,7	13.869,3	16.860,7	18.000,6	23.401,4	24.449,8
Livestock	5.270,8	5.873,3	6.218,2	6.785,1	7.432,4	7.668,8	8.910,5	7.531,5	9.607,0	8.953,9
Forestry	557.205,6	524.585,9	493.752,7	460.318,1	490.360,6	424.658,5	423.202,7	418.146,3	608.969,3	1.088.306,4
Water Resources	6.752,7	7.198,0	7.143,3	8.477,9	8.664,3	9.664,1	12.114,2	13.610,1	15.895,5	18.283,5
Renewable Resources	582.920,0	554.308,6	522.499,9	498.403,5	535.531,3	466.389,9	471.560,3	467.810,4	669.939,4	1.155.739,6
Total Resource Rent	600.413,7	571.241,6	533.502,0	520.656,2	583.545,1	549.815,0	643.124,4	660.828,5	839.974,0	1.316.249,2

	2010	2011	2012	2013	2014	2015
Hydrocarbons	148.164,4	202.960,6	313.164,4	345.717,0	302.300,2	138.697,1
Mining	24.784,7	31.117,7	23.357,5	17.952,1	16.089,7	9.349,9
Non Renewable Resources	172.949,1	234.078,3	336.521,9	363.669,1	318.389,9	148.047,0
Industrial Agriculture	14.005,6	20.354,2	28.474,1	23.886,7	25.115,6	18.298,9
Traditional Agriculture	25.970,5	30.163,8	35.411,8	44.641,9	48.199,5	54.233,8
Livestock	9.976,5	10.942,8	11.761,8	12.924,8	13.590,7	13.590,7
Forestry	895.676,7	696.355,2	863.546,9	778.495,3	695.245,2	730.741,2
Water Resources	23.512,6	27.401,3	30.478,4	33.972,8	37.286,9	41.704,7
Renewable Resources	969.141,9	785.217,2	969.673,0	893.921,4	819.438,0	858.569,2
Total Resource Rent	1.142.091,0	1.019.295,5	1.306.194,9	1.257.590,5	1.137.827,9	1.006.616,3

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 5: Stocks of Natural Capital (millions of constant 1990 Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydrocarbons	15.823,8	15.852,2	16.165,9	15.932,1	16.944,5	17.139,8	16.150,5	22.970,0	25.239,7	26.978,6
Mining	4.690,5	4.911,8	4.861,7	5.493,2	5.592,1	6.673,8	5.816,4	5.757,5	5.747,1	5.979,2
Non Renewable Resources	20.514,3	20.764,0	21.027,6	21.425,3	22.536,6	23.813,6	21.966,9	28.727,6	30.986,9	32.957,8
Industrial Agriculture	551,4	1.130,1	3.802,9	1.942,3	2.169,6	3.042,4	5.118,7	7.513,5	7.846,1	6.101,7
Traditional Agriculture	3.222,8	3.222,6	3.450,8	3.584,0	3.565,4	3.379,4	3.258,3	3.343,3	3.584,2	3.711,5
Livestock	2.905,8	2.911,0	2.994,0	3.014,4	3.084,8	3.140,3	3.207,3	3.275,4	3.360,5	3.455,3
Forestry	243.355,4	242.285,4	241.215,4	240.145,4	239.075,4	238.005,4	236.935,4	235.865,4	234.795,4	233.725,4
Water Resources	1.210,9	1.294,3	1.421,6	2.149,1	1.387,9	1.380,5	2.212,4	2.755,5	2.566,0	3.217,0
Renewable Resources	251.246,3	250.843,4	252.884,7	250.835,2	249.283,0	248.948,1	250.732,1	252.753,0	252.152,3	250.210,8
Total Resource Rent	271.760,6	271.607,4	273.912,3	272.260,6	271.819,7	272.761,7	272.699,0	281.480,6	283.139,2	283.168,7

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hydrocarbons	29.466,9	36.081,3	42.921,5	48.604,7	59.447,3	67.721,7	67.723,6	68.752,4	52.528,4	47.775,0
Mining	6.105,7	5.855,1	5.858,5	5.544,6	4.321,8	6.527,1	8.659,4	11.557,8	30.251,3	30.318,5
Non Renewable Resources	35.572,6	41.936,4	48.780,1	54.149,3	63.769,1	74.248,9	76.383,0	80.310,2	82.779,7	78.093,6
Industrial Agriculture	2.040,0	2.164,0	1.826,1	1.802,2	1.879,7	2.729,8	2.579,4	2.605,0	2.671,5	2.263,4
Traditional Agriculture	3.721,0	3.394,5	3.451,4	3.379,2	3.663,2	3.517,6	3.598,4	3.781,8	3.879,8	4.087,9
Livestock	3.558,1	3.456,4	3.556,5	3.645,4	3.744,7	3.821,2	3.928,0	4.012,8	4.116,1	4.226,4
Forestry	232.655,4	231.586,9	230.518,5	229.450,1	228.381,7	227.313,2	226.244,8	225.176,4	224.108,0	223.039,5
Water Resources	3.735,3	4.344,2	4.585,2	3.892,3	4.489,9	3.784,3	4.747,5	5.638,5	5.643,4	5.613,8
Renewable Resources	245.709,8	244.946,1	243.937,7	242.169,1	242.159,2	241.166,1	241.098,1	241.214,5	240.418,6	239.231,1
Total Resource Rent	281.282,4	286.882,5	292.717,8	296.318,4	305.928,4	315.415,0	317.481,2	321.524,6	323.198,3	317.324,6

	2010	2011	2012	2013	2014	2015
Hydrocarbons	49.681,0	49.887,0	58.726,2	60.164,4	59.101,6	50.702,8
Mining	24.822,3	21.718,0	17.155,6	13.640,1	10.297,9	6.160,3
Non Renewable Resources	74.503,2	71.605,0	75.881,8	73.804,5	69.399,5	56.863,1
Industrial Agriculture	2.161,9	1.939,9	2.246,9	2.855,0	2.710,2	2.256,7
Traditional Agriculture	4.405,9	4.445,7	4.691,2	5.102,5	5.226,0	5.170,8
Livestock	4.339,1	4.326,4	4.451,2	4.553,4	4.576,9	0,0
Forestry	221.971,1	220.902,7	219.834,3	218.765,9	217.697,5	216.629,2
Water Resources	4.690,7	6.639,9	7.071,3	9.260,2	5.612,4	8.763,7
Renewable Resources	237.568,7	238.254,6	238.295,0	240.537,0	235.823,0	232.820,3
Total Resource Rent	312.071,9	309.859,6	314.176,8	314.341,5	305.222,5	289.683,4

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 6: Changes in Natural Capital Stocks (millions of current Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Beginning of the period stock		271.760,6	262.291,6	314.830,2	344.282,3	396.883,8	458.212,0	452.175,3	508.367,6	435.899,1
Depreciations, discoveries and re-appreciations		-231,9	-711,1	-1.146,4	-299,3	-318,9	-837,6	633,8	389,3	812,5
Extractions		-473,0	-496,7	-540,9	-722,8	-952,7	-1.133,2	-1.312,7	-1.255,4	-1.129,0
Changes in the resource exploitation rate		-571,9	-393,4	-66,0	-1.362,3	78,1	-1.009,3	52,0	-734,6	-2.084,6
Changes in the resource unit rent		-8.192,2	54.139,8	31.205,4	54.985,9	62.521,7	-3.056,7	56.819,1	-70.867,8	149.263,1
End of the period stock	271.760,6	262.291,6	314.830,2	344.282,3	396.883,8	458.212,0	452.175,3	508.367,6	435.899,1	582.761,0

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Beginning of the period stock	582.761,0	608.474,0	579.167,1	542.773,8	532.182,9	598.433,5	565.072,9	667.745,7	691.590,7	903.491,3
Depreciations, discoveries and re-appreciations	-2.225,4	-762,6	-1.589,8	113,4	2.188,5	303,1	-799,7	-1.506,0	-47.452,5	-5.887,7
Extractions	-1.021,6	-1.091,5	-1.178,3	-1.369,5	-1.632,9	-1.667,7	-2.151,2	-2.282,7	-4.291,3	-6.507,7
Changes in the resource exploitation rate	-1.756,2	-1.508,6	-732,0	-2.462,7	5.861,8	9.204,2	2.897,2	6.439,4	18.527,0	-15.758,2
Changes in the resource unit rent	30.716,2	-25.944,1	-32.893,2	-6.872,0	59.833,2	-41.200,1	102.726,5	21.194,3	245.117,4	493.483,7
End of the period stock	608.474,0	579.167,1	542.773,8	532.182,9	598.433,5	565.072,9	667.745,7	691.590,7	903.491,3	1.368.821,4

	2010	2011	2012	2013	2014	2015
Beginning of the period stock	1.368.821,4	1.212.452,7	1.124.289,5	1.394.835,5	1.334.914,7	1.207.529,4
Depreciations, discoveries and re-appreciations	-3.037,2	125,3	46.092,1	-1.448,2	781,2	-18.824,7
Extractions	-8.310,9	-12.711,4	-16.627,4	-18.402,6	-19.563,6	-11.477,6
Changes in the resource exploitation rate	1.892,4	6.813,7	13.837,9	27.007,5	1.611,9	-2.897,0
Changes in the resource unit rent	-146.913,0	-82.390,9	227.243,5	-67.077,5	-110.214,8	-121.371,4
End of the period stock	1.212.452,7	1.124.289,5	1.394.835,5	1.334.914,7	1.207.529,4	1.039.368,1

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 7: Changes in Natural Capital Stocks (millions of constant 1990 Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Beginning of the period stock		271.760,6	270.483,8	268.882,6	267.129,4	264.744,9	263.551,4	260.571,4	259.944,6	258.343,9
Depreciations, discoveries and re-appreciations		-231,9	-711,1	-1.146,4	-299,3	-318,9	-837,6	633,8	389,3	812,5
Extractions		-473,0	-496,7	-540,9	-722,8	-952,7	-1.133,2	-1.312,7	-1.255,4	-1.129,0
Changes in the resource exploitation rate		-571,9	-393,4	-66,0	-1.362,3	78,1	-1.009,3	52,0	-734,6	-2.084,6
End of the period stock	271.760,6	270.483,8	268.882,6	267.129,4	264.744,9	263.551,4	260.571,4	259.944,6	258.343,9	255.942,7

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Beginning of the period stock	255.942,7	250.939,5	247.576,7	244.076,6	240.357,7	246.775,2	254.614,7	254.561,1	257.211,7	223.994,9
Depreciations, discoveries and re-appreciations	-2.225,4	-762,6	-1.589,8	113,4	2.188,5	303,1	-799,7	-1.506,0	-47.452,5	-5.887,7
Extractions	-1.021,6	-1.091,5	-1.178,3	-1.369,5	-1.632,9	-1.667,7	-2.151,2	-2.282,7	-4.291,3	-6.507,7
Changes in the resource exploitation rate	-1.756,2	-1.508,6	-732,0	-2.462,7	5.861,8	9.204,2	2.897,2	6.439,4	18.527,0	-15.758,2
End of the period stock	250.939,5	247.576,7	244.076,6	240.357,7	246.775,2	254.614,7	254.561,1	257.211,7	223.994,9	195.841,2

	2010	2011	2012	2013	2014	2015
Beginning of the period stock	195.841,2	186.385,5	180.613,2	223.915,7	231.072,5	213.902,0
Depreciations, discoveries and re-appreciations	-3.037,2	125,3	46.092,1	-1.448,2	781,2	-18.824,7
Extractions	-8.310,9	-12.711,4	-16.627,4	-18.402,6	-19.563,6	-11.477,6
Changes in the resource exploitation rate	1.892,4	6.813,7	13.837,9	27.007,5	1.611,9	-2.897,0
End of the period stock	186.385,5	180.613,2	223.915,7	231.072,5	213.902,0	180.702,8

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 8: Calculation of Resource Rent from Total GDP (millions of current Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Gross Value Added (Total GDP)	15.443,1	19.132,1	22.014,0	24.459,0	27.636,3	32.235,1	37.536,6	41.643,9	46.822,3	48.156,2
(minus) Compensation to Employees	5.386,1	6.764,1	7.983,1	8.823,9	9.540,7	10.643,5	12.883,1	13.859,2	15.277,6	16.683,6
Gross Exploitation Surplus	10.057,0	12.368,1	14.030,9	15.635,1	18.095,7	21.591,6	24.653,6	27.784,7	31.544,7	31.472,6
(minus) Fixed Capital Consumption	1.232,8	1.396,7	1.704,1	2.024,1	2.313,5	2.617,2	2.876,5	3.222,4	3.434,2	3.852,2
Net Exploitation Surplus	8.824,2	10.971,4	12.326,7	13.611,0	15.782,2	18.974,4	21.777,1	24.562,3	28.110,5	27.620,4
(minus) Return To Produced Capital	6.645,2	8.445,0	9.920,6	11.104,4	12.621,1	15.038,0	17.357,2	20.286,0	23.908,6	23.878,8
Natural Resource Rent	2.179,0	2.526,4	2.406,1	2.506,5	3.161,1	3.936,3	4.419,9	4.276,3	4.202,0	3.741,6
Depredation of Natural Resources	391,2	412,1	443,9	500,3	620,2	838,7	1.062,7	1.132,5	1.068,4	876,3
Return to Natural Resources	1.787,8	2.114,3	1.962,2	2.006,2	2.540,9	3.097,6	3.357,2	3.143,8	3.133,6	2.865,3

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Gross Value Added (Total GDP)	51.928,5	53.790,3	56.682,3	61.904,4	69.626,1	77.023,8	91.747,8	103.009,2	120.693,8	121.726,7
(minus) Compensation to Employees	18.727,4	19.375,2	19.946,0	21.374,6	22.681,5	23.725,0	25.002,2	27.803,6	30.187,7	33.810,2
Gross Exploitation Surplus	33.201,1	34.415,2	36.736,4	40.529,9	46.944,6	53.298,8	66.745,6	75.205,6	90.506,1	87.916,6
(minus) Fixed Capital Consumption	4.159,6	4.860,3	5.191,8	5.292,6	5.399,8	5.782,6	6.785,7	8.307,1	9.582,4	10.433,6
Net Exploitation Surplus	29.041,5	29.554,8	31.544,5	35.237,3	41.544,8	47.516,2	59.959,9	66.898,5	80.923,7	77.483,0
(minus) Return To Produced Capital	24.851,5	25.164,5	27.335,1	29.545,5	33.527,0	37.387,9	42.995,3	48.008,5	55.899,2	53.561,1
Natural Resource Rent	4.190,0	4.390,3	4.209,4	5.691,7	8.017,9	10.128,3	16.964,6	18.890,0	25.024,5	23.921,9
Depredation of Natural Resources	943,1	922,6	1.064,5	1.168,0	1.294,8	1.458,1	2.013,0	2.175,6	6.915,1	6.582,9
Return to Natural Resources	3.246,8	3.467,6	3.144,9	4.523,8	6.723,0	8.670,2	14.951,7	16.714,4	18.109,4	17.339,0

	2010	2011	2012	2013	2014	2015
Gross Value Added (Total GDP)	137.875,6	166.231,6	187.153,9	211.856,0	228.003,7	228.014,1
(minus) Compensation to Employees	36.477,1	43.390,1	47.140,8	52.759,9	58.586,1	64.444,7
Gross Exploitation Surplus	101.398,5	122.841,4	140.013,1	159.096,2	169.417,6	163.569,5
(minus) Fixed Capital Consumption	10.192,3	11.261,3	13.124,0	14.800,8	16.466,8	18.873,7
Net Exploitation Surplus	91.206,2	111.580,1	126.889,1	144.295,3	152.950,8	144.695,8
(minus) Return To Produced Capital	63.275,1	72.418,4	80.139,4	91.277,4	101.480,1	112.846,9
Natural Resource Rent	27.931,1	39.161,8	46.749,6	53.017,9	51.470,7	31.848,9
Depredation of Natural Resources	8.286,4	12.748,2	13.990,3	18.741,8	19.907,6	12.491,9
Return to Natural Resources	19.644,7	26.413,6	32.759,4	34.276,1	31.563,1	19.357,0

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 9: Gross Value Added Composition (millions of current Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Gross Value Added (Total GDP)	15.443,1	19.132,1	22.014,0	24.459,0	27.636,3	32.235,1	37.536,6	41.643,9	46.822,3	48.156,2
Compensation to Employees	5.386,1	6.764,1	7.983,1	8.823,9	9.540,7	10.643,5	12.883,1	13.859,2	15.277,6	16.683,6
Return to Produced Capital	6.645,2	8.445,0	9.920,6	11.104,4	12.621,1	15.038,0	17.357,2	20.286,0	23.908,6	23.878,8
Produced Capital Consumption	1.232,8	1.396,7	1.704,1	2.024,1	2.313,5	2.617,2	2.876,5	3.222,4	3.434,2	3.852,2
Return to Natural Resources	1.787,8	2.114,3	1.962,2	2.006,2	2.540,9	3.097,6	3.357,2	3.143,8	3.133,6	2.865,3
Depredation of Natural Resources	391,2	412,1	443,9	500,3	620,2	838,7	1.062,7	1.132,5	1.068,4	876,3

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Gross Value Added (Total GDP)	51.928,5	53.790,3	56.682,3	61.904,4	69.626,1	77.023,8	91.747,8	103.009,2	120.693,8	121.726,7
Compensation to Employees	18.727,4	19.375,2	19.946,0	21.374,6	22.681,5	23.725,0	25.002,2	27.803,6	30.187,7	33.810,2
Return to Produced Capital	24.851,5	25.164,5	27.335,1	29.545,5	33.527,0	37.387,9	42.995,3	48.008,5	55.899,2	53.561,1
Produced Capital Consumption	4.159,6	4.860,3	5.191,8	5.292,6	5.399,8	5.782,6	6.785,7	8.307,1	9.582,4	10.433,6
Return to Natural Resources	3.246,8	3.467,6	3.144,9	4.523,8	6.723,0	8.670,2	14.951,7	16.714,4	18.109,4	17.339,0
Depredation of Natural Resources	943,1	922,6	1.064,5	1.168,0	1.294,8	1.458,1	2.013,0	2.175,6	6.915,1	6.582,9

	2010	2011	2012	2013	2014	2015
Gross Value Added (Total GDP)	137.875,6	166.231,6	187.153,9	211.856,0	228.003,7	228.014,1
Compensation to Employees	36.477,1	43.390,1	47.140,8	52.759,9	58.586,1	64.444,7
Return to Produced Capital	63.275,1	72.418,4	80.139,4	91.277,4	101.480,1	112.846,9
Produced Capital Consumption	10.192,3	11.261,3	13.124,0	14.800,8	16.466,8	18.873,7
Return to Natural Resources	19.644,7	26.413,6	32.759,4	34.276,1	31.563,1	19.357,0
Depredation of Natural Resources	8.286,4	12.748,2	13.990,3	18.741,8	19.907,6	12.491,9

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 10: Gross Value Added Composition (percent)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Gross Value Added (Total GDP)	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Compensation to Employees	34,9	35,4	36,3	36,1	34,5	33,0	34,3	33,3	32,6	34,6
Return to Produced Capital	43,0	44,1	45,1	45,4	45,7	46,7	46,2	48,7	51,1	49,6
Produced Capital Consumption	8,0	7,3	7,7	8,3	8,4	8,1	7,7	7,7	7,3	8,0
Return to Natural Resources	11,6	11,1	8,9	8,2	9,2	9,6	8,9	7,5	6,7	5,9
Depredation of Natural Resources	2,5	2,2	2,0	2,0	2,2	2,6	2,8	2,7	2,3	1,8

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Gross Value Added (Total GDP)	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Compensation to Employees	36,1	36,0	35,2	34,5	32,6	30,8	27,3	27,0	25,0	27,8
Return to Produced Capital	47,9	46,8	48,2	47,7	48,2	48,5	46,9	46,6	46,3	44,0
Produced Capital Consumption	8,0	9,0	9,2	8,5	7,8	7,5	7,4	8,1	7,9	8,6
Return to Natural Resources	6,3	6,4	5,5	7,3	9,7	11,3	16,3	16,2	15,0	14,2
Depredation of Natural Resources	1,8	1,7	1,9	1,9	1,9	1,9	2,2	2,1	5,7	5,4

	2010	2011	2012	2013	2014	2015
Gross Value Added (Total GDP)	100,0	100,0	100,0	100,0	100,0	100,0
Compensation to Employees	26,5	26,1	25,2	24,9	25,7	28,3
Return to Produced Capital	45,9	43,6	42,8	43,1	44,5	49,5
Produced Capital Consumption	7,4	6,8	7,0	7,0	7,2	8,3
Return to Natural Resources	14,2	15,9	17,5	16,2	13,8	8,5
Depredation of Natural Resources	6,0	7,7	7,5	8,8	8,7	5,5

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).

Table 11: Production Taxes (millions of current Bs.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydrocarbons	1.083,5	1.468,7	1.284,8	1.350,9	1.320,0	1.350,5	1.651,4	867,0	1.070,8	931,5
Mining	16,5	12,0	11,1	12,1	18,4	16,3	25,3	58,3	48,0	42,7
Non Renewable Resources	1.100,1	1.480,6	1.295,9	1.363,0	1.338,4	1.366,8	1.676,8	925,3	1.118,8	974,3
Industrial Agriculture	2,1	2,1	1,5	2,4	3,3	4,2	4,8	6,8	6,5	8,4
Traditional Agriculture	1,2	2,1	2,4	2,6	3,2	3,1	3,6	4,1	4,0	4,3
Livestock	1,1	1,7	2,2	0,4	5,2	7,7	8,6	7,1	10,0	9,0
Forestry	0,2	0,2	0,3	0,3	0,6	0,9	1,0	0,9	40,0	22,4
Water Resources	22,0	24,9	28,6	31,6	30,3	41,4	34,7	43,5	55,7	49,5
Renewable Resources	26,6	31,0	34,9	37,4	42,7	57,2	52,6	62,5	116,1	93,6
Total Production Tax	1.126,7	1.511,7	1.330,9	1.400,3	1.381,1	1.424,0	1.729,4	987,8	1.234,9	1.067,9

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Hydrocarbons	1.198,0	1.413,8	1.300,4	1.762,9	2.333,0	5.018,8	8.645,3	9.266,2	10.249,1	10.161,3
Mining	49,3	41,4	47,8	50,4	83,0	120,1	407,6	542,1	688,2	548,9
Non Renewable Resources	1.247,3	1.455,2	1.348,2	1.813,3	2.416,0	5.138,9	9.052,9	9.808,2	10.937,3	10.710,2
Industrial Agriculture	12,1	14,1	17,0	22,3	25,2	18,7	22,7	23,1	29,1	34,6
Traditional Agriculture	4,5	4,8	4,9	5,5	6,0	6,4	7,2	7,7	9,2	9,6
Livestock	11,4	10,7	12,0	7,2	8,9	9,5	10,4	10,0	12,5	13,1
Forestry	18,7	26,8	26,3	22,6	29,6	29,2	37,4	40,9	52,0	60,5
Water Resources	65,6	66,3	73,7	61,8	69,7	78,1	90,6	96,5	104,5	112,6
Renewable Resources	112,4	122,6	134,0	119,3	139,3	141,9	168,3	178,3	207,3	230,4
Total Production Tax	1.359,8	1.577,8	1.482,1	1.932,6	2.555,3	5.280,8	9.221,2	9.986,5	11.144,6	10.940,6

	2010	2011	2012	2013	2014	2015
Hydrocarbons	10.631,7	13.722,3	19.354,2	24.299,8	24.607,3	17.428,7
Mining	795,0	1.193,4	967,0	1.042,6	1.302,5	987,8
Non Renewable Resources	11.426,7	14.915,7	20.321,1	25.342,4	25.909,8	18.416,4
Industrial Agriculture	31,1	36,3	41,8	47,7	48,8	42,3
Traditional Agriculture	9,2	10,6	12,0	14,7	15,8	17,5
Livestock	14,0	15,7	17,0	18,4	19,6	21,0
Forestry	69,5	83,0	97,6	103,2	101,9	104,8
Water Resources	128,9	141,2	151,9	167,5	182,3	199,9
Renewable Resources	252,7	286,8	320,4	351,5	368,3	385,5
Total Production Tax	11.679,4	15.202,5	20.641,5	25.694,0	26.278,2	18.801,9

Source: Authors' elaboration using the methodology presented in Jemio (2010 and 2011).