

Lund University, Department of Economics

April 2011

# **The Institutional Channels of the Resource Curse**

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## **A case study of Bolivia**

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## Abstract

This thesis analyzes the workings of the natural resource curse in Bolivia through a comparison between two periods with different institutional conditions and under dependency on tin and natural gas respectively. First the conditions for handling the resource curse are analyzed and a hypothesis is presented, suggesting that both periods are likely to have suffered from the natural resource curse and that the tin period is likely to have suffered more than the natural gas period. This hypothesis is then tested and it is concluded that Bolivia has suffered from the resource curse during both periods. It is also partly proved that the tin period has been affected more. Finally there is a discussion on what Bolivia has managed to improve between the two periods and, especially, what challenges remain for the future.

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## 1. An introduction to Bolivia and this study

Bolivia is among the poorest countries in Latin America. In 2009 the GDP per capita in Bolivia was 1,758 US\$, which can be compared with the average for Latin America which was 7,221 US\$. Only Haiti, Nicaragua and Guyana<sup>1</sup> are poorer according to the World Bank (WDI, 2009). There are many possible explanations for why Bolivia has not managed to develop in tandem with the rest of South America. Some attribute the lack of development to geographical disadvantages such as being land-locked and a third of the country being Andean, which mean difficulties for the developing of infrastructure and limits to the land area suitable for agricultural production (Morales & Andrade, 2007). Another possible explanation is that Bolivia has been dependent on its natural resource wealth and that it has failed to turn the income from these resources into development. The dependency on natural resources in Bolivia goes back very far in history. In the 16<sup>th</sup> century the Spanish empire found great riches in the silver mines of Potosí in present day Bolivia, which was then called Upper Peru. In the 20<sup>th</sup> century tin took over as the great source of income, and in recent years hydrocarbons have claimed this role. It is clear that Bolivia has been greatly shaped by its dependency on natural resources which is a great part of the national identity, as evidenced by the symbolic re-nationalization of the hydrocarbons industry by the MAS<sup>2</sup> in 2006. Evo Morales, the Bolivian president, did not hold back in his speech and proclaimed it to be a historic event.

*The time has come, the awaited day, a historic day in which Bolivia retakes absolute control of our natural resources* – Evo Morales (quote from BBC News, May 2, 2006)

Evo Morales is, however, nothing of a pioneer in this respect. In fact the Bolivian hydrocarbons industry has been nationalized twice before in the 80 years of its existence<sup>3</sup>(Miranda, 2008).

Perhaps not surprisingly, considering the history, the political situation in Bolivia has been highly volatile. Since Bolivia gained its independence from Spain in 1825 there have been 190 changes of

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1 No data available for 2009 but the 2008 numbers indicate that this would still be true for 2009.

2 MAS stands for Movimiento Al Socialismo, a political movement and the ruling party in Bolivia since 2005.

3 American owned Standard Oil started exploitations in 1927 after small quantities of oil had been discovered. (Miranda, 2008)

government, that is, more than one change per year on average (IMF Selected Issues, 2006, p. 14). The political institutions developed under such instability are likely to be ill-suited to the development of the country. Looking forward, Bolivia is destined to continue as a heavily resource-dependent country, exports of natural gas to Brazil will continue at least to the end of the current contract in 2019, very recently mining has resurfaced as an important source of income and the very high endowments of lithium have given Bolivia the epithet “Saudi-Arabia of lithium”

With the unique characteristics of Bolivia, its current and past resource dependency, institutional fragility and also the possibly crucial role it might play in the future of alternative, sustainable fuels, I found it to be a very interesting country to choose as the focal point of this study. I was especially attracted by the possible link between the history of having such resource wealth and the remarkable institutional instability seen since independence. Hence this study will delve into the question of how natural resources have interacted with institutions in forming the development path of Bolivia.

### ***1.1 Objective***

The objective of this study is to investigate how natural resources through interaction with institutions have affected economic development in Bolivia over two period of resource dependence. By taking advantage of the rare opportunity to analyse the effects over two different periods with dependency on two different natural resources I aim to describe to what degree Bolivia has suffered from the resource curse and how the institutions and the resources interacted to affect the outcome in the two periods. The questions that I try to answer are the following:

- What, if any, symptoms of the natural resource curse have been present in Bolivia during the years studied?
- How do the two compared periods differ in terms of the ability to handle the natural resource-based economy and how do the outcomes differ?

These questions are answered using empirical data found during the field study, and drawing on the answers to these two questions I will try to see which challenges remain for Bolivia looking forward.



## ***1.2 Methodology***

In writing this study I aim to pursue a qualitative as well as a quantitative method. In my opinion this will improve the quality of a study of this kind, where many variables are difficult to measure in satisfying ways. Also if many different aspects of the resource curse are to be considered using an econometric model, it becomes very complex. Previous theories and studies will be considered and weighed against each other in an effort to see which are more applicable in the case of Bolivia.

A field study was conducted in Bolivia where ministries and other authorities were visited to collect data for the analysis. This also included local libraries and institutions working on questions of economic development. Empirical data was collected and interviews undertaken with persons especially knowledgeable on the subject of one of the resources studied or on the area of natural resources and development generally.

Basing the analysis on a comparison between two periods of resource dependence presents an opportunity to assess how changes in the circumstances around Bolivia's resource dependency have affected its economic development.

## **2. Theoretical framework**

The phenomenon of the resource curse has been studied and empirically tested in many papers. The positive relationship between high endowments of natural resources and slow economic growth has been shown by, for example, Sachs and Warner (2001).

A broadening of the relationship into human development was done by Bulte et al (2005). Their study showed a negative relationship between natural resource abundance and several measures of human development. Additionally they find that for almost all their tested variables the causation seemed to go through institutional quality. When this was used as a control variable the relationship seemed to disappear.

In the sections below I will first go through the link between natural resources and institutions, within the context of the natural resource curse. After this I will present the theory of appropriability which is a central part in my analysis of the resource curse in Bolivia. Finally, theories which introduce different symptoms of the resource curse are presented.

### ***2.1 Institutions and natural resources***

An institution is a term that is rather difficult to explain and it is used in many areas of research. In this section I will go through some theories related to institutions which are relevant in the context of development and the resource curse. A common channel through which natural resource wealth affects institutions is by inducing rent-seeking behaviour. This causation is, for example, suggested by Lane and Tornell (1999) in their paper on the voracity effect. They argue that natural resources may cause rent-seeking due to different groups in societies struggling to keep control over rents. In many of the theories referred to in this paper, as well as in many other studies, institutions are quite an abstract concept which refers roughly to the functioning of the state and the quality of which is measured through, for example, the risk of expropriation and other indirect measures. These measures are not perfect measures of institutional quality, since they are measures of the outcome of institutions rather than the rules surrounding institutions; two suggested measures that fit this description are constitutions (Boschini et al, 2009) and social institutions, for example ethnolinguistic fractionalization, which is a concept that concerns to what degree a country is

divided in different Ethnolinguistic groups (La Porta et al, 2002). Boschini et al compare presidential and parliamentary regimes and majoritarian and proportional electoral systems and come to the conclusion that presidential regimes with proportional electoral systems are more prone to rent-seeking, while a set-up with a parliamentary regime and majoritarian electoral system bring little or nothing of a resource curse effect. La Porta et al argue that Ethnolinguistic fractionalization, which is measured through a combination of a few components that consider the occurrence of linguistically different ethnic groups in a country, has a strong negative relationship to the functioning of government. Ethnolinguistic fractionalization is found to lead to more rent-seeking, lower efficiency and so on.

However, other studies frequently use indirect measures such as observing the fiscal behaviour of the government (Lane and Tornell, 1999), which may be indicative of the quality of institutions since it can be argued that if institutions were good enough, fiscal redistribution would not be possible. Another, more obvious, indicator is civil conflict or war, which could indicate that institutions have failed and that the struggle over resources has caused disastrous consequences (Sala-i-Martin et al, 2003). These different approaches work for different situations; the rule-based measures can be used to measure the institutional conditions for growth or for countering the resource curse in a country, while the indirect measures such as risk of expropriation or degree of rent-seeking behaviour may be used to explain other effects surrounding growth, the natural resource curse et cetera.

At the same time that theories on the resource curse have developed to include institutions in different ways, they have also developed to include ideas that natural resources are more or less detrimental to development. Initial research on the resource curse was very much inspired by the work of Sachs and Warner (1995). In their study they show a relationship between natural resources and GDP growth measuring natural resources simply as the share of primary exports in GDP. Their measurement of resources is very broad and includes everything from simple agricultural produce to valuable minerals. In later history this work has been criticized and new, modified, studies have been performed. One common criticism has been the broad measure of resources. Claiming that there is a fundamental economic difference between wheat and diamonds, many authors have tried to divide resources into different categories to assess how their impact on the economy may differ.

Leite and Weidmann (1999) consider the link between specific types of resources and institutions in

their paper on natural resources, corruption and growth. They use a microeconomic model of utility maximization to show the effects of natural resources on corruption. Their main result is that capital intensive natural resources have a positive relationship to corruption: when the incidence of capital intensive natural resources increases the level of corruption does as well. Other authors have followed up on this idea that some resources possess special characteristics that render them more likely to negatively affect institutions and development as compared with other resources. This is done by for example, Isham et al (2003) and Sala-i-Martin et al (2003) as they distinguish between point-source and diffuse resources: point-source referring to resources which are geographically and economically concentrated, while diffuse resources are easily spread and can be accessed by a large variety of economic actors. Examples of point-source resources are minerals, fuels and crops grown on large plantations. Among diffuse resources on the other hand you find animal and agricultural production from small family farms. Both papers find a positive relationship between the occurrence of point-source resources and slow development, Isham et al. attribute this to the risk of terms of trade shocks and a negative relationship with institutional quality. Sala-i-Martin et al. argue that this relationship occurs because the point-source resources generate rents which are easily appropriable.

Some of the theories presented above use similar arguments and show that “point source” or highly appropriable resources are detrimental to growth whilst “diffuse” or less appropriable resources are not. Many other studies however do not make this distinction between different resources. For example, as mentioned above, the seminal works on the resource curse by Sachs and Warner (1995, 2001) simply consider primary sector exports. However, later studies, e.g. the theories of Boschini et al (2007, 2009), presented in the section below, have shown that the relationship is more robust when considering specific types of natural resources. Furthermore, there is one core difference between the studies that do not take into consideration different kinds of resources and the ones that do. The former category tends to focus on the Dutch disease explanation for the resource curse or other direct explanations, whilst the latter category of researchers tends to focus more on the association between natural resources and institutions. It seems reasonable then, as the goal is to assess how resource abundance and institutions interact in the context of development, to make a distinction between different kinds of resources.

## ***2.2 The theory of appropriability***

Boschini et al (2007) combine the idea of considering different types of natural resources and incorporating institutions with their theory about appropriability. They argue for the inclusion of both the characteristics of the natural resource and the quality of institutions in this concept. The definition of appropriability becomes “the interaction between the type of resources that a country possesses, and what we call the quality of its institutions”, dividing the concept into two parts: technical and institutional appropriability. The technical appropriability of the resource is determined using four different measures: how easily sold the resource is, how valuable the resource is, storage capabilities as well as transport capabilities. All these measures are positively correlated with technical appropriability. That is, the more valuable and logistically manageable the resource is, the more appropriable it is, and thus more likely to have a negative effect on growth. To measure institutional quality they first use a property rights index (from Keefer and Knack, 2002). In this paper I will use a rule-based measure of institutional quality as in Boschini et al (2009), but I will use a different measure from constitutions. This is since their measure, due to Bolivia not being democratic over the whole period, is not applicable. Instead I will make a distinction between democratic and autocratic institutions. The argument I make is that democratic institutions are likely to include higher levels of transparency, accountability, et cetera within the government and thus lower levels of corruption, and involve more difficulty in appropriating the nation’s resources as compared with autocratic institutions. Thus the idea that I present in this paper is that democratic institutions bring a lower institutional appropriability as compared with autocratic institutions.

## ***2.3 The theories on the symptoms of the resource curse***

In this section I will present some different theories that try to explain why resource rich countries experience slow development. The purpose is to find symptoms of the resource curse that I can use to determine to which degree Bolivia has suffered from the curse.

A great deal of the literature on the natural resource curse revolves around rents generated by the resources. In fact some studies view rents from very different sources, such as remittances, and compare their effects on the economy to that of natural resource rents; this is for example done in Chaudhry (1989). How do rents interact with institutions to affect development then? In doing my

literature review I have come across two major ways in which this link can be explained. First, the rents are fought over by different groups in society. This process leads to political instability and high levels of redistribution once a certain party has control over the resource. The second view is that the natural resource rents offer an easy and high income for the government, i.e. the group currently in power. Due to this income they may fail to develop important parts of the economy, specifically a proper taxation system and educational system.

Going back to the voracity effect (Lane and Tornell), this concept was introduced in 1999, and it has been frequently cited. The authors present a model with a two sector-economy where different powerful groups struggle over the control of natural resources and attempt to redistribute rents in their favour. Once in power they arbitrarily increase taxation on the formal sector of the economy to generate income which they can redistribute. The effect of this is that investments move into the informal or shadow sector, which is “nontaxable”, counteracting the positive effects of the natural resource rents. This theory grew out of a study of windfall gains so it is mostly applicable in such a situation. To do an empirical assessment of their theory Lane and Tornell present variables from the fiscal accounts of a few natural resource-dependent, or more specifically oil dependent, countries and how they have developed over time. The goal is not to test the main hypothesis of their theory, since there is no data detailed enough for this, but to test the degree of appropriative behaviour within the government. The authors say the following about the variables they consider: “...the fiscal accounts are of particular relevance, as the proximate domestic recipient of oil revenues is typically the national government and the budgetary process is a convenient mechanism by which powerful groups can appropriate resources from the rest of society.” The variables presented in their paper are: Government expenditure, consumption, transfers, investment and government debt interest payments, all as shares of GDP. The argument that is presented is that if the government or strong interest groups use the budgetary process to appropriate resources, these variables will increase more-than-proportionally, that is, there will be an increase in relation to GDP.

The struggle for control over a country's natural resources may even lead as far as to armed conflict. Sala-i-Martin (2003) has shown that countries with large endowments of natural resources are more likely to be war-ridden, and he argues that there is causality between the two. For these effects to take place a country needs to be ethnically, politically or otherwise divided. Collier and Hoeffler also argue for a link between natural resource wealth and experiencing many conflicts; they test for two

different kinds of conflicts, induced by greed or by grievance. They come to the conclusion that many conflicts seem to be induced by greed, that is, they are attempts to appropriate rents, often from natural resources. This conclusion is based on the finding that primary commodity exports greatly increase the risk of conflict (Collier and Hoeffler, 2004). Another type of conflict, social conflict, may also have a link to natural resource dependency. This is shown, for example, in Laserna et al (2008). They argue that one explanation for social conflicts may be attempts to appropriate income from natural resources. Growth from so-called exogenous sources, such as from windfall or terms of trade gains, is concluded to give rise to more conflicts while growth from endogenous sources lowers conflict. Social conflicts negatively affect growth in two ways according to Laserna et al. First, through what they call direct effects, resources being diverted from production, consumption and investment. Second, through indirect or spillover costs. These include for example changes in incentives due to conflict which reduce growth. Spillover effects vary between different conflicts and an example brought up in their paper is that if there is a conflict within a manufacturing industry, downstream or upstream businesses are affected.

The issue of natural resource rents being an easy source of income for the present group in power is somewhat different in its nature, although these two lines of argument are definitely intertwined. The rent replacing taxation as an income for the government is probably one of the more detrimental effects and it is mentioned in, for example Isham et al (2003), Ross (2004) and Chaudhry (1989). Ross argued that demands for representation are lower when taxation is low, which could be a motivation for the ruling power not to develop education. There is also a political danger in trying to reform the taxation system and thus, when an easy source of income, such as natural resource rents, is available, incentives to develop a well-functioning taxation system are lower than otherwise. The absence of proper systems for taxation causes numerous and diverse effects in different parts of the economic and political system. Without taxation citizens are less likely to demand representation and to hold politicians accountable. At the same time the state will not develop ways of controlling the citizenry, and more importantly industry, in ways that they would otherwise do in order to collect taxes (Isham, 2003). This may result in poorer performance by both the private and the public sectors. In a case study on Yemen and Saudi-Arabia, Kiren Aziz Chaudhry (1989) emphasizes that the act of collecting taxes not only involves collecting money but also providing a set of rules that the private sector must follow. It also includes collecting information on the economy, which is crucial in decision-making. Furthermore, Chaudhry found in

her study that when faced with a crisis, Saudi-Arabia failed to control the economy much due to the fact that, without a proper tax system, they did not have many ways to regulate the economy. Chaudhry herself expresses it very well: “Extractive institutions are the base of administration, without which regulation and redistribution are impossible”. The characteristics of the resource rents also offer different possibilities for the state to suppress opposition and engage in what is commonly referred to as “patronage”. Isham et al (2003), argue that the rents due to being “exogenous” can be used to buy consent through providing benefits, infrastructure projects et cetera, especially so-called “white elephant”<sup>4</sup> projects are interesting here. This is easier to do with this sort of revenue than with tax revenue since the tax revenue comes with a demand for representation and a pressure for accountability. It also seems likely that transparency will be lower when it comes to income from national resource rents as compared with taxes. Furthermore revenues from natural resources are often large and thus they offer, to the government, resources to directly repress and use violence against the opposition. For similar reasons as to why tax systems are not properly developed, educational systems have been shown to lack behind in countries rich in natural resources. Gylfason (2000) argue that due to the security of income from the rents and the fact that the extraction of natural resources is often very capital-intensive, governments neglect education. This affects development negatively, assuming that the country in question has a suboptimal level of education to begin with. Gylfason, when testing his hypothesis, uses three different measures, with the aim of capturing to which degree countries focus on education. Using average years of schooling for females, secondary school enrollment and public investment in education he finds some indications in favor of his hypothesis that the slow development of resource rich countries can be explained by insufficient efforts to develop the educational sector. Furthermore, Isham et al (2003) propose a “delayed modernization” effect, that is, the ruling elite have an incentive to hinder modernization, including modern industry and education, since this imposes a risk to them of losing power. This effect is argued to be more prominent in countries with point-source resources since these are more likely to be controlled by a smaller group. This is an alternative explanation for why the manufacturing sector might not develop or even decline in

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4 A white elephant is a project with a negative pay-off, these can be politically attractive since they prove a commitment to redistribution which is not as evident with projects that generate a surplus (Robinson & Torvik, 2005)



resource rich countries. A more common explanation for this lies in the Dutch Disease argument. It says that an increase in the real exchange rate occurs due to an increase in the value of the natural resource exports. This change lowers competitiveness of the manufacturing sector causing it to decline or stagnate (Humphreys et al, 2007).

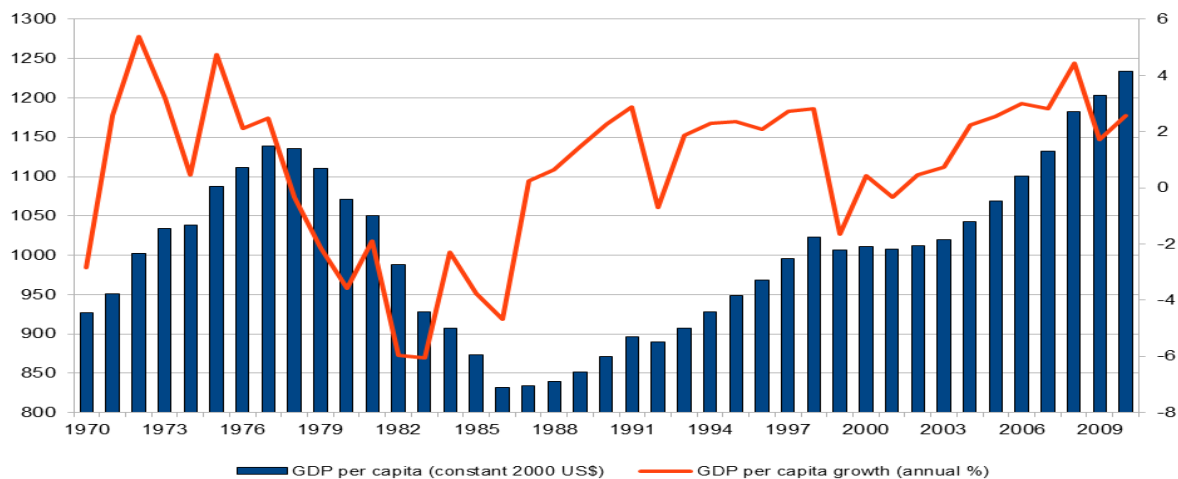
Another symptom of the natural resource curse that is often mentioned in the literature is how the manufacturing sector may shrink because of the natural resource sector. This is argued by Sachs and Warner (1997) in one of the more important papers on the natural resource curse. This effect is argued to explain why resource-rich economies grow slower since the manufacturing sector has positive external effects of learning-by-doing, which affect the economy as a whole. When explaining the link between natural resources they mostly point to the Dutch disease effect. Another explanation, argued by Humphreys et al (2007) is that the resource sector diverts capital from other parts of the economy. The link to institutional quality is lower when it comes to this aspect of the resource curse. However, if proper policies are undertaken these effects may be greatly limited. In order for this to happen, well-functioning institutions are needed.

The effects discussed above are connected in several ways; the voracity effect predicts that tax policy will be very opportunistic and what evolves from this behaviour will likely be a malfunctioning system, especially since activity is pushed into a non-taxable informal sector. Also the struggle over power is present in both sets of theories. Lane and Tornell and Sala-i-Martin present the more direct effects of this struggle, such as political instability, whilst, for example, Isham et al. show how the struggle to stay in power leads to resource rents being wasted in unproductive or even counterproductive activities.

### 3. The case of Bolivia

In recent years Bolivia has seen improved economic development, and GDP per capita has increased by, on average, 2.8 % yearly between 2005 and 2009. This however is the highest growth seen over a 5 year period since the 1971 to 1975 period<sup>5</sup> (Fig. 1). The Bolivian economy continued to grow until the late 1970's but after that the economy started to shrink. During the first half of the 1980's the crisis deepened more and more with the lowest notation of GDP in 1986, which had then fallen by almost 27 % (own calculation from WDI-data, 2009) compared with the top notation in 1977.

Figure 1: GDP per capita (actual and growth), 1970-2009



Source: Data from WDI online

Between these two successful periods of growth the Bolivian economy saw an economic crash that brought with it a lot of changes. Below follows an account of the economy during the 1970's, today and what changed in the period in between.

In the 1970's the Bolivian economy was heavily influenced by its mineral exports. In 1970 exports

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<sup>5</sup> During 1971-1975 growth was on a yearly average 3.2 %. Averages computed from data taken from WDI (2009)

consisted to 95 % of minerals, out of which tin made up 60 % (IFS, 1979-1985). However, in the years following both the mineral and the tin share dropped. This has been attributed to quality of the mineral ores dropping which leads to rising extraction costs in the mines and falling productivity (Jordan Pozo, 1999). In the early 1970's the natural gas sector also started to claim shares of the country's exports, which of course contributed to the falling share of minerals and tin.

In 1985, after having declined for many years, the tin sector in Bolivia crashed completely. This was due to an international tin crisis and also a general international economic crisis, where over-valuation and speculation had finally caught up on the industry. Tin prices fell, when the crash hit between October 1985 and July 1986, from USD 5.60 per lb. to USD 2.55 per lb. (Sachs & Morales, 1989, p. 204). Many of the Bolivian mines, which were running with very high costs<sup>6</sup>, had to close down. However, natural gas had already started to become an important export commodity by this time. Ever since 1972, when a contract to export gas to Argentina came into force (Andersen et al, 2006), natural gas exports had increased as a share of total exports. A few years after 1985 production was quite stagnant, much due to the deep financial crisis in Bolivia. During the years after the economic crisis many economic reforms were undertaken to stop hyperinflation and to open up the economy (Andersen et al, 2006). These policies laid the basis for the development later seen in the natural gas sector. When eventually the economy started to recover, and thanks to new liberal laws, foreign direct investment in exploration and exploitation of natural gas poured into Bolivia, new reserves were found and production soared. In recent years this has grown to be the most important export commodity in Bolivia and the primary driver of growth.

Below I will present some characteristics of Bolivia which matter for their ability of handling the resource curse, which will be followed by a more detailed run-down on the two periods mentioned above.

Bolivia is a country with high ethnical fractionalization. This is an important observation as many of the theories presented in the theory section argue that ethnical fractionalization together with natural resource wealth may cause conflicts (Sala-i-Martin et al, 2003) or rent-seeking (Lane and Tornell, 1999). The division of the Bolivian people into ethnical or cultural groups has been tried a

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<sup>6</sup> Thoburn (1987, p. 39) shows how Bolivia had the highest production costs for tin in the world in 1981.

couple of times and the results are not very straightforward. Table 1 summarizes a few different surveys on the subject.

**Table 1: Survey measure of ethnicity**

	1990 Census	1950 Census	2001 Census	LAPOP	PNG, UNDP /ILDIS*	CRISE**
Indigenous (generic)	51,00%	63,00%	-	19,00%	16,00%	-
Indigenous (specific)	-	-	62,00%	-	-	57,00%
Mestizo	27,00%	37,00%	-	-	67,00%	25,00%
Mestizo or cholo	-	-	-	65,00%	-	-
White	13,00%	-	-	11,00%	17,00%	2,00%
Indigenous/mestizo	-	-	-	-	-	6,00%
None or other	-	-	-	4,00%	-	10,00%

Source: Zavaleta Reyes (2007)

\* Programa Nacional de Gobernabilidad, United Nations Development Program (Bolivia, Instituto Latinoamericano de Investigación Social).

\*\* Centre for Research on Inequality. Human Security and Ethnicity. Oxford University

**Source: Data from Zavaleta Reyes (2007)**

As can be seen above, results on the ethnic identities of the Bolivian people differ greatly. Zavaleta Reyes attributes a lot of these differences to political intentions when creating the surveys. It is clear that this is an issue that causes and has caused a lot of cleavages in Bolivian society, and there have been several events showcasing this, for example the “water war” in 2000<sup>7</sup>. This subject is discussed further in Albó (2007) and Toranzo Roca (2007).

Another characteristic is the high degree of informality in the Bolivian economy. When looking at the informal sector during these two periods you can see that Bolivia has and has had a very large informal sector. During the years 1975-1981 the size of the informal sector varied between 73.7 % and 69.5 %, referring to how large a portion of the working population had an informal occupation, according to estimates by Foro Economico (1986). In the later years during the 1980's this estimation fell by around 10 percentage points, but during this period the crisis in Bolivia might

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7 A conflict that arose in Cochabamba over high prices and monopolistic tendencies after a privatization of the water market, the background is discussed thoroughly in Perreault (2006)

have temporarily affected numbers as well as the quality of studies. Another study that was encountered during the field study presents considerably more conservative numbers; according to Casanova (1986), the informality in 1976 was 46 %, in 1980 53 % and in 1984 58 %.

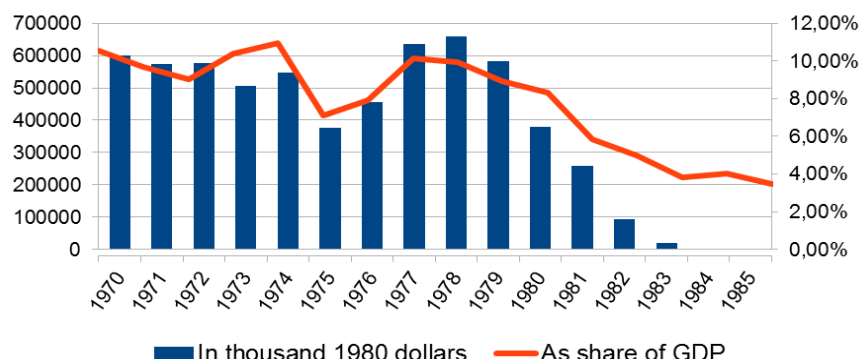
Between the early period and the period from 1995 and onwards informality does not seem to have declined significantly. According to Cué and Chumacero (2009) informality was 65.3 % in 1995 and dropped slightly after that, staying at 62.4 % in 2000 and 2005. Other studies (Iriarte, 2007; Quevedo and Vaca, 2005) present estimates that are slightly lower, just under 60 %. It seems possible that the natural resource richness in Bolivia has negatively affected efforts to control the informal sector as it has not decreased considerably and is very high in comparison to most other countries in Latin America (Quevedo and Vaca, 2005). It has also been argued that informality is at such high levels because the resource sector is very capital-intensive and at the same time not very labor-intensive. That is, it draws capital from other formal sectors but does not create many new formal jobs, leading to informality often being the only option for people (Cué and Chumacero, 2009). It should be noted that data on the informal sector is usually quite inaccurate and the numbers here are meant to give a general view on the informality in Bolivia and strong conclusions should be drawn from differences between years (Interview with Carlos Machicado, July 2011).

### 3.1 Bolivia during the tin era, 1970-1985

As previously mentioned the tin sector held an important position in the Bolivian economy during the 1970's. During the first half of the decade the importance actually fell but in the second half it rose again, enough to surpass

the level at which it was in the beginning. The average share of GDP from 1970-1980 for tin exports is just below 9.5 %. The same number for mining as a whole, which is likely to have similar characteristics as tin mining, is around 15,5 %. Figure 2 displays how tin

**Figure 2: Exports of Tin, 1970-1985**



Source: Calculated using data for mining exports from BCB, *Memorias Anuales (1970-1985)* and for GDP from INE, *Anuario Estadística (1970-1985)*

exports changed during the period studied. As can be seen there is a large fall during the 1980's which coincides with the economic crisis during these years with large falls in GDP. The tin sector has been said to have been a large part of the problem leading to the crisis in the 1980's. COMIBOL accumulated great debts during the 1970's and, for example, the subsidization of food for miners came to be a huge cost, and also a difficult one since it was politically very difficult to remove. In 1983, shortly before the subsidy was removed prices for meat on the market were 100 times higher than the subsidized price for miners.

During the period studied Bolivia exported their tin and other mining products to many different countries. All countries that over the period 1970-1985 contributed to more than 1 % of exports of tin from Bolivia are presented in the table below; these are the 11 most important partner countries over the period:

**Table 2: Top importers of Bolivian tin, 1970-1985**

Country	Value (in million US\$)	Share in %
England	825,4	21,7%
USA	1293,8	33,9%
Germany	304,9	8,0%
Holland	421,4	11,1%
Russia	234,6	6,2%
Colombia	45,0	1,2%
Peru	40,9	1,1%
Argentina	78,2	2,1%
Checkoslov.	116,4	3,1%
Brasil	139,6	3,7%
Switzerland	38,5	1,0%
Total exports	3813,1	
Top 11 countries share of total exports	3538,6	92,8%

*Source: Data from BCB, Memorias Anuales (1970-1979) and INE, Anuarios Estadísticas (1979-1985)*

These 11 countries make up 92.8% of total exports of tin, with the five largest constituting 85.5 %. During this period Bolivia tried to broaden the market to which they could sell their tin, and this was in fact one of the main objectives of the tin smelting program (Ayub and Hashimoto, 1985). There seems to have been an effect in this direction as the share of exports to England dropped from 73 % in 1970 to 26.5 % in 1974. However Bolivia has not seen many new countries becoming importers of their tin, and while England lost shares other top importers gained shares. The top five importers

made up 94 % in 1970 and in 1974 they made up 77 %; this drop is, although still significant, not as dramatic. Overall the desired effect was never large and the smelting program, in regards to this aspect, a failure. This is discussed by Ayub and Hashimoto who suggest that the higher complexity of metal markets as compared to unrefined mineral markets is what caused the effect to be small, although metal markets are broader. An important point that they make is also that countries often impose higher taxes on metals in comparison to unrefined minerals.

When it comes to transport costs, the data available was, as mentioned earlier, much more limited in comparison to most other data found. However in two interviews, with Eliodoro Sandi Bernal and Rolando Jórdan, both very knowledgeable on the mining industry during this period, I was told that the data I will present below could be used to get an approximate view of how transport costs looked over the whole period. They were also both of the opinion that transport cost in the mining sector was not a major issue and compared with the natural gas sector today it had a much smaller significance.

Transport of Bolivian tin during this period was by carrier or train and in my interview with Karl-Heinz Ampuero (July, 2011), economist at UDAPE in energy and mining, I was told that transport in this sector was relatively cheap and also that it was very easy to adapt to the market by expanding or contracting. The data that I found is from the report by Ayub and Hashimoto. From 1978 to 1981 transport costs as a share of export value varied between 2.62 and 4.81 %, and was on average 3,65 %.

The institutions during this period were all but favourable to avoiding symptoms of the resource curse. Bolivia was ruled by military dictatorships from 1964 until 1978. After the dictatorship of Hugo Banzer Suarez fell in 1978 political chaos followed, with election processes being accused of being fraudulent and several military coups. During the period of 1978-1982 Bolivia had eleven different heads of state (Morales and Sachs, 1988). True democracy did not return to Bolivia until 1982 and after that the political situation could start to stabilize. During the chaos from 1978-1982 Bolivia experienced their possibly worst government, the one of Luis Garcia Meza. During his rule the government was deeply involved with the cocaine industry and Bolivia became isolated, for example IMF, the Inter-American Bank and the World Bank withdrew their support and lending (Sachs and Morales, 1988). The period when Bolivia was under the rule of Hugo Banzer Suárez was also a very harsh one. Recently torture chambers stemming from these times were found in La

Paz and it has been estimated that around 2000 political prisoners were held there during the dictators rule from 1971-1978 (BBC News, 2009).

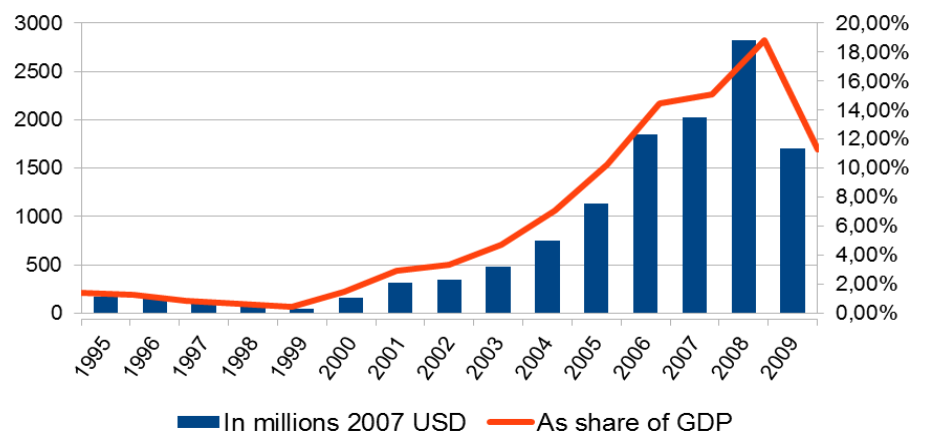


### 3.2 The Natural Gas Sector in Bolivia, 1996-2010

The natural gas sector in Bolivia was first developed in the 70's. However some important political events during the 1990's caused the sector to grow incredibly. Before this growth the sector, which is now the most important sector in the Bolivian economy, had a limited significance especially true for the period before the decline in the mining sector that started in the 1980's. Below is a graph depicting how the sector has developed since 1995.

As can be seen the importance of natural gas to GDP has increased a lot during this period, starting at insignificant levels and then growing quickly after 1999 when exports to Brazil started.

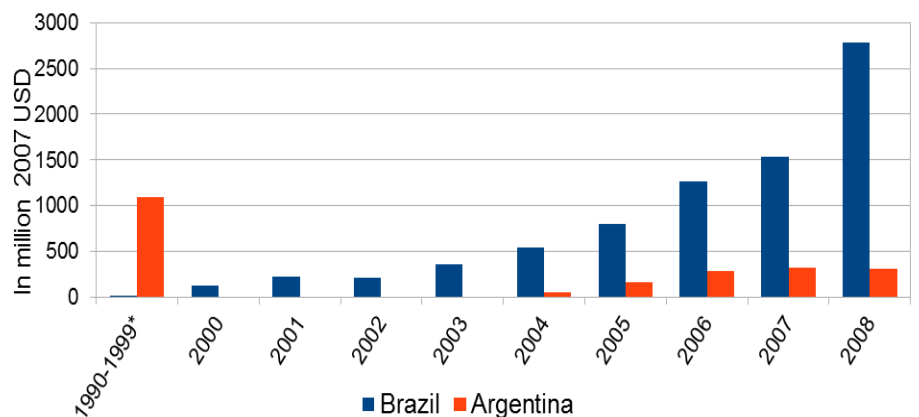
**Figure 3: Natural gas exports, 1995-2009**



In contrast to the tin in the other examined period, is only exported Argentina was the sole importer of Bolivian gas. In 1999 when exports to Brazil started the value of exports started increasing quickly, and a very large part was destined for Brazil just as is still the case today. In figure 4 the development of exports to Brazil and Argentina respectively is shown. As can be seen in this

*Source: Calculated using data for exports from BCB, Memorias Anuales (1995-2009) and for GDP from INE, Anuario Estadística (1970-1985)*

**Figure 4: Natural gas exports to Argentina and Brazil**



*Source: Data from UDAPE Diagnósticos Sectoriales (2009)*

graph in recent years the Bolivian natural gas sector has almost entirely relied on exports to Brazil. The market for Bolivian gas has, thus far, been very narrow indeed.

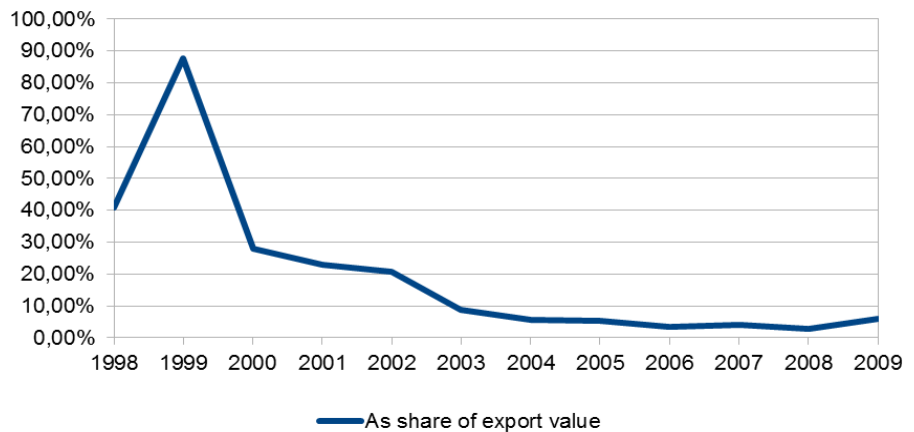
When it comes to transport costs the gas sector is slightly more complex than the tin sector. This is due to the fact that transport requires at first heavy investment, in the case of Bolivia in pipelines but it can also be in LNG-plants<sup>8</sup>. Apart from investment costs there are also costs for maintaining the pipelines and for LNG it is necessary to pay for carrier transport or another means of transport. In figure 4.6 the data on

transport costs in recent years, a compound of maintenance and investment cost in the transportation system, is presented. At the moment only pipelines are used to transport the Bolivian gas, although there are discussions about starting to build factories for liquefied natural gas (Interview with

Carlos Alberto Echazu, August 2011). As can be seen here costs were very high around the time that exports to Brazil started. Both investments as well as maintenance costs are higher initially. This is presumably due to many problems occurring during the start-up of the new pipelines. However, most of the difference in total costs lies in the higher investment costs (YPFB, 2010). In recent years the cost has stabilized. The average cost in share of GDP thus far has been 23.61 %. If transport costs stay at the lower level seen in recent years for the rest of the contract with Brazil, which continues up until 2019, then average costs would be around 6.3 %<sup>9</sup> over the whole contract.

With regards to the institutional conditions during this period they are much more favourable than was the case earlier. By the start of the studied period democracy had become stable in Bolivia and

**Figure 5: Transport costs in the natural gas sector**



*Source: Calculated using data on transport costs from YPFB Transporte (2010) and export value from BCB, Memorias Anuales (1995-2009)*

8 LNG=Liquefied natural gas, an option to transporting the gas through pipelines is to use an LNG-plant to transform the gas into fluid, in order to be able to transport the gas by carrier, train or boat.

9 Calculated assuming costs for the period up until 2019 to be an average of the stabilized cost during the last 6 years.

it has not been seriously questioned or in danger during the period, although some turbulence was present in the early years of the 2000's before the fall of the liberal regime and the rise to power of Evo Morales in 2005. Although democracy seems stable the political situation in Bolivia is far from ideal. In the Corruption Perception Index Bolivia scored 2.8 in 2010, which means that it is number 110 among the 178 countries surveyed for corruption (Transparency International, 2010). When it comes to political freedom they are given a score of 3 for both political rights and civil liberties in a survey by Freedom House. Political freedom has actually dropped from a score of 1 in 2002, which is partly due to increased corruption and influence of drug money generally after 2001 and partly due to the events in 2003 when protests over plans to export gas to USA and Mexico via Chile led to a bloody confrontation between protesters and the military with around 80 people dead. The protests led to the removal of the president. This also led to the status in the report by Freedom House going from “free” to “partly free” in the 2004 report. This status remains today (Freedom House, 2011).

## **4. Analysis**

In this section I will present and analyze data I found during my study. The first part will analyze data already presented in the previous section regarding the two periods of resource dependence and attempt to provide a prediction regarding which resource regime is likely to be more affected by the natural resource curse. The second part will present data on symptoms of the natural resource curse in Bolivia during the two periods and try to answer the hypothesis presented in the first part. Finally there is a concluding section where the questions asked in the very beginning of this paper are answered.

### ***4.1 Two periods of natural resource dependence***

In this section the two different periods of resource dependence in Bolivia are discussed. The discussion is centred on the appropriability of the resources and the goal is to try to predict to what extent and how the natural resource dependency should affect development during the two resource regimes. The technical appropriability will be discussed first followed by the institutional appropriability and finally a hypothesis is presented. The institutional appropriability will be analysed by discussing the political system during the two periods. The different aspects of technical appropriability will be analysed as follows: the value of the resource will be measured using the export value as share of GDP and I will argue around how easily sold the resource is by referring to the size of the market to which the resource has been sold during the relevant periods, in an attempt to assess the market width for the resource. The discussion on transport capabilities of the resource will be based on the transport costs as share of export value. Finally data on storage, unfortunately, were not found during my field study so this is left out; however, one could guess that storage of natural gas is more complex and more expensive than storage of tin or any mineral for that matter.

The data collected about the two periods is a bit difficult to analyse. Out of the three characteristics considered, two, i.e. transport costs and how easily sold the resource is, speak quite strongly for the case of tin being more appropriable, and thus likely to cause more adverse effects. Regarding transport costs we see that the transport costs in the natural gas sector have been substantially higher as compared with the tin sector, even if the calculated long-term average cost for transportation in

the natural gas sector is considered the cost greatly exceeds that of the tin sector, around 3.7 % for tin compared with 6.3 % for natural gas. The same clear result is seen when it comes to the width of the market; during the tin era Bolivia exported tin to many countries, at least 5 of which were significant importers (England, USA, Germany, Russia and Holland). I argue that the width of the market sold to during the two periods can be used as an indicator for how easily sold the resource is. The conclusion then is clear, that tin was more easily sold than the natural gas is and has been.

However the value of natural gas exports has in recent years far exceeded that of tin in the period studied, making up almost 20 % of GDP in 2008 and since 2004 it has stayed above the share that tin held on average before the decline in the 1980's.

The arguments here are straightforward with the only exception of the value of the resource which points towards natural gas being more appropriate. However, regarding the value of the resource I would argue against its importance in this case. Given a sufficient value of the sector further increases in the value are not very relevant. For most of the symptoms of the resource curse that are considered in the next section it is the behaviour that the resource curse creates that is detrimental to the economy, not the actual value of the rents appropriated. Arguably, some factors, such as conflict, may be more likely to be affected when the value is very high and when the growth in the sector is large, since demands for change are likely to be higher in these cases. However the tin sector was, surely, large enough to attract rent-seekers and thus create the unwanted behaviour that gives rise to most of the negative effects of the resource curse.

Continuing, the institutional conditions in Bolivia indicate a low ability of countering the negative effects of natural resource dependency, but there is a difference between the two periods. First, the ethnolinguistic fractionalization in Bolivia is rather high during both periods. There are, according to the new constitution, 36 nationalities in Bolivia and at least three large ethnolinguistic groups exist, Aymara, Quechua and Mestizo/Spanish. It has been pointed out that groups that do not speak Spanish are especially excluded from the judiciary in Bolivia (Freedom House, 2004, 2010). The question of ethnicity is a sensitive one in Bolivia, which is indicated by the very different results from the censuses presented earlier, likely due to political motives in the creation of the surveys. This is likely to lead to poor institutional quality during both periods, as argued by La Porta et al (1999) and it creates a foundation for effects such as the voracity effect to take place. Second, when it comes to form of government there is a difference between the two periods; during most of the tin

period Bolivia had various military dictators ruling the country or short periods of very unstable democracy. Only in 1982, when the tin sector was already declining did Bolivia start to see a stable democracy again, for the first time since 1964. Consequently the institutions have been much more likely to be able to handle, and counter, the negative effects of the resource curse during the natural gas period as compared with the tin period. However, institutional quality is still low in both of the periods. Although there is democracy now, figures presented above, regarding corruption obtained from Transparency International as well as political rights and civil liberties obtained from Freedom House, indicate that institutions are still frail. Unfortunately the comprehensive surveys done by these two institutions today were not done during the 1970's and thus it is hard to put the numbers into a historical perspective. However, in my interview with Rolando Jordan (August, 2011) he mentioned that the government and also the whole organization surrounding the mining sector were much less transparent than is the case today within both the government and the natural gas sector. This is partly due to the organizational structure and the general political climate but also due to a certain characteristic that differs between the sectors. When we discussed reasons for this, Jordan agreed that an important difference between the two periods, and reason for the difference in transparency apart from the form of government, is that tin was sold on a world market to many different countries while natural gas is sold via long-term contracts and to only two countries. It is obvious that long-term contracts and few agents within the market are favorable to transparency since there are less transactions to follow and the terms follow the contract, which is over 20 years, and does not change from one deal to another.

Following the discussion above, I propose that the analysis of the symptoms of the resource curse in Bolivia should show that both studied periods have seen effects of the natural resource curse since the technical appropriability is high during both periods and institutional conditions do not predict that they are sufficiently strong to counter this. Furthermore, the tin period is likely to have experienced more severe negative effects of the natural resource curse than the natural gas period. The exception is effects that are heavily linked to public disagreement with how the income is handled, such as social conflict, which is likely to be stronger during the natural gas period since the value of the sector is higher and also since there is heavy growth within the sector. In the next section I will present data on symptoms of the natural resource curse in Bolivia during the two periods to see how the country has been affected and to test the above hypothesis.

## 4.2 Symptoms of the natural resource curse

In this part of the analysis I have collected information about symptoms of the resource curse in Bolivia during the two considered periods in an attempt to assess which effects of the resource curse have affected Bolivia during these two periods. The data collected is based on the theories presented earlier. The explanations circle around three main ideas; that people struggle over resource rents, that the rents are poorly handled or that they diminish incentives to create other means of income.

### The voracity effect and social conflict in Bolivia

A common idea is that a large resource sector leads to more corruption within a country, and there are many arguments for this but they all relate to the fact that it is considered easier to appropriate resources from these sectors as compared with other sectors. Above, I discussed the appropriability of the two resources that Bolivia is dependent on. Here, I will discuss the fiscal behaviour of the government in Bolivia during these two time periods, using the variables presented in the theory section, in an effort to discern

attempts at appropriating national income.

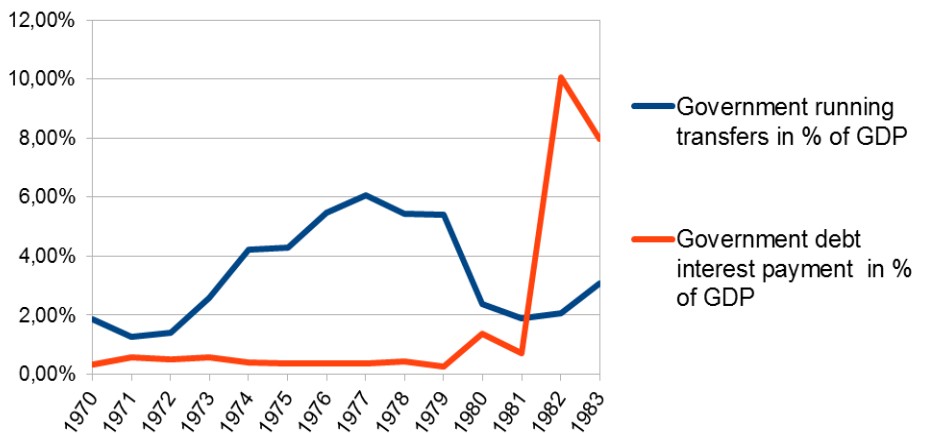
Unfortunately I was not able to find any data on government investment for the earlier period so this is left out of the analysis.

Moreover, the data presented here includes years from 1970 to 1983,

but I believe that the data from 1981 and onwards may

be slightly unreliable due to the economic and general crisis with, for example, high inflation in the country. Information from this period is sparse and seemingly less accurate.

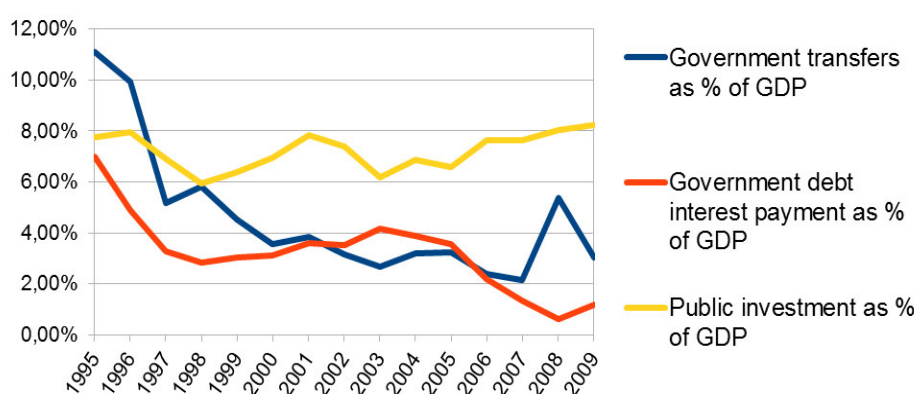
**Figure 6: Debt interest payments and transfers, 1970-1983**



Source: Data from BCB Memorias Anuales (1970-1983) and data on GDP from INE, Anuario Estadística (1970-1985)

The graphs here depict the above mentioned variables, as shares of GDP. In the data it is quite clear that during the recent period with expansion of the natural gas sector the government has been able to avoid the old sins committed during the tin era. In the figures here we can see that during the 1970's there is a clear increase in the measure of government transfers whilst this measure actually dropped during the 95-2009 period. Debt interest payments stayed fairly constant up until 1981, and the massive increase that was seen then is probably due to the general economic crisis internationally as well as in Bolivia. In Bolivia this crisis was, however, very much related to the mining sector since the increase here is likely due to mismanagement, for example of the state mining company COMIBOL which amassed heavy debts during this period (interview with Eliodoro Sandi Bernal). As mentioned, data on investment was only available for the latest period and it shows that public investment has been fairly stable over the period.

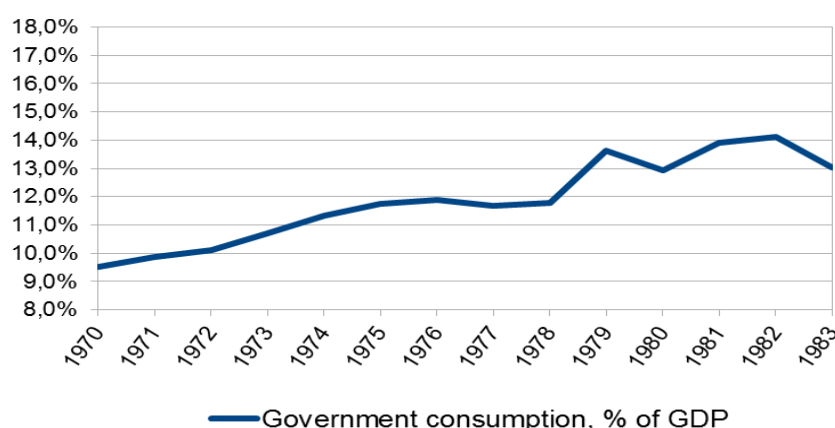
**Figure 7: Debt interest payments, investments and transfers, 1995-2009**



Source: Data from UDAPE Dossier de Estadística (2011) and UDAPE Atlas Fiscal, 2010 and data on GDP from INE, Anuario Estadística (1970-1985)

related to the mining sector since the increase here is likely due to mismanagement, for example of the state mining company COMIBOL which amassed heavy debts during this period (interview with Eliodoro Sandi Bernal). As mentioned, data on investment was only available for the latest period and it shows that public investment has been fairly stable over the period.

**Figure 8: Government consumption, 1970-1983**



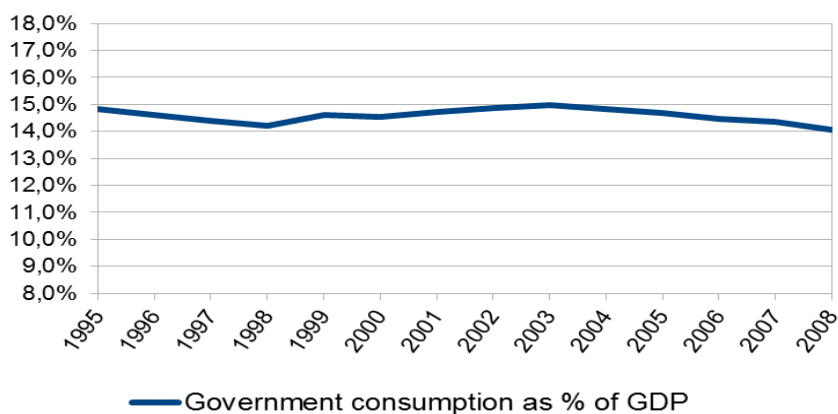
Source: Data from CEPAL(2009)

The data on government consumption also shows a marked difference between the two periods. As can be seen in figures 8 and 9, consumption during the period 1970-1983 increased in relation to GDP, from just below 10 % in 1970 to just above 14 %



in 1982. At the same time the data for the 1995-2009 period shows that government consumption actually dropped slightly, by almost 1 %.

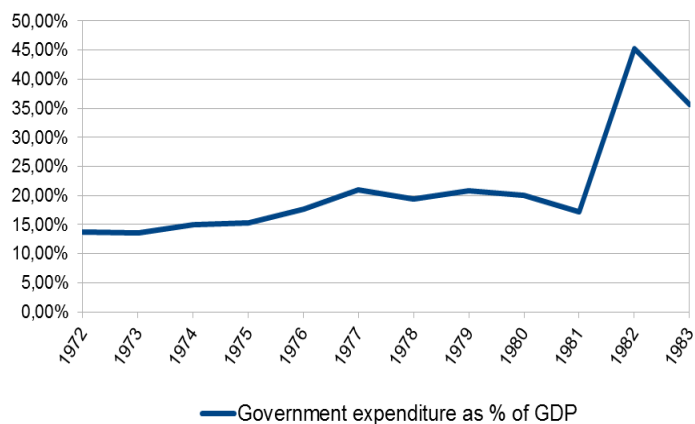
**Figure 9: Government consumption, 1995-2008**



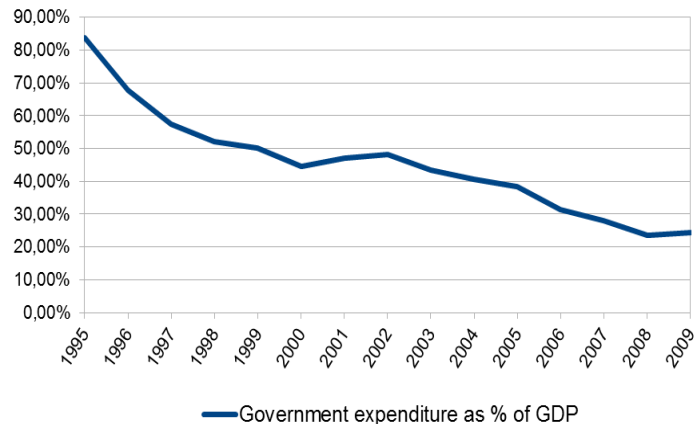
Source: Data from CEPAL (2009)

Finally, government expenditure follows the same trend as the previous ones, the data for the first period, which in this case only covers the years 1972-1983, shows a fairly steady increase during most of the 70's and a big jump in the 80's, again the data for the 80's may contain some uncertainty. The graphs below show the clear difference, as the data for the 95-2009 period show a steady decline.

**Figure 11: Government expenditure, 1972-1983**



**Figure 10: Government expenditure, 1995-2009**



Source: Data from BCB, Memorias Anuales (1972-1983) and data on GDP from INE, Anuario Estadística (1970-1985)

Source: Data from UDAPE, Dossier de estadística (2010) and data on GDP from INE, Anuario Estadística (1970-1985)

The variables presented above indicate quite clearly that appropriative behaviour within the government was present to a much higher degree during the tin period as compared to the natural gas period. What, partly, caused the increased expenditure and consumption of the government was populist policies, such as the subsidy of food for mining workers which, admittedly, was created long before this period but it was kept almost throughout the crisis and cost Bolivia dearly. Furthermore some investment during this period went into so-called white elephant projects. One glaring example is the tin volatilization plant at La Palca. The plant was built with the help of the U.S.S.R. and construction was begun in the early 1970's. The chosen location was La Palca, outside Potosí, despite geological studies that questioned the geological structure there. After experiencing a multitude of problems during and after construction and due to shortages of raw material the plant ended up being an economic catastrophe. The final investment cost was 80 million USD, which is ten times the original estimated cost (Ayub and Hashimoto, 1985). Fortunately, it seems like these kinds of bad investments have been avoided recently, but, interestingly, the Bolivian government is once again experiencing problems due to a subsidy linked to the natural resource sector. The cost of the subsidy, which provides cheap Diesel and LPG<sup>10</sup> to the Bolivians, has grown to enormous proportion. In 2010 the cost of the subsidy was around 422 million USD and the cost is expected to grow (Interview with Carlos Alberto Echazu). Using the average growth of demand and supply over the last 10 years, Echazu predicted the cost for the coming years. Only this year, the cost is expected to grow to 522.8 million USD and if the situation remains the same the estimated cost for 2020 is an astounding 1911.3 million USD.

Another negative effect that is likely to occur in countries where there is a struggle over resource rents, and especially in countries where different ethnic groups are represented as in the case of Bolivia, is social conflicts.

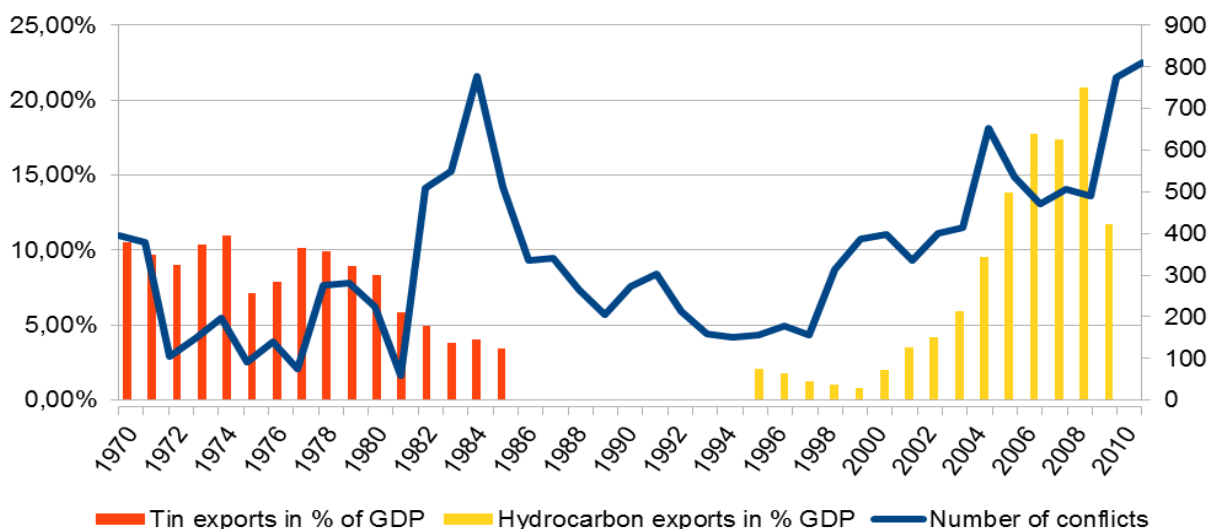
Bolivia is no exception to the idea that natural resource rich countries experience more conflict, but conflicts in Bolivia have been different compared with the ones in many other low-income countries. In Bolivia, conflict has been undertaken by well-organized groups in the form of protests, strikes, boycotts, road-blocks etc., but not armed conflict (Laserna et al, 2008). Laserna et al claim

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<sup>10</sup> Liquefied Petroleum Gas

that collective organizations are particularly developed in Bolivia if you compare with Latin America or low-income countries overall. The actual number of social conflicts in Bolivia has varied highly between different periods. Below is a chart of the number of conflicts from 1970-2010 combined with data on exports as share of GDP for tin and natural gas.

**Figure 12: Occurrence of social conflict in Bolivia, 1970-2010**



*Source: Data on conflict from CERES, Observatorio de Conflictos. Data on exports from BCB, Memorias Anuales (1970-1985 and 1995-2010) and data on GDP from INE, Anuario Estadística (1970-1985)*

As can be seen above social conflicts are fairly low during the period from 1972 to 1982 and it is easy to connect this with the oppressive autocratic rule of Hugo Banzer Suárez and the chaos that followed his rule until democracy was instituted in 1982. This argument is supported by Laserna et al (2008). Moreover, they also argue that the numerous conflicts that arose after 1981 may have had hidden motives of redistribution of the incomes earned during the economic growth of the 1970's. A more direct link between the tin sector, or rather the mining sector, and conflicts is present in the same report. That is, the share of different leading groups in social conflicts. Here mining workers are deemed to have been involved in 4.9% of conflicts from 1970-2005. The group is the seventh

biggest on a long list and it should be noted that miners are likely to be a less numerous group<sup>11</sup> in comparison to for example: public employees, the largest group; students, the second, etc. Also it is worth considering that after 1985 mining's importance was greatly reduced, as was the number of miners, and it is likely that after some unrest following lay-offs in the 80's, the number of mining related conflicts would have been much fewer compared to earlier periods which makes this number more interesting than it might look like at first sight.

The 1995-2010 period, in contrast, shows a clear correlation. As the importance of hydrocarbons in GDP has increased so has the number of conflicts. An interesting observation that can be made is that conflicts start rising slightly before the heavy growth in the natural gas sector. However, when social conflicts start increasing, in 1997, the prospect of natural gas sales to Brazil was known and it is likely that this was a major reason for the increased rate of conflict. This goes in line with the argument made earlier, that the growth of the natural gas sector makes it more likely to give rise to social conflict compared to the fairly constant revenues from the tin sector. The natural gas period is, of course, not exempt from other events that may have caused conflicts. For example, at the same time as output from the hydrocarbons industry increased during the early 2000's, the liberal regime was being criticized and many conflicts arose surrounding how it ruled the country and when conflicts increased in 1997, the former dictator Hugo Banzer Suárez had returned to power, although this time through a proper election. However, as Laserna et al (ibid.) suggested, conflicts that officially concern one matter may very well be disguised struggles over the distribution of income.

The costs of these social conflicts for society and the consequences for development have been high. Estimates put the direct cost of conflicts at a level of, on average, 1 % of GDP annually, while the indirect costs, or spillover costs, are estimated at 3 % of GDP annually, and for some years close to 10 %.

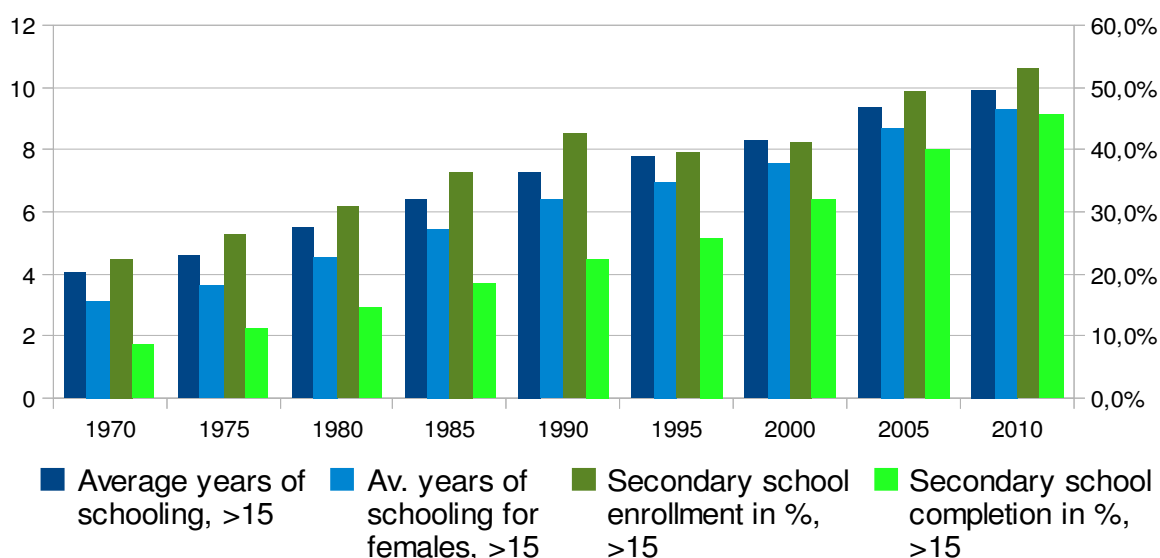
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11 Between 1970 to 1978 the mining sector employed between 70 000 to 78 000 people. (Anuario Minero, p. 40, 1979)

## Effects on education and the manufacturing sector in Bolivia

Education and the manufacturing sector are two certainly linked parts of the economy. In a developed economy the manufacturing industry hires many of the highly educated people in society, for example in research and development positions. But perhaps more importantly the manufacturing industry might provide incentives for workers to educate themselves. Thus, education provides better possibilities for the manufacturing sector and at the same time the manufacturing sector provides incentives to get educated. The manufacturing sector is also often considered to have positive externalities on the rest of the economy; these are discussed in the theory section. Below, I will present data on the variables for education used in Gylfason (2000) and data on the size of the manufacturing sector over the two periods.

**Figure 13: Educational attainment, 1970-2010**



*Source: Dataset from Barro-Lee (2011)*

Gylfason uses three different measures to capture how the government in different countries prioritize education. He argues that insufficient investment in, and focus on, education is an important reason why resource rich countries often experience slow development. As can be seen in the graph above educational attainment in Bolivia has been on a steadily increasing path for the past 40 years, with the exception of the 1990 to 1995 period when secondary school enrollment dropped

somewhat. However, in both periods that I am more interested in, 1970-1985 and 1995-2010 the increasing trend is clear. To be able to more clearly distinguish the two periods I will also calculate the change in relation to the previous period for the different measures.

**Table 3: Change in educational attainment, 1970-2010**

<b>Participation in education* in Bolivia</b>				
Change in comparison to previous period				
	Change in average years of schooling	Change in average years of schooling for females	Change in secondary school enrollment in %	Change in secondary school completion in %
<b>1970</b>	n/d	n/d	n/d	n/d
<b>1975</b>	0,577	0,519	3,7%	2,6%
<b>1980</b>	0,884	0,896	4,6%	3,2%
<b>1985</b>	0,895	0,927	5,6%	3,9%
<b>1970-1985</b>	2,356	2,342	13,90%	9,70%
<b>1990</b>	0,894	0,953	6,2%	4,0%
<b>1995</b>	0,506	0,538	-3,0%	3,5%
<b>2000</b>	0,521	0,632	1,5%	6,0%
<b>2005</b>	1,069	1,106	8,1%	8,2%
<b>2010</b>	0,551	0,635	3,8%	5,6%
<b>1995-2010</b>	2,141	2,373	13,40%	19,80%

\* All data is for the age group 15 and older

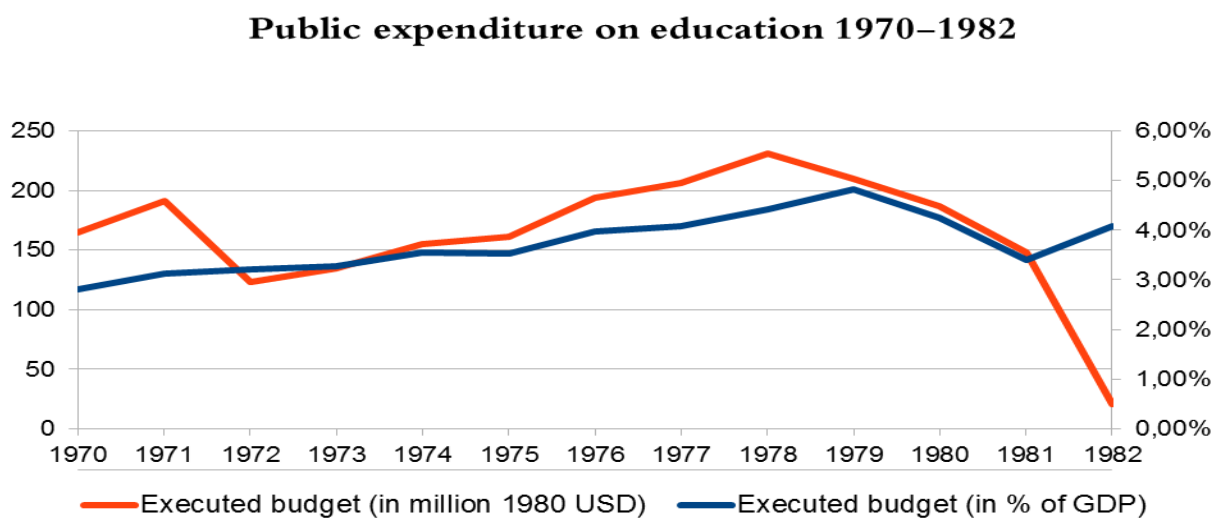
*Source: Dataset from Barro-Lee (2011)*

he table above displays how much change has been seen between the periods. The change in average years of schooling is displayed in years and the change in school enrollment in percentage units. I have included secondary school completion as a measure; this is intended to capture the quality of education. As can be seen above the gap between enrollment and completion in secondary school is partly closed during the 1995-2010 period. Although there was change over the period, I would argue that the advancements made in this period required more effort than the previous ones. The argument behind this is that it is more difficult to advance in both these categories the higher the level you are at since you come closer and closer to an optimal level of education. The variables that Gylfason considers are “average years of schooling for females” and “secondary school enrollment”. These variables only show small differences, but following the argument above, it is reasonable to value the changes during the 1995-2010 period higher than the earlier period since the increase is from a higher level to begin with. When comparing these numbers to other countries in South America it turns out that Bolivia is performing very well, considering that they are behind in economic development. On average over the 1970-2010 period, Bolivia is actually the second best country, after Chile, when it comes to secondary school enrollment. The performance in the other

variable is not as convincing, Bolivia takes 7<sup>th</sup> place among the 11 countries compared. Its average is slightly below the average for all countries, 6.2 and 6.5 years respectively.

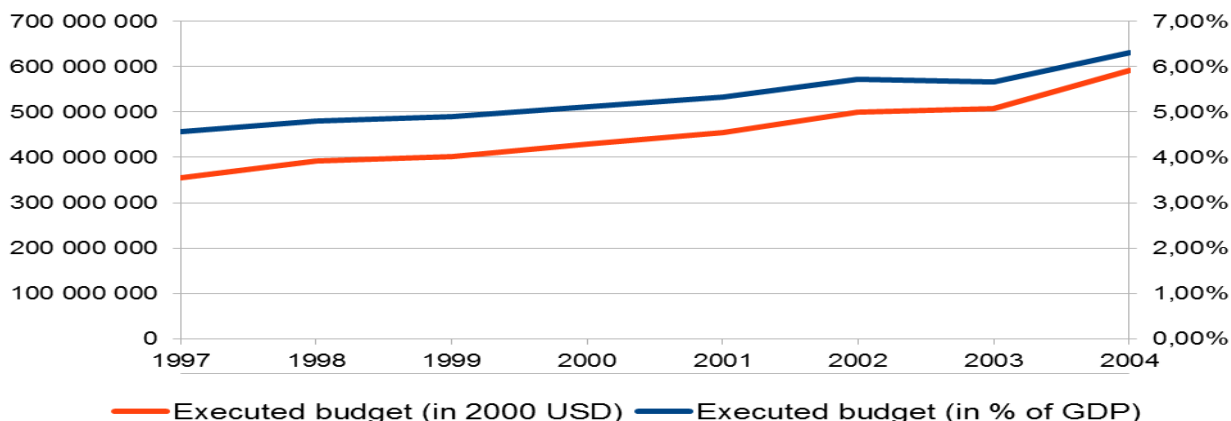
The difference is also confirmed, albeit not strongly, when considering public expenditure on education, the third measure used by Gylfason. The two figures below show the development of public expenditure on education in relation to GDP over the two periods. Unfortunately data for the 1995-2010 period is incomplete and only covers the period from 1997-2004.

**Figure 14: Public expenditure on education, 1970-1982**



*Source: Data from BCB, Memorias Anuales (1970-1982) and data on GDP from INE, Anuario Estadística (1970-1985)*

**Figure 15: Public expenditure on education, 1997-2004**



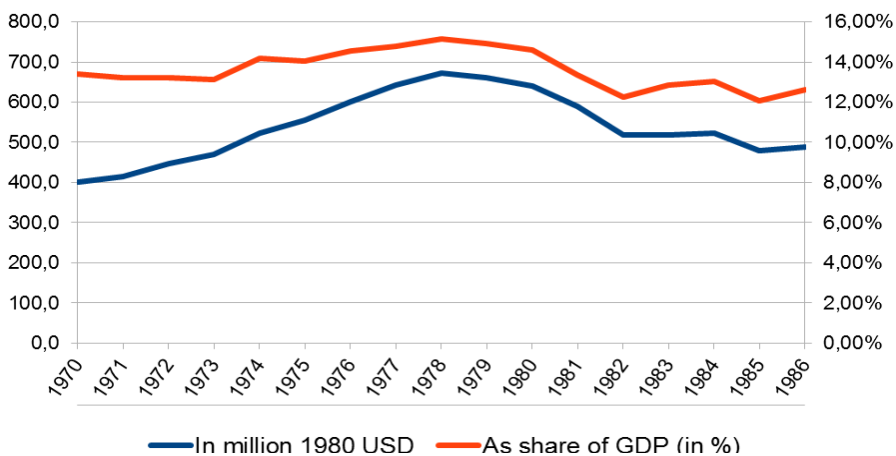
Source: Data from Ministry of Education, *Estadísticas Escolares (2008)* and data on GDP from INE, *Anuario Estadística (1970-1985)*

In interviews I have gathered that the development seen above seems to have halted in recent years, but there is, to my knowledge, no official data on this and therefore I do not try to speculate on how spending in education has developed recently.

The difference here is not a great one and it is easier to discern when considering the change in relation to the previous period, when doing this and averaging over the period I came up with the following: the average increase in public expenditure, as share of GDP, for 1997-2004 was 0.25 %, and for 1970-1982 it was 0.10 %. As I have mentioned previously in the study, there may be some discrepancies in the data after 1981. For that reason I also calculated the average from 1970-1980, but even then there is a clear difference as the average change amounts to 0.14 %.

Continuing with the manufacturing sector the data collected on this in Bolivia shows clearly how little development the sector has seen. As I mentioned there may be many explanations for the

**Figure 16: Size of the manufacturing sector, 1970-1986**



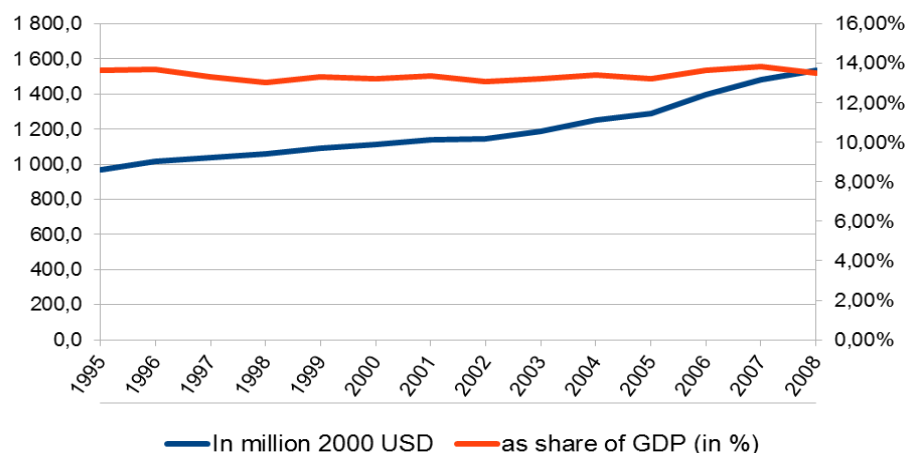
Source: Data from CEPAL (2009)



lack of development in this sector; this is true for Bolivia as well. In many of my interviews it was agreed that this is and has been one of the main problems linked to the natural resource economy in Bolivia. Suggested reasons during the interviews for why the manufacturing sector has not managed to develop in Bolivia were often one of the following three: the Dutch disease has made it impossible for the sector to compete with foreign goods due to appreciation of the real exchange rate; the government does not invest enough in the sector and especially in reducing bureaucracy which today makes it

very difficult to have a formal business in Bolivia; and finally, the geography and poor infrastructure in the country make it very difficult to transport goods around or out of the country resulting in markets not being sufficiently large to

**Figure 17: Size of the manufacturing industry, 1995-2008**



Source: Data from CEPAL (2009)

support domestic industries. The Dutch disease explanation may be viable for the lack of development during the tin period. The real exchange rate index, with base year 2005, for Bolivia was close to 200 in 1980 and reached 560 in 1985. However the same cannot be said about the natural gas period as the index decreased between 1999 and 2006, the period when Bolivia saw huge increases in its natural gas exports. During this period one of the other two explanations is more likely to be true. The lack of a well-developed manufacturing sector is very evident when visiting Bolivia. Very rarely do you see any factories and, even more seldom, anything with the “Made in Bolivia” tag, the exception being wine, chocolate and other food produce. I also believe that nearly every single educated person I met worked for either a governmental institution or a non-governmental organization, taking part in another interesting distributive struggle, i.e. the one over aid money. The lack of industry was one of the most striking impressions during my field trip.

## Effects on the taxation system

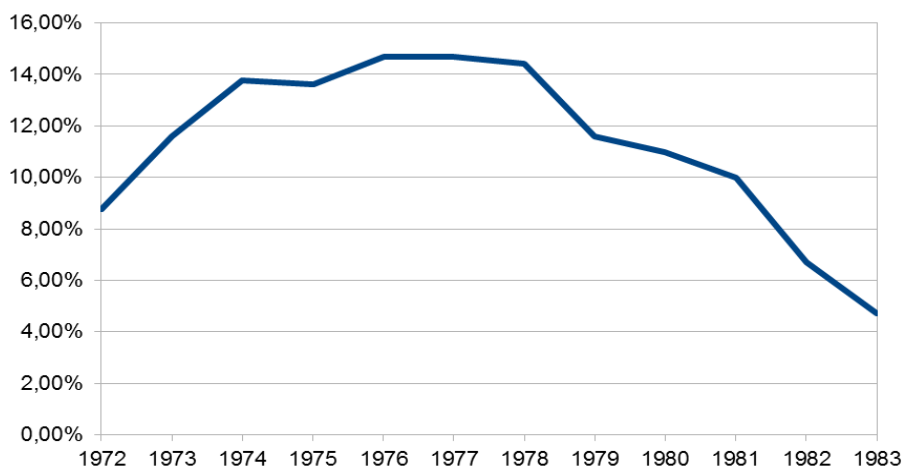
In this section I discuss and present some data regarding the taxation system in Bolivia. I tried to find data on the actual tax rates and how they have varied but I did not find this information. Instead, a measure of the relation between total tax revenues and GDP per capita is used. Moreover a discussion about the

size of the tax base is included, referring to the high informality in Bolivia.

The two graphs here display the relation between tax revenues and GDP per capita. Since a large share of the Bolivian private sector is informal and the

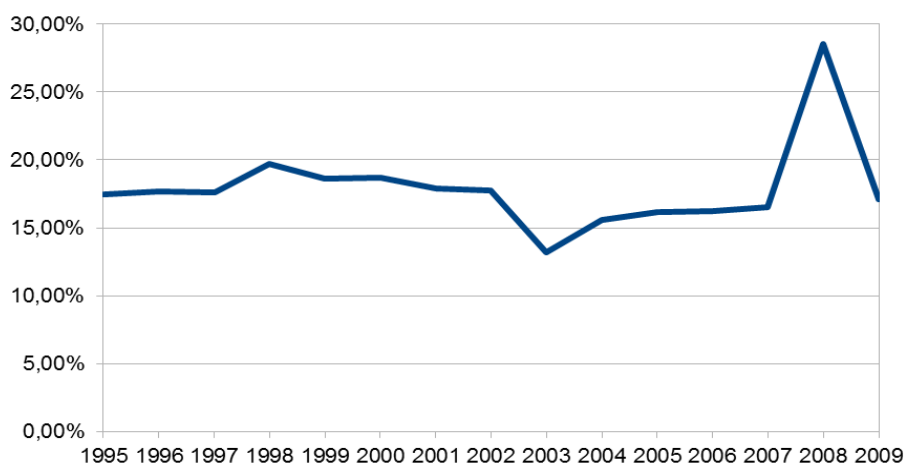
resource sector is not, the expected outcome during a resource boom should be that the ratio increases. This since the driving sector of the boom also is one that contributes a lot to tax revenues in comparison with other sectors. When there is no boom, but rather a constant

**Figure 18: Tax revenue as share of GDP, 1972-1983**



*Source: Data from BCB, Memorias Anuales (1972-1983) and data on GDP from INE, Anuario Estadística (1970-1985)*

**Figure 19: Tax revenue as share of GDP. 1995-2009**



*Source: Data from UDAPE Dossier de Estadística (2010) and data on GDP from INE, Anuario Estadística (1970-1985)*

dependency on the natural resource sector, this ratio should remain constant. What the data shows is that during the 72-83 period there was at first an increase, indicating an actual increase in importance of tax revenue from the non-tin sector. However the relationship later dropped again. Over the whole period the variation is not very significant. During the 1995-2009 period however the relationship is very stable, except for the year 2008. This should indicate that tax revenues from other sectors than the resource sector have, relatively, lost importance during the period. Still, there is no question of a collapse of the taxation system or a near non-existent taxation system, as in Chaudhry (1989). The reason for the very low numbers lies partly in the very high informality in Bolivia. Numbers suggest that informality was around 70 % during the tin period and around 65 % during the natural gas period, or, according to more conservative measures between 50-60 % during the tin period and just below 60 % during the natural gas period.

### ***4.3 Conclusion***

The hypothesis proposed in the end of section 4.1, is partly confirmed in section 4.2. Most of the findings go in line with what the analysis of the appropriability during the two periods suggested. Below, I will go through the effects of the resource curse presented above, both in order to establish which, if any, of the resource curse symptoms have been present in Bolivia and to test which period is affected worse.

The fiscal accounts indicate a high measure of appropriative behavior within the government during the first period and no such behavior during the second period. This is arguably one of the most important and interesting findings as this is part of the root of the problem associated with natural resource dependency. This rent-seeking behavior is likely to affect many other parts of the economy due to inefficient use of resources. Possibly this can also lead to spreading of rent-seeking behavior throughout the economy and loss of trust in the government. The findings from the first period suggest that the ruling power had a strong direct control over fiscal processes, which is not surprising since Bolivia had autocratic rulers over a large part of the period. This may also be a part of the explanation for why the manufacturing sector did not develop over this period. With a high degree of control the ruling power could have created a delayed modernization, as described in Isham et al (2004), by diverting away investment from regular industry and towards the natural resource sector, in which the state has a high degree of control. During the second period however,

as mentioned, there are no indications of appropriative behavior when considering the fiscal accounts. This is an impressive improvement in comparison with the previous period. However, it seems likely that rent-seeking has simply been forced to find other channels to go through since the institutions have changed; the poor rating of 2.8 in the Corruption Perception Index indicates that this sort of behavior has not vanished from the Bolivian elite.

Regarding education, Bolivia has not suffered the effect of insufficient focus on education. The spending is steadily increasing over both periods, as are the results, in terms of average years of schooling and secondary school enrollment. Also, in comparison with other countries in South America, Bolivia performed just below and far above average in the two measures respectively. This is a bit surprising when considering that Bolivia is not only a resource dependent country but also one of the poorest countries in South America. In the light of this it performs very well over both periods. This has likely to do with the strong tradition of collective organization among workers and other societal groups. In comparing the two periods the data shows that the increase in spending on education and also in the quality of education was higher during the natural gas period showing that education has held a more important position in this period. This goes in line with what was suggested in section 4.1.

The hypothesis is also confirmed when considering the findings on social conflicts in Bolivia during the two periods. As was predicted, social conflicts have been more numerous during the natural gas period, and they show a fairly clear correlation with the growth in the natural gas sector. During the tin period on the other hand, social conflict is much lower. This was attributed to the autocratic regimes during the period, in Laserna et al (2008). However I would argue that the windfall gain associated with the quick rise in income from the natural gas sector in comparison with the steady income from tin may also play a part in explaining this difference.

Finally the taxation effect also follows the hypothesis. During the tin period tax pressure was around 13-14 % during most of the years although it varied some. The numbers for the natural gas period are higher, between 15-20 %. This indicates that the taxation system was better constructed for collecting tax during the natural gas period. The informality is about as high during both periods, remaining as a pressuring issue for the Bolivian economy.

To conclude it can be said that Bolivia has experienced natural resource curse effects during both these periods and during the natural gas period, and despite improved institutional conditions and

dependency on a less appropriable resource, it has only managed to avoid some of the effects present during the tin era and some others have even become stronger. Looking forward the most dire need seems to be for improved institutions; this will be discussed further in the next and final section.

## **5. Implications for the future**

Looking towards the future it is obvious that many challenges remain to be faced by Bolivia. As mentioned previously in this paper Bolivia is expected to start exporting lithium in the future apart from the natural gas. Furthermore, in recent years the mining sector has experienced a rebirth with increasing world market prices for many minerals. Some of the problems that Bolivia faced in the 1970's seem to have been greatly reduced in more recent years. Spending on education in Bolivia is now at a higher level. Other measures of education and the data also indicate that a large part of the appropriative activity within the government has decreased significantly. However many problems remain. The manufacturing sector in Bolivia is very underdeveloped, a problem that was brought up in many of my interviews as one of the greatest obstacles to development in Bolivia. Social conflicts are still numerous and widespread with high costs for society. It is very important for Bolivia to try to find more democratic ways of voicing dissent. The informal sector is still very large and, thus, the tax base still small. With the expansion of the natural gas sector, the rebirth of the mining sector and the prospect of lithium exports, the natural resource dependency of Bolivia does not seem to be diminishing. The problems which remain today will need to be resolved if long-term sustainable development is going to be secured. As was mentioned by several interviewees during my field study, the handling of the current natural gas boom cannot be properly judged until the system has been tested through decreasing prices. To manage the economy during the boom is not very difficult, but to avoid a backlash when the boom ends is what is important and proper policy decisions are needed in order to do this. Bolivia should, for example, aim at creating a larger and more competitive manufacturing industry and also reduce the informal sector so that the tax base is larger. This is important for the possibility of gathering information about the economy and also to be able to affect more people through economic policy. Another important issue is to learn from historical mistakes. For example a very urgent issue for the government is to take care of the problem associated with the fuel subsidy before it grows out of proportion, like what happened with

the food subsidy during the tin era. With the right governance Bolivia should have every chance to lift itself out of poverty with the help of the wealth of its natural resources. One of the more positive findings in this study was the improvement in the handling of the fiscal accounts. All the negative appropriative behavior that the fiscal accounts suggested during the tin period have been remedied or even reversed. If these findings truly reflect reality, meaning that Bolivia has managed to heavily reduce the extent of rent-seeking activity within the government, this is a big step towards being able to turn the natural resource curse into a blessing.

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Karl Heinz Ampuero Puerta - Economist in the energy and mining department at UDAPE.

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