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Bolivia's Binding Constraint to Growth: A Growth Diagnostic

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Abstract

This paper presents a growth diagnostic to determine the binding constraint to growth in Bolivia, particularly in light of the political and economic events of the past decade. Answers the question: can a decade of land reform, nationalization, wealth redistribution, and other socialist reform policy reverse the previous decades' lackluster and often negative growth in South America's poorest nation? Prior to 2006, Bolivia's growth strategy largely adhered to *Washington Consensus* reform and studies around this time suggested that the binding constraints to growth were macroeconomic instability and poor appropriability. The election of Evo Morales - a populist, leftist, indigenous coca farmer, and member of the *MAS* (Movimiento al Socialismo) party - in 2006 marked a leftward-turning point in political and economic policy that has often defied the conventional wisdom on growth strategy. Despite this, the Andean nation has generated unprecedented economic growth and reductions in poverty. The question that remains for many is whether and how the nation can sustain its current growth and escape the cycle of boom and bust that so often plagues Latin American countries. Findings are compared and contrasted with a 2006 diagnostic by an economist at the World Bank. The research concludes that low appropriability of returns is the binding constraint, resulting from corruption, distortionary taxes and uncertainty about government appropriations and property rights.

1. Introduction

From its stark, glacier-capped Andes mountain ranges in the west to its dramatic descent into the lush Amazonian basin to the east, Bolivia's geography serves as an apt metaphor for many of the contrasts that characterize its history, culture, politics and economics. It is South America's poorest nation, with a GDP per capita $7236 (PPP, 2016 USD)[1] and ranks 118th (of 188) on UNDP's Human Development Index at 0.674[2]. Yet it possesses some of the deepest reserves of natural resources such as tin, natural gas, gold, and lithium. The country has long been characterized by deep inequalities, particularly among its large rural and indigenous populations which comprise 30.7% and 20% of the total population[3]. According to 2016 estimates, Bolivia has a Gini coefficient of 47.0 - a Gini coefficient of 0 represents absolute equality and 100 represents absolute inequality - placing it as the 28th least equal among 150 countries ranked by the CIA[4].

Following a series of deep political and economic crises in the 1970s and early 1980s, Bolivia instituted a number of reforms to stabilize the economy and remove barriers to positive growth[5]. These *Washington Consensus* reforms were a slate of policy prescriptions that included, among other things: privatization of markets, liberalization of trade, lowering of taxes, fiscal policy discipline deregulation and a market orientation. Despite some overall economic improvements (Table 1.1), the reforms tended to distribute benefits unequally, exacerbating already present socioeconomic divisions within the country[6]. Subsequent opposition and instability in the late 1990s led to a steady reversal of these policies over the next decade and economic growth slowed[7].

Table 1.1. Selected economic indicators 1981-2005 (Jemio M.)

	1981-1985	**1986-1990**	**1991-1995**	**1996-2000**	**2001-2005**
GDP growth (% change)	(2.35)	1.81	4.20	3.89	2.53
Per capita GDP growth rate (% rate)	(4.57)	(0.51)	1.82	1.44	0.26
Inflation rate (% change)	732.73	25.15	11.06	5.11	3.36
Devaluation rate (% rate)	678.44	35.81	8.70	5.19	5.48
Current account balance (% of GDP)	(8.27)	(3.40)	(4.80)	(6.20)	0.70
Fiscal balance (% of GDP)	(15.96)	(5.30)	(3.90)	(3.50)	(6.30)
Investment rate (% of GDP)	14.67	12.60	15.60	19.10	13.40
FDI flows (million US$)	26.06	36.10	167.10	740.10	272.80
Open unemployment rate (% of labor force)	13.51	15.06	4.84	5.49	7.54
Productivity growth rate (% change)	(4.00)	(0.94)	0.97	2.50	(0.65)

By 2005, Bolivia's per capita GDP growth rate over the past 45 years was less than half that of other Latin American and Caribbean nations, high income countries excluded[8]. With this as a backdrop, Sara Calvo - then working with the World Bank - undertook a study to determine the principal constraint to growth in Bolivia, using a methodology called *Growth Diagnostics*. Her findings concluded that slow growth was a result of "stubborn uncertainty about future private returns" due to "macro-financial instability, poor enforcement of contracts and property rights"[9].

At this same time, my own experience in Bolivia was beginning. After an early morning flight into La Paz, my sister and I walked from our hotel to a meeting at the U.S. Embassy. I was dressed in a crisp, black business suit and tie, and the contrast between myself and the people on the streets could not have been more stark. I had known - academically speaking - that Bolivia was impoverished and faced enormous development challenges; after all that was why we had begun our work building libraries. Nothing had prepared me for the poverty I encountered that day and throughout my stay. I was embarrassed and ashamed at my own privilege among so much poverty. *Why*, I wondered to myself in a question that has followed me since that day, *was I so much more fortunate than these people?*

Since my initial visit, and since Calvo's report, Bolivia has undergone significant - perhaps even radical - political and economic change. In 2006 MAS (Movimiento al Socialismo), a far-left socialist party, assumed control of the government under the leadership of Evo Morales, the first indigenous leader of Bolivia (or all of South America, for that matter). Since, the growth rate of per capita GDP has been more than double that of Latin America and the Caribbean (again, excluding high income countries) and while inequality remains high, its Gini co-efficient has declined from 58.5 to 47.0[10]. This past summer, I visited the cities of Sucre, Cochabamba and Santa Cruz. It was impossible not to notice a sizeable increase in economic activity: new condominiums and office buildings rising against the skyline where once there were only low-lying adobes precariously hugging the steep hillsides, new cars from China and Brazil where once there were "hand-me-downs" at least 30 years removed from the factory line, and clothing stores with familiar brand names like Nike or Adidas (with very U.S. price tags).

And so with this in mind, we will will ask - and endeavor to answer the question - has Bolivia remedied the binding constraint that Calvo found, and if so *what is its most binding constraint to growth*, now ten years later?

2. Methodology

2.1. Growth diagnostics

Bolivia is not the only nation for whom Washington Consensus reforms failed to produce sustained economic growth. But, while it is perhaps easy to criticize Washington Consensus reforms in hindsight, Dani Rodrik suggests that the failure of these reforms to ignite growth is often not because the reforms themselves are erroneous, but because they are often implemented in the absence of context[11]. In the introduction to Growth Diagnostics he writes, along with Ricardo Hausmann and Andrés Velasco:

> "Most well-trained economists would agree that the standard policy reforms included in the Washington Consensus have the potential to promote growth. What the experience of the last few decades has show, however, is that the impact of these reforms is heavily dependent on circumstances… Policies that work wonders in some places may have weak, unintended, or negative effects in others."[12]

Growth Diagnostics, is a framework that allows us to understand and analyze potential constraints on an economy - in the context of that particular economy. The goal of such an approach is to determine the *most binding constraint* on the economy, and to recommend policy action that would be most effective at eliminating or at least mitigating that constraint. This binding constraint is the distortion of which "the removal would make the largest contribution to alleviating the constraints on growth"[13].

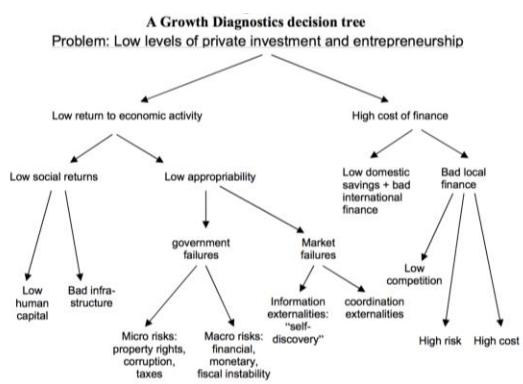

Figure 2.1. Growth Diagnostics Tree (Hausmann, Klinger & Wagner, 23)

2.2. What makes a constraint binding

Working through the nodes on the tree shown in Figure 2.1 above, we attempt to discern the binding constraint - or, perhaps more appropriately - we attempt to reject the hypothesis that a given node is the binding constraint on an economy. In order to assert that a constraint is binding, Hausmann, Klinger, and Wagner[14] propose four properties we should look for:

1. "The (shadow) price of the constraint should be high"[15]. If a constraint is binding (i.e., limited by supply), then it is not enough to observe that the quantity supplied is low. We should also see that the equilibrium price is high, signalling a supply rather than a demand constraint. For example, if poor highway infrastructure were the binding constraint, we might expect to see that costs to ship products were high relative to a country's peers.
2. "Movements in the constraint should produce significant movements in the objective"[16]. We should be able to observe in the data evidence that either the tightening or loosening of the constraint should correspond to growth. Taking our example of transportation, we might expect that an expansion of highways would generate growth.

3. "Agents in the economy should be attempting to overcome or bypass the constraint"[17]. If the constraint is binding, then private markets would respond by finding other avenues to accomplish their agenda. Again, if highway infrastructure were a binding constraint, we might expect to see unusually high demand for freight or air shipping.
4. "Agents less intensive in a binding constraint should be more likely to survive and thrive, and vice versa" [18]. If a constraint were to be binding, then we would see those in industries most likely to be impacted by the constraint underperforming those in other non-constrained industries. Agricultural producers would likely be heavily constrained by inadequate highways and would underperform, say, telecom providers.

Sara Calvo's 2006 growth diagnostic paper affords us a serendipitous opportunity to analyze the present binding constraint to growth in Bolivia in light of MAS party governance and reforms. Throughout this paper we'll endeavor to contextualize it in such a manner in the hopes of understanding how the landscape of Bolivia's economy has changed since 2006 and what that might mean to its future growth potential.

In order to understand the relative context of Bolivia's economy, and for illustrative purposes, we identify four other countries as part of its "peer group": Ecuador, Guatemala, Uruguay and Paraguay. All four of these countries are in Latin America, have relatively small populations and as of 1950 had not entirely dissimilar GDPs (Table 2.2).

Table 2.2**.** Peer group countries, 1950-2015.

	1950		**2015**				
	Population (millions)	Real GDP (millions, 2011 USD)	Population (millions)	%Δ	Real GDP (millions, 2011 USD)	%Δ
Bolivia	2.8675728	12002	10.561887	268.3%	63611	430.0%
Ecuador	3.4451625	10084	15.902916	361.6%	173538	1620.9%
Guatemala	3.0587508	9848	16.015494	423.6%	111394	1031.1%
Paraguay	1.5136575*	3828*	6.552518	332.9%	54652	1327.7%
Uruguay	2.1835043	14395	3.419516	56.6%	65489	354.9%

*Data shown from 1951 (Penn World Tables)

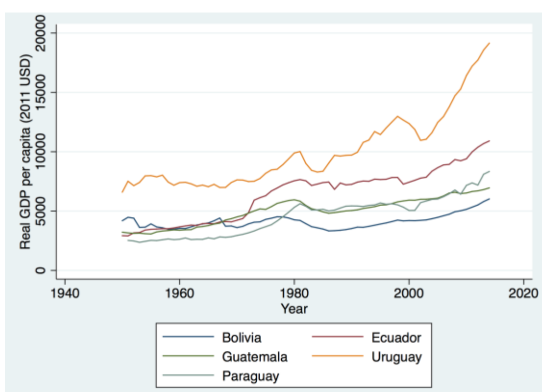

Figure 2.3. Real GDP per capita (Penn World Tables)

Despite these similarities, Bolivia's economic performance has lagged that of its peer group (Figure 2.3). In order to understand these countries contextually, we'll have a brief look at each and noting similarities or dissimilarities with Bolivia:

Ecuador, located in the northwest corner of South America, shares with Bolivia a heavy dependence on extraction-based exports; in its case, petroleum which accounts for more than half of its exports. Other industries include food processing, textiles, wood products, and chemicals. Unlike Bolivia though, Ecuador has ample ocean access and Quito is a major maritime port[19].

Contrastingly, the economy of Guatemala is largely agricultural, and while from its location just south of Mexico it has sea access on both the east and west coasts, its ports are not major shipping hubs. Like Bolivia, it is among the least developed nations in the western hemisphere, with high levels of extreme poverty and income inequality[20].

In some ways Paraguay is the most similar to Bolivia, also carved out of central South America with no maritime access - indeed the northwest border is shared with Bolivia. But, its exports are primarily agricultural, but also include textiles, wood products and electric power. It too suffers high rates of inequality and extreme poverty.

Several hundred kilometers southeast of Paraguay on the coast between Argentina and Brazil lies Uruguay. With a heavily export-oriented economy largely centered on agricultural products,machinery, equipment and petroleum products, Uruguay also began the 1950s with a small population and rather low GDP per capita, but now appears to stand out among the peer group with its relatively high GDP per capita and low inequality - perhaps making it a comparative success story in some ways.

Of course, we must also understand the economy and history of Bolivia, and so in order to begin our diagnostic, we will first address the question of context[21], and indulge a brief history of Bolivia in order to understand the political and social context the country currently occupies[22].

3. A brief history of Bolivia

In response to a diplomatic slight, Queen Victoria is said to have once declared that the nation of Bolivia "no longer exists" and struck it from the map. Indeed, the modern reader might be surprised to learn that this poor and somewhat obscure Andean nation was once very near the center of global commerce and trade.

Encompassing a region of South America about one and a half times the size of the U.S. state of Texas, modern Bolivia is landlocked between (clockwise from the north) Brazil, Paraguay, Argentina, Chile and Peru. It's diverse geography includes two Andean mountain ranges, the *altiplano* (an expansive high altitude plain that spans between ranges), Amazonian rainforests, and desert plains. While the indigenous people of Bolivia come from many different tribes, they are most often classified by their native language: either Aymara or Quechua. Abundant in natural resources, it seems almost inevitable that the region would attract the notice of Spanish conquistadores in the early 16th century. Over the next two centuries, the Spaniards would extract enormous amounts of silver and gold, accounting for as much as half of the world's supply in the late 16th and early 17th centuries[23]. The epicenter of mining, Potosí, grew rapidly and reached a population of 100,000 to 150,000[24]. By the seventeenth century, Potosí "had become a world-class city, rivaling London and Paris in size and crammed with fortune seekers from all over Europe"[25]. The cost of this growth was deadly for the indigenous population, as an estimated one to four million miners may have died in the mines and as many as 90% of the population may have died as a result of contact with European conquest and disease[26].

Suffering thus under European rule and subjugation, added to which was a depression and crisis in agricultural output, Bolivia (then known as Upper Peru) in 1809 became one of the first countries to join the Bolivarian revolution[27]. After fourteen years of conflict, it would formally declare its independence on August 6, 1825, taking up the name Bolivia in honor of *El Libertador*, Simon Bolivar. By this time, Bolivia's famed mining economy had all but collapsed from the long conflict and destruction of capital. Added to this, protectionist measures installed by the nascent government and the absence of previously-received Imperial subsidies for the mining industry prompted the closure of as many as 60% of its refining mills and mines between 1803 and 1825[28].

Tragically, for the indigenous people of Bolivia, liberation did little to improve their lives, economically or otherwise. The stagnation of the mining industry would prove persistent and "fatal for sustained growth in the national economy"[29]. Even when the mining industry eventually recovered - and later surged with the discovery of tin in the late nineteenth century - it did so under the control of wealthy elites who were adept at influencing government policy to retain their oligarchy[30]. As such, the next century was characterized by constant tension and strife between mining interests, workers, indigenous peoples and the occasional would-be reformer. The resulting social unrest and seemingly constant regime change would earn Bolivia what Farthing and Kohl call "the dubious distinction of having one of the highest number of coup d'etats in the world"[31] with social movements "among the world's most militant"[32].

In the 1930s, Bolivia fought a bloody and unsuccessful border war (the Chaco War) with Paraguay which led to political turmoil and a rapid succession of coups. In an effort to consolidate popular support, then-leader Colonel David Toro nationalized the full Bolivian assets of the Standard Oil Company without compensation, placing the petroleum industry under complete state control. This would be the first among a series of moves that would lead to nearly half of Bolivia's economy being under state-control following the nationallzation of mines following a revolution in 1952[33].

In the late 1970s, following about a decade of junta governments, Bolivia's economy collapsed into a deep depression, largely as a result of poor fiscal management, mounting debt, high unemployment and low discoverability[34]. Hyperinflation took hold and GDP growth per capita declined sharply through the 1980s, bottoming out in 1983 at negative 6%[35].

Under newly elected President Paz Estenssoro, a decree was issued in 1985 that devalued the currency, established a floating exchange rate, eliminated price controls and heavily curtailed government spending[36]. Thus by the late 1990s, Bolivia became "the top economic reformer of Latin America"[37]. These measures stabilized the economy, but only generated meager growth[38]. Meanwhile, mounting political pressures from a coalition formed among coca growers and the increasingly empowered rural and indigenous populations - both of whom resented liberalization and U.S.-led interventionism - forced a movement towards reversal of reforms and an already tepid growth rate ground to a halt[39].

Evo Morales was elected in 2005 on this wave of nationalism and anti-imperialism, and with his MAS party immediately began his own *Proceso del Cambio*, beginning with signing into law the Impuesto Directo a los Hidrocarburos (IDH) law, which effectively nationalized Bolivia's natural gas industry with a 50% royalty on all extraction. By 2013, state control of the economy had increased from 8% to 34% under his regime[40]. In 2007, the government ratified the National Development Plan, built on the tenets of macroeconomic and financial stability, stable employment growth and social inclusion[41]. Morales used the increase in government revenue from both this and the commodities boom to pay reduce government debt, increase foreign currency reserves, increase public infrastructure spending and fund a massive income redistribution program to reduce inequality. Enjoying widespread popular support, Morales was easily re-elected in 2009 and in 2014. Since 2014 however, the global commodities collapse has led to a decrease in government revenue, and with a significant deficit the administration has tapped into its reserves in order to preserve current spending levels and, presumably, the popular support of their agenda. Despite this, Bolivia's growth has continued and it has achieved measurable reductions in inequality [42]. In 2016, the administration released the latest version of its development plan, the Patriotic Agenda 2025, with 13 pillars including the eradication of extreme poverty, socialization and universalization of basic services, "communitary" financial sovereignty as well as environmental, natural resource and food sovereignty, diversified development and transparency of governance[43].

4. Growth Diagnostic Analysis

4.1 High costs of finance

Referring back to our growth diagnostic chart (Figure 2.1) the framework holds that low levels of private investment can be driven by either low returns to investment or high costs of finance. If the binding constraint to growth in Bolivia were the cost of finance, then we would expect to see behavior that satisfies the four properties of binding constraints. In her 2006 study, Sara Calvo observed low access to credit and cautionary lending by banks due to "high macroeconomical policy risks" and low interest rates with relatively high spreads, but was "unable to conclude unambiguously" that the high cost of finance represented the binding constraint on Bolivia's growth[44].

First, we can look at the shadow price by examining the interest rate spread -- the difference between the lending rate and the deposit rate. If we were to see a high interest rate spread this would be, in effect a shadow price on lending activity - indicating that low lending is also accompanied by a high price on lending and thus suggesting a supply constraint. We can see in Figure 4.1 that this spread is low, particularly relative to Bolivia's closest peer countries. Over the past several years it has hovered between 6.5-6.75%, implying a general willingness among banks to supply lending at favorable terms.

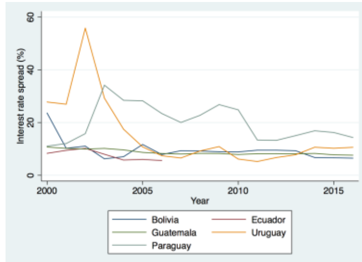

Figure 4.1. Interest rate spreads 2000-2016 among selected Latin American Countries. Note: recent data for Ecuador was not available. (World Bank Open Data)

Indeed, we can see from Figure 4.2 that Bolivia has a low movement in GDP as a function of increased domestic credit, which helps us to consider the second property of a binding constraint: that a movement in the constraint should produce a large movement in the objective. If the cost of finance were the binding constraint, we would expect that a lowering of the cost would produce an increase in credit and that the additional credit would lead to a significant increase in GDP.

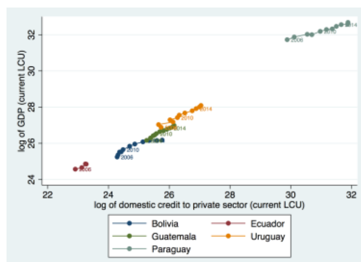

Figure 4.2. Relative changes to domestic credit and GDP at LCU. (World Bank Open Data)

Both the shadow price and the relative movements between finance costs and GDP seem to suggest that we can reject the cost of finance as the binding constraint. However, two more properties remain for us to examine.

If the high cost of finance were the binding constraint, then we might expect to see agents attempting to bypass or overcome the constraint. In this case, we might look to foreign direct investment (FDI) as a proxy measure; in the case of high finance costs, we might expect to see a significant amount of FDI as businesses look across borders to secure capital. As we can see in Figure 4.3, it does not appear that Bolivia has an unusual amount of FDI relative to its peers and in fact it has declined since 2006.

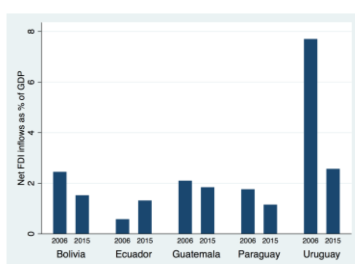

Figure 4.3 Net FDI inflows (World Bank Open Data)

Finally, if high costs of finance were the binding constraint, we would expect to see that less credit intensive businesses thrive relative to more credit intensive businesses. To examine this, we can look at the value added by more labor intensive sectors such as agriculture and services in comparison to that added by more capital intensive sectors such as manufacturing and other non-manufacturing industry. As we can see by looking at the percentage of value added by each sector (Figure 4.4), Bolivia's capital intensive industries occupy the median position among its peers.

It is perhaps important to note that non-manufacturing industry includes Bolivia's substantial hydrocarbons sector. As it is largely state-owned, its value added may not be indicative of the high cost of finance as a constraint, and may in fact mask greater relative performance in less capital intensive sectors. To tease this apart we can look specifically at a timeline of Bolivia's sector contributions since 2000 (Figure 4.5), bearing in mind that the nationalization of most hydrocarbon resources took place in 2006.

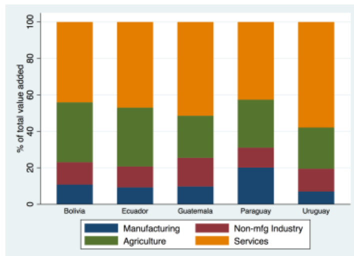

Figure 4.4. % value added by sector (World Bank Open Data)

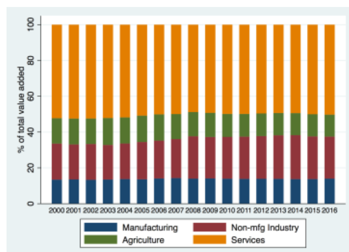

Figure 4.5. % of total value added among leading sectors in Bolivia (World Bank)

As we can see - and might have hypothesized - there is a subtle transformation in 2006, however it does not appear to have radically distorted the relative value added by each sector.

Having established that (1) the cost of finance (the shadow cost) does not appear to be high, (2) that movements in the cost of finance produce little movement in our GDP objective, (3) that there is no significant evidence that agents are attempting to bypass finance costs, and (4) that more credit-intensive businesses do not seem to be significantly underperforming less credit-intensive businesses, we are now prepared to reject the hypothesis that the high cost of finance is the binding constraint to growth in Bolivia. This seems to be corroborated by the Global Competitiveness Report (2016-2017)[45], which ranks Bolivian financial market development 76th among 138 countries. This places it just above the median ranking for its peer group, bounded at each extreme by Ecuador (113) and Guatemala (18).

This can be easily contrasted with findings Calvo encountered in the 2003-2004 Global Competitiveness Report[46], which ranked Bolivia poorly in several measures of the financial system. In a later report (2006-2007)[47], respondents to the survey ranked "access to financing" as the "most problematic factor for doing business". Much of Calvo's ambiguous assessment on this point appears to have centered by questions of underlying macroeconomic instability and uncertainty. It may now be easier to reject this hypothesis due to improvements in some aspects of the macroeconomy during the intervening period, most notably prudent fiscal and monetary policy. These improvements - which we will attend to in more detail later - have likely reduced the risk premium lenders require as well as allowed for a less volatile backdrop against which we can evaluate the data.

4.2. Low social returns

Having now rejected the hypothesis of high costs of finance as the binding constraint, we will now turn to the leftward side of the diagnostic tree shown in Figure 2.1 to determine what might be driving low returns in Bolivia. We'll begin by considering whether low human capital is the binding constraint to growth.

4.2.1. *low human capital*

According to the most recent Global Competitiveness Report[48], Bolivia's educational system is weak, as shown in Figure 4.6. Measures of enrollment are perhaps on par with those of its peer groups, but in indicators such as quality or underlying factors such as internet availability in schools and teacher training, it lags far behind. As we can see in subsequent Figure 4.7, Bolivia boasts somewhat high rates of enrollment in secondary schools, confirming a possible problem with the quality of education. Respondents to the Global Competitiveness Report ranked "inadequately educated workforce" as their sixth most problematic concern (2016)[49].

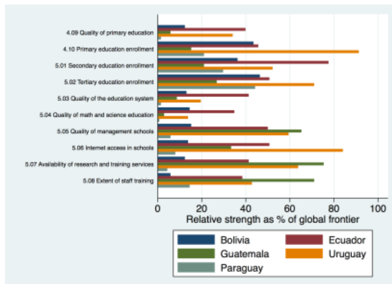

Figure 4.6. Relative strength in selected measures of education, indexed from ranked data. (Global Competitiveness Report, 2016-2017)

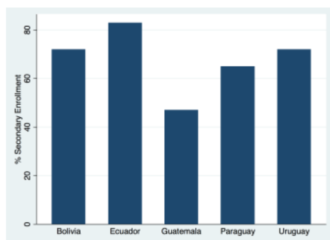

Figure 4.7. Secondary enrollment as a percentage of eligible students. Data shown for Paraguay is 2012, Uruguay 2010, all others 2013. (UNICEF)

Despite these high enrollments, it might be tempting to quickly conclude that poor education points toward low human capital as the binding constraint, given the low rankings in the Global Competitiveness Report. However, once again we must look to the four properties of a binding constraint to properly evaluate the consideration.

Again, first we will examine the shadow price of the constraint on the objective function. In this case, we can look at the effects of additional years of schooling on one's earnings potential. As we can see in both Figure 4.8 and Figure 4.9, the returns to education in Bolivia are extremely low in comparison to its peer group - a discrepancy that has grown significantly since 2006 when Calvo found already low returns to education (16). In a look at returns to education in Bolivia, a senior researcher at INESAD (Instituto de Estudios Avanzados en Desarrollo: an economic development NGO in Bolivia) concluded that returns to education are "alarmingly close to zero", citing in particular the low quality of schooling[50].

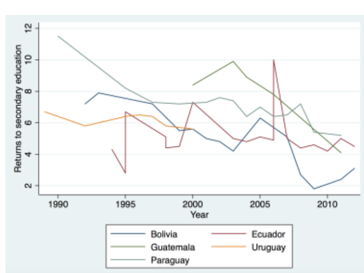

Figure 4.8. Returns to secondary schooling. Compiled from World Bank data by Claudio E. Montenegro and Harry Anthony Patrinos (2014). The y-axis indicates the percentage increase in income for each additional year of schooling at the given level

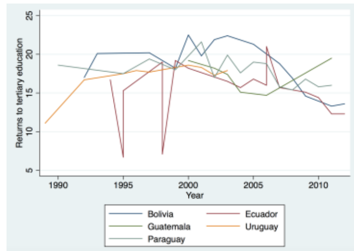

Figure 4.9. Returns to tertiary schooling. Compiled from World Bank data by Claudio E. Montenegro and Harry Anthony Patrinos (2014). The y-axis indicates the percentage increase in income for each additional year of schooling at the given level.

Still, unemployment rates are reasonably low for all educational attainment groups (Figure 4.10). Unemployment among those with a secondary education stands out as noticeably lower than Bolivia's peers, whereas unemployment among those with tertiary education is a little higher than the median as of 2015 (no data was available for Bolivia from 2016).

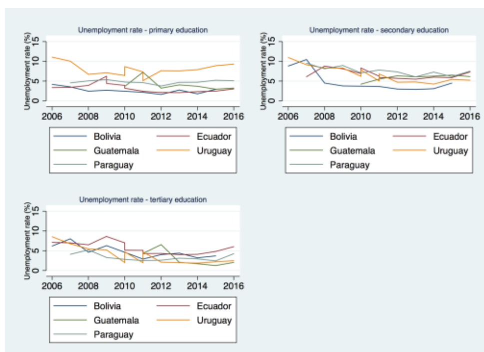

Figure 4.10. Unemployment rates by educational attainment. (ILOSTAT)

According to Hausmann, Klinger & Wagner, yet another method of ascertaining whether education is the binding constraint is by looking at skilled labor inflows (Appendix I). Even though Bolivia's overall population comprises barely more than 1% international migrants[51] - very low relative to most of its peers - and that a relatively high number of educated Bolivians compared to the similarly educated workforce emigrate to OECD nations (Figure 4.11), it seems unlikely that businesses are attempting to overcome a skilled labor shortage by importing talent. The Global Competitiveness Report ranks Bolivia 114th and 117th in capacity to retain talent and attract talent, indicating that "brain drain" is a significant problem[52].

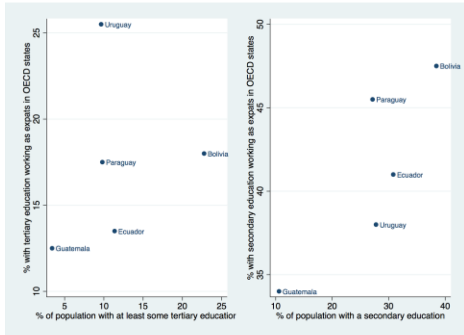

Figure 4.11. Educated workforce outflows to OECD states as related to the educated population in Bolivia, 2009.
Note: population data for Guatemala is from 2006. (World Bank, Simões & Martínez)

And so, despite problems with the quality of education, we can likely reject the hypothesis that low human capital is the most binding constraint to growth in Bolivia. Calvo reached a similar conclusion in 2006, also noting that while the quantities of education supplied were relatively high, quality was of concern - and it appears it remains so today.

4.2.2. poor infrastructure or geography

As a landlocked nation, Bolivia faces significant disadvantages. Difficulty of trade, distance to ports and reliance on passage through other sovereign nations lead to 57% lower GDP per capita and lower measures of human development in landlocked countries[53]. The loss of its coast in the Atacama border dispute with Chile remains a sore point among many Bolivians today, and in fact the promise to regain access to the ocean is a popular rallying cry among his supporters and has recently placed the dispute before the International Court of Justice. While there is little doubt that improved ocean access would provide a boost to Bolivia's growth, however given that Chile does provide Bolivia with free and preferential access to its sea ports of Arica and Antofagasta under terms of their 1904 treaty[54] we should examine whether lack of sovereignty over that access might be Bolivia's binding constraint.

Perhaps surprisingly, Bolivia's costs to transport are relatively low. The time and cost required to transport goods to Arica - including document fees, ground transportation, - are 6 hours and $750 USD, respectively[55]. In fact, the total cost to ship a freight container appear to be only somewhat higher than the median among its peer group (Figure 4.12).

Doing Business ranks Bolivia 98th out of 190 countries in "trading across borders" -- a ranking that is slightly better than the median for the peer group shown in Figure 4.13.

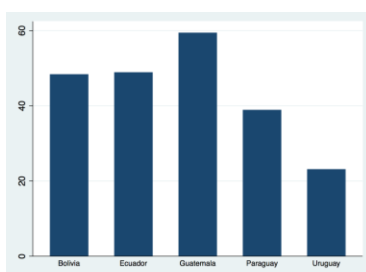

Figure 4.13. Trading across borders, indexed from ranking data of 190 countries (Doing Business)

If we were to accept that ocean access is the most binding constraint, we would also expect to see non-export businesses thriving in relation to export businesses. In fact, if we examine Bolivia's exports as a percentage of overall GDP (Figure 4.14) it stands out with a high share of its income derived from exports - certainly due in no small part to its hydrocarbons and minerals sectors. Referring back to figures 4.4 and 4.5 when we previously examined the relative contribution to value added by sectors, it is readily seen that despite the contributions of the extractive sector, there is no apparent distortion in sectors relative to other countries.

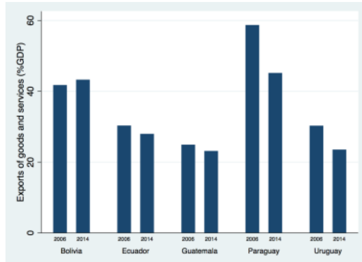

Figure 4.14. Exports as a percent of GDP (World Bank).

Aside from the obvious question of maritime access, we must now turn to considering the rest of Bolivia's transportation infrastructure. The vast majority of Bolivia's 90,000 kilometers of roads are unpaved[56], and with its rocky, mountainous terrain, its roads are subject to frequent washouts. *Blocados* - the closing of roadways - are a popular form of protest and occur commonly along major thoroughfares into and out of cities like La Paz. Still, the Global Competitiveness Report ranks their quality 105th among 138 countries[57]. The airline industry is a hybrid of both private and state-owned concerns and ranks slightly better at 96th[58]. The largest airline, BoA (*Boliviana de Aviación*) is state-run, having begun operations in 2009 and has increased passengers by 75% since[59]. In a country where it might typically take 11 hours by *flota* (bus) to travel between the capitals of La Paz and Sucre, the availability of affordable one hour flights is significant - and at prices that range between $45-65 USD[60], BoA has met that need. Railways in Bolivia are not a significant mode of travel for most people and many of them have fallen into lack of use and disrepair. However, there are still 3500 miles of rail lines[61] that serve to transport goods, the most important of which is the Antofagasta rail line that connects La Paz to the Chilean port of Arica[62] netting Bolivia a ranking of 92nd in quality of railroad infrastructure[63].

With 31% of its population living in rural areas[64] and its fragmented geography, access to basic infrastructure remains limited in some areas, although significant progress has been made under the Morales administration (Figure 4.15).

Doing Business ranks Bolivia 99th in "getting electricity", the 3rd strongest of its 11 performance indicators and a signal that existing limitations are limited in their impact on businesses ability to thrive[65]. Still, it behooves us to look at whether this infrastructure improvement corresponds with a significant increase in GDP. As we can see in Figure 4.16, there does not appear to be a strong correlation between electrification and GDP growth. Indeed, it appears that countries who were already close to their frontiers experienced the most growth, but whether that implies causation or that countries with strong GDP growth are in a better position to invest in electrification of more difficult regions is beyond the scope of this paper.

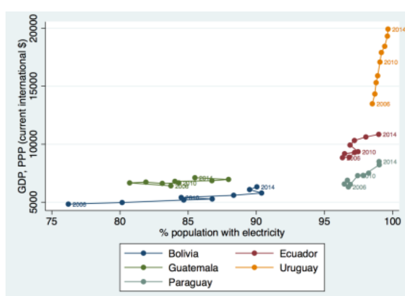

Figure 4.16. Gains in electricity access measured against GDP growth, 2006-2014. (World Bank)

A consistent cornerstone of the Morales administration's platform has been investment in public infrastructure - something it has clearly delivered upon. However, the evidence for its impact on growth is perhaps less clear: since 2005, spending on public infrastructure has increased from $326 million to $2.698 billion (constant USD) - a staggering eight-fold increase[66]. Meanwhile, per capita GDP has grown from $4180 to $7236 (constant USD) over the same period[67]. When examined against the backdrop of infrastructure spending since 1990, it appears that there may have been a stronger correlation between spending and growth in the nascent years of the administration, but the massive increases in spending since 2010 have achieved increasingly diminishing returns (Figure 4.17).

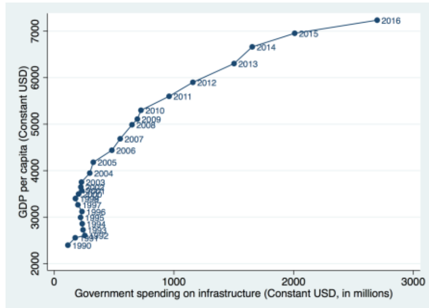

Figure 4.17. Government spending on infrastructure vs GDP per capita. (World Bank, INE)

The following Table 4.18 suggests that Bolivia's roadways remain underutilized. Air travel, while used regularly for passenger traffic, appears underutilized for freight traffic.

Table 4.18. Roadway & air system usage

	Vehicles per km of road	Km of paved roads (per 1m population)	Airports w/ paved runways (per 1m population)	Annual passenger traffic / population	Annual freight traffic (millions mt-km / population)
Bolivia	9	0.88	1.89	0.23	0.85
Ecuador	18	0.40	6.20	0.35	5.29
Peru	16	0.60	1.90	0.46	7.21
Costa Rica	20	2.05	9.53	0.33	1.88
Nicaragua	15	0.55	1.99	.01	n/a

Note: data was not available for Paraguay, Guatemala, nor Uruguay. Costa Rica, Nicaragua and Peru were chosen as surrogates for comparison. (Trading Economics, CIA)

Given the significant geographical constraints of the country it is hard to reject the hypothesis that infrastructure is the most binding constraint to growth. However, the data suggests that recent investment in infrastructure is approaching the frontier as far as gains in income. Calvo[68] also noted similar challenges: poor topography, low demand for current transportation networks, and low returns to roadway improvement. However, she also cited poor communications infrastructure - a component which we have seen measurably improve since 2006. Nonetheless, we will not reject this hypothesis until we have explored other possibilities, but acknowledge that it may be a weak one.

4.3. Low appropriability

4.3.1 market failures

Next we will look at whether market coordination problems or low self-discovery are implicating market failures and therefore low appropriability as Bolivia's binding constraint.

Using a slightly modified version of the approach Klinger & Lederman[69] introduced in 2004, we can identify "discoveries" by looking for large increases in commodities over a period of time. To do so, we first look for commodities whose sum exports totalled less than $2m USD in 1996, that subsequently increased by at least fivefold

- to over \$10m USD. We repeat the same for the period 1996 to 2016, this time increasing each threshold by 50% to account for a rough approximation of global inflation. In the initial period 1996-2006, Bolivia had five discoveries, three of which were agricultural and two of which were industrial. However, in the following decade, Bolivia only had one discovery: gold, for which exports increased from \$1.5m USD to \$75.6m USD. Meanwhile, as seen in Figure 4.19, its peers each had four or more discoveries during this period (Figure 4.19).

One way we can look at a country's discovery is by examining the quality of its export baskets in relation to the global market. Such an index - EXPY - was conceived by Hausmann, Hwang and Rodrik[70] and was later recommended by Hausmann, Klinger & Wagner[71] as an indicator of comparative advantage in trade across a range of products. We start by looking at the weighted contribution of each commodity in the country's export basket and compares it to the weighted contribution of the same commodity in the global export market. This is multiplied by the country's per capita GDP to product a measure called PRODY - in this case $PRODY_k$ represents the total productivity for each product *k* in country *j:*

$$PRODY_k = \sum_j \frac{(x_{jk}/X_j)}{\sum_j (x_{jk}/X_j)} Y_j$$

The top portion of the equation is simply the export value x_{jk} as a ratio of total export values for product *k* in country *j*, and the denominator is the sum export value x_{jk} as a ratio of product *k* in all countries. A higher PRODY value for a product means a more sophisticated product. Perhaps unsurprisingly, among Bolivia's highest PRODY value products are several of their extractive industries, such as natural gas, tin and other minerals and ores (Appendix II). Once PRODY has been calculated, the values are weighted according to the product's importance in the export basket and summed:

$$EXPY_i = \sum_l \left(\frac{x_{il}}{X_i}\right) PRODY_l$$

This final number, EXPY should tell us the overall export sophistication of a given economy, with a higher number representing a more sophisticated export portfolio. What's more, Hausmann, Hwang and Rodrik[72] found that countries' EXPYs tend to converge on their per capita GDP and that countries with a high EXPY relative to their GDPs tend to not experience constraints on growth because of export sophistication, while those with low EXPYs tend to experience slower growth.

Figure 4.20 shows the log of Bolivia's EXPY plotted against the log of its per capita GDP and set against a backdrop of other nations for illustration purposes. Clearly, Bolivia and its peer group have higher EXPYs relative to their per capita GDPs, implying that export sophistication is not a significant obstacle to growth.

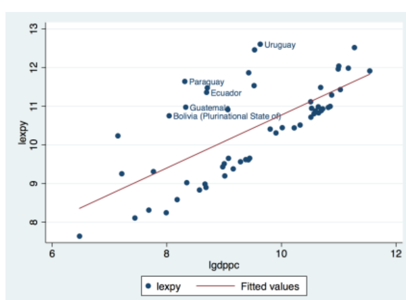

Figure 4.20. Log of EXPY vs log of GDP per capita (2016, current USD). Author's calculations using data from COMTRADE and World Bank.

Coordination problems can also be revealed by examining what Hausmann and Klinger[73] call the "open forest". Using the metaphor of a monkey who wishes to travel across a forest, they suggest that the monkey would have a much easier time doing so where the forest is dense. Much the same, countries who have similar or related goods to current exports face a greater degree of freedom in discovering and exploiting new activities. We can look at the product space thus, as mapped by MIT's Observatory of Economic Complexity (Figure 4.21). Activities nearer to the “trunk” expose the country to greater opportunity for discover and improve exports, while those in the more remote branches have fewer products to “jump to”. In the case of Bolivia, most of the 73 products (as shown by the dots) in which it possesses a comparative advantage lie in the latter, meaning it may face coordination problems.

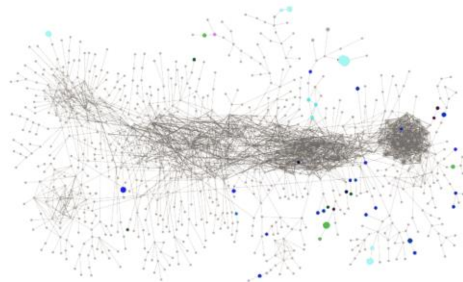

Figure 4.21. Bolivia’s product space. (Observatory of Economic Complexity)

A high correlation of growth and terms of trade, might also indicate low self-discovery as a binding constraint With high terms of trade, imports become cheaper and domestic production for those products slows. If GDP is heavily affected by the production slowdown it implies that producers are unable to discover substitute products. However, despite a significant fluctuation in terms of trade during both the commodity boom and subsequent crisis, there appears to be little correlation with GDP growth (Figure 4.22).

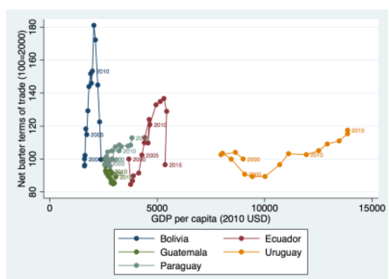

Figure 4.22. Changes in terms of trade relative to changes in per capita GDP (World Bank)

While Bolivia has coordination and discovery limitations, it appears unlikely that low self-discovery is the current binding constraint to growth since producers appear to be adequately prepared to move to adjacent products given recent shocks to terms of trade. Calvo reached a similar conclusion in 2006, and there seems little to suggest this has changed measurably.

4.3.2. government failures

4.3.2.1. micro risks

Having rejected market failures as a cause of low appropriability of returns, we now turn to the possibility of micro risks caused by government failure. These include corruption, taxes, poor property rights, and a history of expropriations.

4.3.2.1.1. corruption

Returning to the Global Competitiveness Report, corruption was perceived as being the most problematic factor for doing business in Bolivia in 2016, with 19.1% of respondents enumerating it among the five most problematic areas. This is up significantly from the 2006 report, which ranked it third after 12.8% of respondents selected it as one of their five most problematic areas. The same 2016 report ranked the overall "institutions pillar" as 133 out of 138 countries (Figure 4.23). The only four countries ranking lower were Burundi, Chad, Venezuela and Yemen.

Indeed, despite numerous pledges and legislation passed since 2006 in an effort to combat corruption [74], it continues to plague the current administration. According to World Bank's Worldwide Governance Indicators, the Morales administration has done little to combat corruption, with its percentile rank of "Control of Corruption" declining in the decade following 2006 from 39th percentile to 27th percentile[75]. Enterprise Surveys found that in 2010, nearly 60% of firms identified corruption as a major constraint[76].

Transparency International[77], which derives their data from the Global Competitiveness Report as well as 12 other sources, assigns Bolivia a somewhat more favorable ranking of 113 out of 176 countries surveyed - near the median for its peer group. Interestingly, this marks a small relative improvement since 2005 when the ranking was 117/158, and this may have to do with a rise in public perception following anti-corruption laws enacted by the MAS party in 2009[78]. Notwithstanding, Transparency International's assessment of corruption in Bolivia is clear:

> "Corruption in Bolivia is present at all levels of society. The judiciary, the police and the public administration more broadly are perceived as the most corrupt institutions of the country. Bolivia is dependent on its natural resources and this sector, worldwide, is notoriously prone to corruption."[79]

Asked the question "how much progress do you believe that they [the Bolivian government] have made in reducing corruption over the past two years", 22% of respondents answered "none", while 35% said "a little". Only 4.6% said "much"[80]. Interestingly, when examined in cross-section, there seemed little variation among MAS-party respondents and those unaffiliated or from opposition parties. When asked "have you known of or been a party to an act of corruption within the past two years", 82% of respondents answered in the negative. These findings conflict somewhat with those of Transparency International, which found that 57% of respondents felt that corruption had either *increased* a little or a lot over two years and among whom 52% and 38% admitted to a member of their household paying a bribe to the police or judiciary respectively[81].

The costs of bribery are not insignificant: according to data from Enterprise Surveys, the average expected value of a "gift" needed to secure a government contract was 2.3% in 2010, much higher than its peer group[82]. However, more recent data suggests that the administration may have made recent inroads in combating corruption, at least in terms of the cost impact of bribery - however similarly sharp declines were seen in Paraguayan respondents, and no data was available for either Ecuador or Guatemala. Other indicators, while down from 2006, are not as sharply down (Figure 4.24) It is early, then, to tell if this is an early indicator of the reduction of corruption and its impact on businesses.

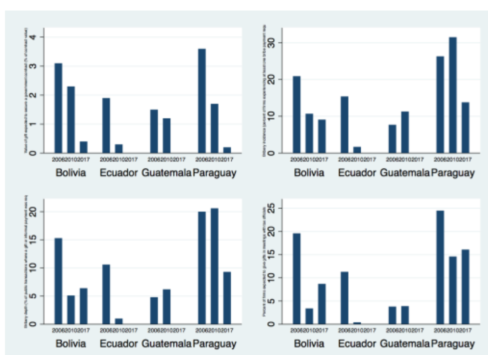

Figure 4.24. Prevalence and costs of bribery incidence, 2010. Data was not available for Uruguay. (Enterprise Surveys)

According to Transparency International, "the judiciary is traditionally the weakest branch of the Bolivian government and its independence continues to be restricted in practice". Moreover, it seems that the government's will to prosecute corruption among officials is often selective, targeting opposition party-members and occasionally its own party when the knowledge of the corruption becomes sufficiently public[83]. Despite apparent and visibly public efforts to combat corruption, "there is broad consensus that widespread corruption is one of the major problems confronting the Bolivian government but there is also strong resistance to systematic tackling of this problem"[84].

In considering their Ease of Doing Business Index, the World Bank consigned Bolivia to the bottom third of 190 countries at 137 and 128 where protecting minority interests and enforcement of contracts were concerned[85].

4.3.2.1.2. taxes

Doing Business gives Bolivia an exceptionally poor rating when it comes to the burden firms face with regards to taxation, ranking it 186th of 190 countries, this time with only Central African Republic, Mauritania, Chad and Somalia ranking lower. Respondents to the Global Competitiveness Report[86] ranked tax rates and tax regulations as their fourth and fifth leading concerns, although they ranked the closely related issues of inefficient government bureaucracy and restrictive labor regulations second and third. Indeed, tax revenues have risen considerably over the past decade under the Morales administration (Figure 4.25).

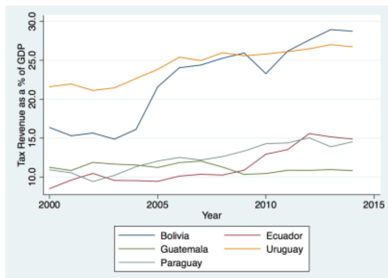

Figure 4.25. Tax revenues as a percentage of GDP (IMF)

While Bolivia's tax revenues are high relative to its peers, Doing Business's total calculated tax rate (Figure 4.26) is startlingly high and as such bears closer inspection. Companies in Bolivia pay 25% tax on profits, but there are additional taxes for certain types of activities. Financial institutions with returns on equity greater than six percent must pay an additional 25%. Extractive industries pay an additional 25% (with some deductions available) and mining companies are subject to up to an additional 20%. Royalties are also required from mining companies, totalling 1-7% of sales. The personal income tax rate is 13%, with a credit for VAT paid on purchases (Worldwide Tax Summaries). Clearly, Bolivia's mining and hydrocarbon sectors would seem to heavily skew the mean with tax rates that can easily exceed 75% of profits but mining, hydrocarbons and financial services only account for roughly ⅓ of of overall tax collections[87]. Meanwhile, petroleum gases and ores alone combine for more than 50% of Bolivia's exports[88], yet account for only 27% of government tax collections (Figure 4.27) - suggesting that few firms are paying the full rates calculated in the Doing Business report.

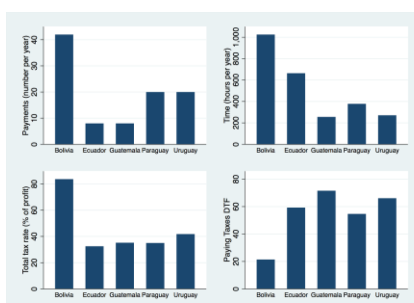

Figure 4.26. Counterclockwise: number of tax payments per year, time spent preparing and filing taxes, total tax rate as % of profits, distance-to-frontier of total tax burden on businesses. (Doing Business)

It is perhaps worth considering why actual tax revenues on these industries seem disproportionately low to what might be expected as a function of their nominal tax rates and overall contribution to the GDP. Looking at a comparison between nominal tax rates computed by Doing Business to actual tax revenues as a % of GDP (Figure

4.28), it appears that Bolivia lies well outside of the cluster of other countries. This is likely a result of low private participation in these sectors due to nationalization and the otherwise extremely high tax rates on extractive industries.

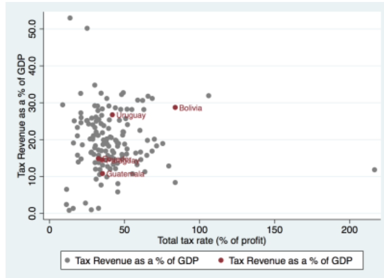

Figure 4.28. Tax revenue % of GDP as a function of nominal tax rates on profit, 2014. (IMF; Doing Business)

Given this apparent distortion, we should decompose this growth in tax revenues (Figure 4.29) where we can see the majority of the growth in tax revenues clearly occurred within excise taxes, a result of the 2005 IDH law which secured for the government a considerable royalty share (50%) on the extraction of hydrocarbons[89].

Having established this, if we look only at tax revenues *minus excise taxes*, we can find (Figure 4.30) that Bolivia's tax revenues drop to a more midline position among its peers, with 15 year growth rates that are not entirely dissimilar.

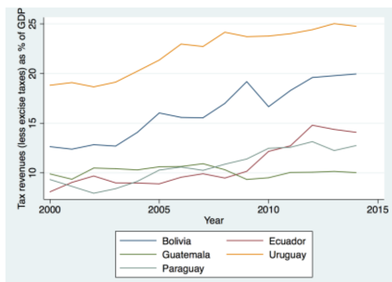

Figure 4.30. Tax revenues without excise taxes. (IMF)

If it seems we have belabored the point regarding taxes and hydrocarbons, it is to illustrate an important distinction. It may be useful to treat taxes on hydrocarbons and taxes on all else as similar but not identical problems - even though they may stem from common political will - and it may be that only one, both or neither are the binding constraint to growth. When Calvo conducted her research the IDH law either not yet enacted or nascent but was on the horizon, to which she said, "the sudden drop in foreign direct investment in 2004 points to uncertainty regarding the Hydrocarbons Law as the source of today's wait-and-see attitude of investors, in particular foreign investors."[90] In any event, we are unable to reject the hypothesis that taxes are a constraint to growth.

4.3.2.1.3. property rights

The Global Competitiveness Report gives Bolivia a ranking of 130 of 138 countries in property rights[91] and Doing Business ranks it as 137th and 128th in protecting minority investors and enforcing contracts[92]. Heritage Foundation also ranks them poorly, but somewhat less starkly so in contrast to most of their peers[93] (Figure 4.31).

As we earlier noted, Bolivia's judicial branch suffers from corruption, but this is not the extent of its ineffectiveness. In justifying its low ranking of Bolivia, the Heritage Foundation cites "an unreliable dispute resolution process", "the lack of adequate land title verification", tight control by the MAS party and "ongoing scandals, corruption, and influence-peddling"[94].

Figure 4.32. (Global Competitiveness Report)

Government expropriations have been plenty under the Morales administration, including reneging on hydrocarbons contracts in 2006, confiscating telecom company Entel, power-generation plants in 2010, and the company supplying the national power grid in 2012[95]. Not only is this history solely emblematic of the MAS party; the aforementioned IDH was signed into law just prior to Evo's ascension to power continuing a long history of expropriation and on-again off again nationalization that extends as far back as 1937 with the seizure of the assets of Standard Oil Company following the Chaco War[96] and later the nationalization of mines of 1952 and agrarian reforms of 1953[97]. Within the first year of assuming office, Morales signed a law resurrecting the Instituto Nacional de Reforma Agraria (INRA) act from a decade prior, and through 2013 the MAS party is credited with redistributing land to more than 900,000 peasants - nearly 10% of its population[98]- encompassing more than 25 million acres[99].

Countries with low judicial effectiveness and property rights tend to receive reduced foreign investment and provoke non-marketable production (such as subsistence farming) and capital flight[100].

It is clear that Bolivia faces significant microeconomic risks to investment, from corruption to distortionary taxes, to uncertainty about property rights and fair adjudication of law. Low appropriability and/or uncertainty about appropriability lead to low levels of investment. Corruption is both a cause of low appropriability as well as a symptom, as investments effectively move to informal mechanisms. Given the strong data on all measures of micro-risks, we cannot reject the hypothesis that low appropriability due to corruption, taxes, and appropriation are the binding constraint to growth in Bolivia.

Interestingly, while a number of expropriation measures had not taken effect when she conducted her research, Calvo yet had this to say: "high risk of appropriability of private returns may have a direct negative effect on growth by creating the perception that Bolivia is a public-sector driven economy, i.e., that the market is not really open, thus deterring firm growth and newcomers." Her conclusion, in fact, was that micro-risks centering on corruption and property rights (not taxes) were complicit with macro-economic factors in undermining investor appropriability. With this in mind, we now turn to the final diagnostic segment of our analysis: macroeconomic risks.

4.3.2.2. macro risks

In her 2006 analysis, Calvo identified uncertainty about macroeconomic risks as the underlying issue causing low appropriability to be prohibitive to investment, citing a "fragile fiscal situation and financial sector". One of the key priorities under the Morales administration's 2006 development plan has been to stabilize the macroeconomy, and it may have been successful - at least according to an IMF report which recently "commended the Bolivian authorities for the sound macroeconomic management and poverty reduction during the past commodity boom"[101]. Of course, implicit in this statement is the question of whether it can sustain this trend in the face of the commodity collapse, which caused a dramatic movement downwards in global commodities - particularly affecting Bolivia's hydrocarbon and mining industries. And so, in the final section of our analysis, we'll turn to analyzing whether macroeconomic factors remain the binding constraint to growth.

During the 2000s global commodity boom, Bolivia was lauded for building up strong foreign currency reserves. At least at one point it had a greater percentage of reserves to GDP than any economy besides China[102]. Since the collapse, its reserves have been drawn down but remain strong compared to its peers (Figure 4.34). Furthermore, the decline appears to have stabilized according to Bolivia's central bank which counts $10.13m USD in reserves for the period ending September, 2017, compared to $10.08m for the close of 2016[103].

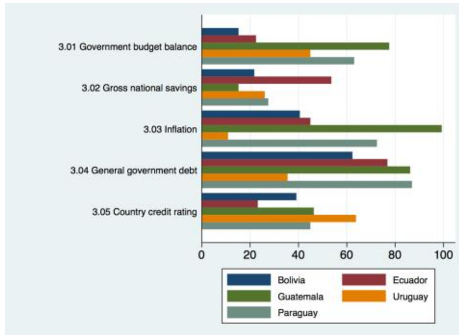

Figure 4.33. Macroeconomic indicators. (2016 Global Competitiveness Report)

Overall inflation has remained relatively steady under the Morales administration (Figure 4.35), with the exception of a period in which it reached 17.3% during the global financial crisis. As Weisbrot, Ray, & Johnston point out though, this was nearly half driven by food and energy prices, leading the Morales administration to resist calls from both the opposition party and the IMF to adopt policies that would slow growth[104]. This proved advantageous as Bolivia was able to maintain growth in a period when other nearby economies slowed[105].

While early in the Morales administration the government generated steady budget surpluses, it plunged into deficit spending in 2014 and has remained there since (Figure 4.36). It appears that spending stabilized and even contracted in 2016, but first quarter 2017 returns imply this trending may be quickly reversing[106].

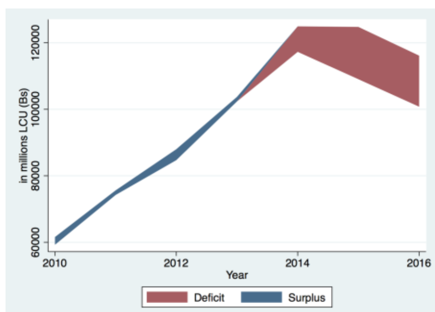

Figure 4.36. Government deficit spending and surplus, 2010-2016. (Banco Central)

According to the Bolivian government's development agenda for 2016-2025, deficit spending is expected to continue until 2020, bottoming out at 7.3% of GDP in 2017 - after an average of 3.9% since the commodities collapse - as the government engages in investment spending[107]. The IMF cautions against a much larger deficit, reaching as much as 15-20% of GDP, while noting encouragingly that "the authorities are prepared to be flexible and pragmatic regarding implementing the PDES (development plan)"[108].

Given this, it appears that the Morales administration did successfully relieve the macroeconomic constraints through its prudent fiscal and monetary policy, at least for the period 2006-2014. However, falling government revenues and rising deficit spending since 2014 raise a strong caution flag. It may be too early to conclude whether the IMF's optimism regarding the government's pragmatism will hold, or whether popular pressure inhibits its ability to constrain spending. Given this, we cannot entirely reject the hypothesis that macro-risks are the current most binding constraint to growth, but it is highly dependent on government fiscal policy over the next several years and may not be clear at this point.

5. Conclusion

We began our diagnostic by considering the costs and availability of finance. Observing low interest rate spreads, relatively high availability of credit from the banking sector, as well as low levels of FDI relative to its peers, we were able to reject the hypothesis that the cost of finance is the binding constraint to growth. While quality of education remains a concern, low returns to education, somewhat higher unemployment among the college-educated workforce relative to its peers and little evidence that firms are importing skilled labor leads us to likewise reject the hypothesis that low social returns are the binding constraint. As a landlocked country, with rugged terrain, geography presents a persistent and significant challenge. However, in the face of data suggesting that recent investments in infrastructure have resulted in lower marginal rates of return, it does not appear that infrastructure or geography are the current constraint. These findings all imply that the problem lies in problems with appropriability, the first of which we examined being market failures. We found that Bolivia may have discoverability problems, and that its product space is not conducive to lateral growth, its export sophistication is high relative to what might be expected given its GDP and there is a low correlation between terms of trade and growth. This led us to reject problems with market coordination or discovery as the constraint.

Finally we turned to whether micro-risks or macro-risks are causing problems with appropriability. Corruption in Bolivia is rampant, and taxes are high - particularly in the mining, banking and hydrocarbons industries. With a recent history of government appropriations in utilities, mining, and hydrocarbons as well as broad land reforms, uncertainty about property rights is a major concern. The state of the macroeconomy has improved considerably overall since Calvo's study, but recently some warning signs have emerged in the face of the global commodities collapse. It is uncertain at this point whether the concerns are currently causing a constraint to growth or will coalesce into one in the future, so we are unable to reject this hypothesis. Given these findings and the data that is presently available, we conclude that the current binding constraint to growth in Bolivia appears to be low appropriability as a result of high tax burdens and corruption as well as uncertainty about future appropriability due to concerns about government appropriation and property rights.

Contrasted with Sara Calvo's 2006 findings, it appears that prudent fiscal and monetary policy under the Morales' administration has - for the time being - eliminated macroeconomic stability as the binding constraint to growth. Instead, the current most binding constraint centers on microrisks - risks which she found in her analysis and which she was unable to reject as binding constraints. One might hypothesize that micro-risks were in the batter's circle, as it were, and once macro-risks had been loosened, became the next most binding constraint. Indeed, in some ways, it appears the administration is targeting at least some of the present constraints, with anti-corruption laws and preliminary evidence that the incidence and impact of corruption may be on the decline. Meanwhile, the government may be signalling an increased willingness to work with international investors[109] and the degree to which it is able to allay both the tax impact and appropriability fears of these may relieve the current constraints. However, it may be that the improvement in the macroeconomic stability was merely a reprieve, buoyed by high commodity prices. Growing deficit spending and dwindling (although still strong) reserves point towards a potential for macroeconomic issues to return as the most binding constraint to growth.

In many ways, these challenges are often endemic to the current economic and political situation in Bolivia and as such may prove difficult to surmount. Countries heavily reliant on resource-extraction often face high levels of corruption[110]. State-owned enterprises also often face significant problems with corruption[111]. High taxes are, of course, vital to funding Bolivia's aggressive redistributive agenda. Indeed, overall production in extractive industries - vital to Bolivia's income redistribution program has increased significantly since nationalization (Appendix III) On the face, it may be tempting to prescribe a series of Washington Consensus reforms: lowered taxes, greater privatization of industry - or in this case re-privatization, secure property rights and anticorruption measures. And indeed, the latter two are recommended. But to prescribe the full series is to ignore both Bolivia's tepid past experience with these reforms as well as its more recent success in generating significant growth and poverty through its own model of "Andean capitalism"[112]. It would also risk ignorance of the will of the population and the perhaps overestimate the "scarce political capital of reformers"[113]. Indeed, the goal of this growth diagnostic exercise is to recognize the individual context and circumstances of a country and to make policy recommendations within the constraints of that country.

Given this, it may not be prudent to recommend an immediate privatization of all state-owned enterprises, or necessarily to recommend lower taxes, particularly as the government is currently entering a deficit period. Instead, we suggest that the government should focus on improving the governance, transparency and accountability of current state-owned enterprises as well as internally in order to reduce corruption. Taxes are particularly distortionary for extractive industries, and nationalization in some of these sectors serves to crowd out private investment. With its budget deficits and reliance on these taxes for such a large share of government income, it may not be prudent to lower these taxes immediately. Instead, there is a certain serendipity in the largely untapped lithium reserves under its salt flats. While these reserves are the largest in the world, they lie within a delicate ecosystem, and their extraction is made more costly by high levels of magnesium[114]. The investment required for sustainable and profitable extraction may prove high for the government, but may present opportunities for public-private partnerships that help "reset" investors' perceptions of appropriability risks. But, this "resetting" may come at a cost as investors are wary due to "lack of legal security, weak rule of law, corruption and murky international arbitration measures"[115] - and it may be this cost is borne by higher revenue concessions to private concerns than the government is accustomed to making. Additional royalties from lithium revenues could perhaps be used to gradually ease taxes in other distorted sectors over a period of time, without sacrificing redistributive efforts, public investment, or in raising deficit spending. More importantly, it could be used as a signal of a willingness to improve private appropriability of returns for investors and demonstrate a willingness to pursue a middle path which opens up lucrative sectors to some level of privatization without having to renege on the social contract with its electorate. Over time, this may serve to reduce fears of appropriation among investors. The judicial system also needs to be strengthened through greater independence from the central government. Meanwhile, Bolivia needs to remain vigilant about its deficit spending in order to preserve the fiscal and monetary credibility it has established over the past 10 years.

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