NATURAL RESOURCE REVENUES: THEIR EFFECT ON THE PATTERN OF DOMESTIC INVESTMENTS RELATIVE TO INTERNATIONAL INVESTMENTS.

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ABSTRACT

The question of interest in this essay is whether the presence of natural resource rents detracts from or contributes more to domestic investments and economic diversification vis-à-vis international investments. In general, there is a positive relation between natural resource rents and domestic investments. However, evidence suggests that albeit resource dependent economies are capital scarce, they tend to invest in international markets proportionally more than domestically. We use a panel quantile regression to model the influence of natural resource revenues on the evolution of investments and precisely on the ratio of domestic investments relative to international assets investments (Investment Pattern). Our results show that natural resource rents are negatively related to the ratio of domestic investments relative to foreign assets only in countries with resource rents per GDP higher than 12.5 percent. We also show that different levels of resource dependence significantly affect each percentile of the investment pattern differently.

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INTRODUCTION

The last fifty years proved that natural resource rich nations followed a non-sustainable investments pattern especially in those that are capital scarce and highly dependent on hydrocarbon income. Until recent, not too many spending choices were available to such countries. Evidence revealed that governments in resource rich nations favored the march of resource revenues into international markets. These markets were considered as a safe haven to escape the curse of natural resources. Others favored direct consumption patterns to placate social unrests, match urgent consumption needs in countries with high poverty rates or pay national debt. *The critical question for most resource rich countries is where and how to invest their windfall revenues in order to attain a robust growth path?* It is well known that many resource rich countries are capital scarce and domestic investments are rather minimal compared to international investments. Further, when investing domestically, governments in such countries tend to invest in the wrong projects including those that are white elephant projects. (Robinson and Trovik 2007)

In this paper, we show that natural resource windfalls channel investments to international markets vis-à-vis domestic markets merely in nations that are highly dependent on resource revenues and the effect gets severe in capital scarce countries. One would expect the opposite since most natural capital rich countries are capital scarce, and their return to physical capital should be higher than the world’s yielding assets. We use a panel quantile regression to show that the negative effect of natural rents on domestic investments depends on the country’s reliance on natural capital income. It is obvious from our results that this negative effect is contributing to the relocation of wealth internationally only in countries that are highly dependent on resource revenues as a vital source of their income (countries with high resource rents per GDP). This wipes out any evidence showing that highly resource dependent economies may gradually decrease their capital scarcity anomaly overtime. A key innovation of our empirical analysis is finding a threshold of resource dependency, where above this threshold, natural resource revenues will alter the ratio of domestic investment to international investments. However, lower than the designated threshold, any increase in natural resource revenues will complement the ratio of domestic to international investments. Our empirical results underline the substantive role of diversification and highlights the border line where natural resource revenues become growth promoting through advancing domestic investments.
To check the association of natural capital dependence and the investment pattern, we use a sample of 78 countries between 1990 and 2010, from both, the World Development Indicators (WDI) and the Lane-Milesi-Ferretti (2010) index of International flows. At the basics, the graph below shows that natural resource rents and the ratio of domestic to foreign investments have a concave relation. The graph states that in countries with low dependence on natural capital, the correlation between resource revenues per GDP and the ratio of domestic to foreign investment is positive. However, the relation is reciprocated as the dependence on natural capital revenues increases. Since this correlation support our hypothesis, it is worth investigating this issue further.

**Figure 1: The Relation Between Natural Resource Rents and Investment Pattern**

The remainder of the paper is as follows: section two conducts a brief review of the literature on natural resources revenues and investment behavior in natural resource rich countries. Section 3 presents the methodology implemented in this paper and highlights why panel quantile regression is a robust methodology compared to regular panel data analysis. Section 4 will cover the model estimation and a conclusion.

2. BACKGROUND

In the 19th century, countries such as the U.S., Germany, and Britain, were highly endowed with natural resources, they experienced a rapid growth through investing in developing their industrial sector during that period. The availability of coal deposits in such countries was the *sine qua non*
for the development of non-resource sectors such as the local steel industry (Gylfason, & Zoega, 1999). By contrast, in the past century, countries endowed with resources experienced lower growth associated with low overall non-resource investments.

Even though resource rich countries enjoy a high level of resource revenues, poverty among 29 resource rich developing countries is significantly high. Around 60 percent are still living at 2 dollars or lower per day with a significantly low level of productive non-resource capital (IMF, 2012). This sheds light on the ramification of long run under-development and low growth in such countries that was coupled with low domestic investments over the last 3 decades. As mentioned earlier, the scarcity of domestic investments in such countries was linked to the non-optimum public policy decisions especially those that advocated strategies that mitigate the effect of the curse in the short run. Also, behavior of the private sector did not vastly deviate from the public sector. Private investors disliked risk as much as the governments did and always took further steps to avoid the uncertainty through escaping to more efficient international markets (Frankel, 2010).

In many countries natural resource windfalls are considered a key driver to public and private domestic investment. However, many resource rich countries face difficulties to invest domestically due to the disruptive nature of natural rents, especially when these countries are highly dependent on resource income. The most famous caveat to domestic investments is the Dutch disease, where excessive expenditure spending might disrupt the labor market due to the appreciation in relative sectoral wages of non-tradable goods. This manifested in many resource countries, where a large magnitude of resource windfalls solicited governments and private sector to invest internationally, facing major positive resource shocks. This posits a policy challenge to most governments in resource rich nations on how to manage resource revenues and utilize spending efficiently to boost investments and domestic asset accumulation (Ploeg and Venables, 2008). Historically, during resource booms, governments followed different policies to manage resource rents that were expected to mitigate the effects of the resource curse. The most common thematic recipes for these countries are: paying off national debt and invest in infrastructure to boost private investments\(^1\), consumption smoothing following the permanent income hypothesis (PIH) to meet urgent consumption needs and the creation of sovereign wealth funds that is invested in international

\(^1\)Paying debt tends to lower interest rates, and boost private investments.
markets to avoid growth volatility and guaranty higher income in the long term (Berg 2012).

Paying off national debt is always a good private investment booster as it decreases interest rates in the long run. However, inconsistent fiscal policies in resource rich countries tend to accumulate more debt when the duration of resource boom is not accurately estimated (Frankel, 2010). For example, Peru significantly increased its debt levels due to the inaccurate projection of metal prices. Peru is a major producer of silver, zinc, lead, molybdenum, copper and gold. Between 1990 and 1995, the country accumulated very high levels of debt (85 percent of GDP) to finance their public expenditures (UN 2011). From a positive side and complying with economic theory, debt repayment usually improves society’s welfare, boosts consumption, lowers taxes, and reduces interest rates on lending. If we take Chile as an example, using its resource receipts and a strict fiscal rule, it payed most government debt and increased domestic investments significantly. In order to increase domestic investment returns, the Chilean government invested heavily in infrastructure and in non-resource industries, such as wineries, aluminum smelting, and salmon production. While this approach succeeded in Chile, in many resources rich countries debt repayment has not significantly improved the position of domestic investments, yet leaving many countries to be under-diversified while having a competitive advantage only in natural capital.

Consumption smoothing was also a desirable strategy by policy makers in developing and least developing resource rich countries (IMF, 2012). Increasing consumption for the poor following the permanent income hypothesis (PIH), is welfare improving. However, PIH does not optimally design the path of investment dynamics. Further, PIH contributes to higher relative prices, and leads to a decrease in non-resource exports (The Dutch disease effect). Usually, government policies following the PIH in distributing resource rents, frontload consumption and neglect domestic investments (IMF 2012). Recent research by the IMF confessed that their previous advising role in developing countries through promoting the PIH failed to increase long term growth.

The most famous strategy to fight the volatility dimension of the resource curse is to invest natural wealth in sovereign wealth fund (SWF), mainly in international markets. This strategy was considered as a conservative one and a prudent behavior to mitigate natural resources volatility. Many countries do so when natural resource rents as a percentage of total income is high and their financial markets are not efficient and capable enough to absorb the resource windfalls. Such countries place their resource rents in funds, usually in more efficient financial markets to consume
the interest income incurred in the long run. This will only guarantee a limited level of income after resource revenues are completely depleted (Bjerkholt, 2002; Barnett and Ossowski, 2003). Usually, SWF backloads consumption, and postpones spending to the future (IMF, 2012). These funds avoid current consumption needs to improve welfare and encourage resource revenues to be transferred into financial assets that might have a lower discounted present value return compared to domestic investments in the long run. Moreover, international investments are subject to international financial risks and yet lower expected income, especially during recessions. This was encountered in 2008 in countries such as Kuwait, Libya, and United Arab Emirates. Libya lost $5 billion out of a $53 billion fund in 2009, due to investments in toxic financial assets in Europe (Financial Times, 2011). Another issue is that the political objective of the SWF is not clear, especially in countries where resource revenues are controlled by corrupt governmental elites (Bahgat, 2011). Besides, countries that accumulated a large foreign investment account, will find difficulties in transferring this stock of capital to domestic markets to be utilized in development since foreign investments will be the main source of national income. International funds could result in more certain return, and a useful mean to mitigate volatility of revenues, however, in the long run this might become counterproductive through delaying investments for current generations and guaranteeing a relatively lower consumption to future generations.

The revenue management techniques discussed above raised many questions regarding the nature of government policies in promoting growth. Obviously, these policies contributed to halting the non-resource sector, maintained high volatility and lowered overall long run growth. The challenge is that once a government follows one of the above paths solely, it is hard to maintain a higher level of investments and a lower level of economic dependency in the long run. Sachs (2007) claims that a country’s optimal path commences by balancing the adverse macroeconomics consequences of resource earnings with the need to invest in non-resource sectors at home. However, there is still no reliant evidence in most resource countries showing that governments are effectively managing resource revenues especially when it comes to investments.
3. **EMPIRICAL ANALYSIS**

3.1. **DATA AND DESCRIPTIVE STATISTICS**

Our empirical analysis is based on data collected from both Lane-Milesi-Ferretti (2010) indicator of international flow and the World Development Indicators. The data set includes 78 resource rich as well as resource poor countries. Some countries were excluded from our sample, purely due to the limited availability of country level data. Our variables were generated between the years of 1990 to 2010 on an annual basis. The table below shows some descriptive statistics of the ratio of domestic investment relative to international investments, natural resource rents per GDP, and other variables that we consider directly influencing investment allocation.

**TABLE 1: DESCRIPTIVE STATISTICS**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Median</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Capital Formation to Foreign Assets</td>
<td>0.45</td>
<td>0.61</td>
<td>0.68</td>
<td>0.01</td>
<td>11.51</td>
</tr>
<tr>
<td>Natural Resources to GDP</td>
<td>0.04</td>
<td>0.09</td>
<td>0.12</td>
<td>0.001</td>
<td>0.68</td>
</tr>
<tr>
<td>GDP per Capita Growth</td>
<td>0.03</td>
<td>0.04</td>
<td>0.04</td>
<td>0.01</td>
<td>0.47</td>
</tr>
<tr>
<td>Government Spending to GDP</td>
<td>0.33</td>
<td>0.40</td>
<td>0.24</td>
<td>0.10</td>
<td>1.00</td>
</tr>
<tr>
<td>Corruption</td>
<td>3.00</td>
<td>3.03</td>
<td>1.37</td>
<td>0.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.04</td>
<td>0.24</td>
<td>2.34</td>
<td>-0.08</td>
<td>74.82</td>
</tr>
<tr>
<td>Terms of Trade to GDP</td>
<td>0.66</td>
<td>0.80</td>
<td>0.59</td>
<td>0.11</td>
<td>4.74</td>
</tr>
<tr>
<td>Market Capitalization to GDP</td>
<td>0.47</td>
<td>0.67</td>
<td>0.65</td>
<td>0.11</td>
<td>6.60</td>
</tr>
<tr>
<td>Absorptive capacity Index</td>
<td>-0.51</td>
<td>-0.24</td>
<td>1.18</td>
<td>-2.2</td>
<td>3.73</td>
</tr>
<tr>
<td>Gross fixed Capital Formation to GDP</td>
<td>0.21</td>
<td>0.21</td>
<td>0.06</td>
<td>0.02</td>
<td>0.62</td>
</tr>
<tr>
<td>Total Foreign Assets to GDP</td>
<td>0.43</td>
<td>1.16</td>
<td>2.11</td>
<td>0.02</td>
<td>16.32</td>
</tr>
<tr>
<td>Natural Resource Rents to Capita</td>
<td>63.30</td>
<td>883.07</td>
<td>3022.90</td>
<td>0.00</td>
<td>38565.40</td>
</tr>
</tbody>
</table>

**SOURCE: DATA COLLECTED BY AUTHORS**

Looking at Natural Resources Rents per GDP, one can see that natural resource shares can be as high as 68 percent of the total income. Having such a high share could be a result of poor investment policies over time that did not promote non-oil sectors to exist especially manufacturing, and services (i.e., a low ratio). Further, the ratio of domestic investments relative to foreign investments varies from 0.01 in a country such as Malawi, and goes up to 11.5 in a country such as India. Observation of the investment pattern across countries revealed that countries that are capital scarce usually have the lowest investment pattern ratio with no significant changes over time.
3.2. METHODOLOGY

Standard linear regression techniques summarize the average relationship between a set of regressors and the outcome variable based on the conditional mean function of y on x, $E(y|x)$. This provides only a partial view of the relationship, as we might be interested in describing the relationship at different points in the conditional distribution of the dependent variables. Quantile regression provides this capability (Koenker, 2004). Unlike least square, quantile regression does not require having assumptions on the distribution of variables, it is robust in handling extreme value points and outliers, and insensitive for any monotonic transformation of the dependent variable. Quantile regressions predict the $\tau^{th}$ percentile of the dependent variable instead of its conditional mean. It is worth noting that one of the main reasons to use quantile regression in this paper is because the investment pattern is heavily skewed to the right (Figure 2).

FIGURE 2: THE RATIO OF DOMESTIC INVESTMENTS TO FOREIGN ASSETS

In analyzing relations among variables, quantile regressions are a technique that offers a better and more detailed picture of a linear regression through offering a much richer and more focused view of the dependent variable than could be achieved by looking at merely the conditional mean. Quantile regressions introduced by Koenker and Bassett (1978) seek to the estimation of conditional quantile functions—models in which quantiles of the conditional distribution of the response variable are expressed as functions of observed covariates. Just as we can define the sample mean as the solution to the problem of minimizing a sum of squared residuals, we can define the median...
or other quantiles as the solution to the problem of minimizing a sum of absolute residuals. In estimating a least square problem with a random sample \( \{y_1, y_2, y_3, \ldots, y_n\} \) we solve the following:

\[
\min_{\mu \in \mathbb{R}} \sum_{i=1}^{n} (y_i - \mu)^2
\]

This will give us an estimate of the condition expectation of \( y_i = E(Y|x_i) \) given the mean of \( y, \mu = \mu(x_i, \beta) \). Using a quantile regression, we follow the same steps to find the conditional quantile function, by setting the \( \tau^{th} \) quantile, \( \tau \in (0,1) \). One can minimize the sum of absolute residuals at the \( \tau^{th} \) quantile:

\[
\min_{\mathcal{I} \in \mathbb{R}} \sum_{i=1}^{n} \ell_{\tau}[y_i - \mathcal{I}(x_i, \beta)],
\]

Where \( \ell_{\tau} \) represent the absolute value function (or the loss function) that yields the \( \tau^{th} \) sample quantile as its solution (Koanker and Hallok, 2001). \( \mathcal{I}(x_i, \beta) \) is a parametric function (conditional quantile function of \( y_i \) at the \( \tau^{th} \) quantile). This minimization problem can be introduced as a linear programming problem by introducing 2n slack variables, \( \{u_i, v_i; (1, \ldots, n)\} \) to represent the negative and the positive residual respectively. Then the new minimization problem will be as follows,

\[
\hat{\beta}(\tau) = \underset{(3u,v)}{\text{arg min}} \{\tau 1_n^T u + (1 - \tau)v | 1_n \mathcal{I}(X, \beta_\tau) + u - v = y\},
\]

Where \( 1_n \) is a vector of ones, \( X \) has \( (n \times k) \) dimension, and \( u_i \) and \( v_i \) are the positive and the negative value of the residuals respectively. In the above minimization problem we split the residuals vector into positive and negative error margins, and the estimation of the coefficient at the \( \tau^{th} \) quantile \( \hat{\beta}(\tau) \) can be solved through a linear programming problem.

### 3.3. Models Estimation

Our analysis underlines the role of resource revenues in discouraging the evolution of domestic investments in resource rich nations. This might raise questions concerning the effect of resource rents in countries that are not dependent on resources. To answer that, one cannot deny the substantial role of natural resource rents in boosting domestic investments in many countries such as Norway, Chile and Peru. However, the effect of natural resource windfalls is country specific and
contingent on country’s level of dependence on natural capital income, its stock of domestic investments, its levels of diversification, absorptive capacity and the political economy among others. The following subsections will explain how different economic specifications in resource rich countries would influence the evolution of investments. Our purpose is to show that unless a government invests a substantial amount in non-resource industries, domestic investments will always be altered by international markets while keeping resource nation capital scarce in the long run.

3.3.0. **The distinct effect of resource revenues**

Table 2 (see annex) shows how the effect of resource rents diverge based on the country’s level of dependence on resource revenues and their fraction of domestic investments to international assets. Different countries have different resource endowments and are affected differently given their level of dependence on resource income (i.e. economic diversification). In Table 2 we classify countries according to their level of natural resource revenues as a percentage of GDP. We split countries in our dataset into two clusters, low natural resource rents per GDP (below 12.5 percent) nations and high natural resource rents per GDP (above 12.5 percent). We then check the effect of these revenues on different quantiles of investment patterns. The results of our quantile regression are summarized in figure 2. The blue colored coefficients represent the effect of natural resource rents in countries that have natural resource rents per GDP below the threshold between the 10th percentile and the 5th percentile of the investment pattern. While the orange colored coefficients represent the effect of natural resource revenues in resource dependent economies (resource rents per gdp higher than 12.5 percent) between the 20th percentile and the 70th percentile of the investment pattern.

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2 Figure two presents only the significant coefficients at the 1 percent and the 5 percent.
One can see that the effect of natural resource revenues varies depending on the level of resource revenues as a percentage of GDP and the level of investments pattern. For example looking at the second decile (countries with low ratio of domestic to foreign investments), those countries with high ratio of natural resource rents to GDP (above 12.5 percent of GDP) have a negative and significant effect on the investment pattern. It is also obvious from the graph above that at the same percentile, countries with low natural resource rents per GDP have a positive and significant effect. In low resource dependent countries, as natural resource rents increase by one unit, the ratio of domestic to foreign investment increase by 0.233 units, and the effect is significant at the 5 percent level of significance. However, for the same decile if the country has a high level of resource rents, an increase of natural resource rents by one unit will significantly decrease the ratio of domestic to foreign investments by -0.311 units.

One can also see that as the investment pattern increases, the effect of the resource curse “via lowering domestic capital” is almost increasing consecutively for only countries with high level of resource rents per GDP, then subsides as they invest more domestically, yet stays negative in and almost increasing in resource dependent economies. This effect is even stronger if one takes a sample of only least developing resource dependent countries. Arguably, countries that are highly dependent on resources have a higher diminishing return to investments compared to non-resource countries. One could also argues that most developing resource rich countries have many constraints preventing them from having a higher social return on investments. Some of these preventive constraints are higher level of corruption, low transparency (no checks and balances), lower absorptive capacity, lower diversification, and less political rights for individuals (Alesina et al., 2003). All these factors, if present, might influence the level of investments through increasing the

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**FIGURE 2: CLASSIFYING RESOURCE RICH COUNTRIES BY LOW AND HIGH RATIO OF RESOURCE RENTS PER GDP**

![Graph showing the effect on quantiles of investment patterns](image_url)
uncertainty of return (Van Der Ploeg et al., 2009). The presence of such issues may encourage governments to switch to more efficient international markets as they consider that a more rewording approach. As a result, capital-scarce countries with initially low dependence on resources are likely to attract domestic investments and bring more wealth home compared to resource dependent nations.

3.3.1. ROBUSTNESS CHECK

In this section we propose different constraints that are considered as key factors effecting investments evolution. We will consider constraints such as absorptive capacity, political economy, national savings, the technological stock and macro policy as crucial element of investments and growth in all countries. Controlling for the following channels in our analysis will enrich the result and strengthen our findings.

3.3.1.1. ABSORPTIVE CAPACITY

It is obvious that absorptive capacity is a binding constraint in natural resource rich countries, and considered as one of the main issues to hamper domestic investments. Evidence showed that in countries with natural endowments, authorities failed to rapidly expand the macroeconomic absorptive capacity and promote that as a *sine quo non* for rapid and sustainable long run growth. Macroeconomic capacity can be expanded through investing in human capital, infrastructure, manufacturing, technology, and improving the size, efficiency and perfection of the financial markets among others (Brown et al. 2009). To assess the effect of the overall absorptive capacity, we created an index for this reason that includes school enrollment, GDP, Population size, Market capitalization, manufacturing, and high tech production of total exports. We use the dynamic factor analysis approach by Federici and Mazzitelli (2005) to create this index using the first factor that explains the most variability of each variable on the latent variable.

Recent research by Araji and Mohtadi (2014) showed that natural resource abundant countries have a low level of human capital and technology due to the lack of incentives to invest in human capital. Further, most natural resource countries, and especially oil producing nations have low access to international markets, yet their domestic financial markets are relatively shallow. Since the marginal return to capital is diminishing (the marginal benefit of an additional unit of capital is decreasing);
then any increase in macroeconomic absorptive capacity is essential to mitigate this diminishing return through expanding the economy and let accept additional private and public capital to materialize. Increasing the absorptive capacity plays a crucial role in the long run. It is a key growth promoting behavior as it advances the capacity of the non-resource sectors to generate additional income. It may assist the transfer from resource-dependent production to non-resource production, mainly through adding more manufacturing and high tech outputs. In figure 3 below, we add the absorptive capacity index to our analysis to assess the influence of absorptive capacity on the ratio of domestic investments relative to international assets.

Similar to our previous analysis, we will also split countries into high resource rents per GDP and low resource rents per GDP. The effect of resource rents does not deviate from Table 2 especially for those countries that are highly dependent on resources. From Figure 3 and mainly looking at capital scarce countries, the investment pattern is negatively affected by a resource shock regardless of the level of resource dependence. However, one can also see that this negative effect varies in magnitude. If we investigate countries with low resource rents dependence, countries at the far left of the distribution (1st and 2nd deciles), natural resource revenues have a negative and significant effect on the ratio of domestic to international investments. As the investment pattern advances beyond the 20th percentile, the effect of resource shock gets not significant only up to the 50th percentile. Then after building a higher ratio of domestic investment to foreign assets overtime, natural resource revenues will start to positively and significantly influence the evolution of investments. This is obvious in figure 3, where the effect of natural resource rents is positive on the 60th percentile onward. This interesting observation is curtail, after controlling for absorptive capacity, resource shocks decrease the ratio of domestic investments to foreign assets only at early stages of capital accumulation for countries that are less dependent on resources. However, the negative effect sustains only for highly dependent economies. The results we have in the graph below, asserts that unless countries diversify enough, natural resources will not help in building domestic capital.
Looking at Absorptive capacity, our model shows that there is a positive and significant relation between absorptive capacity and the ratio of domestic investments relative to foreign assets up to the 5th decile. It is obvious from figure 3 that a higher index will enhance the investments reallocation by proportionally invests more at home up to the median. One can see in figure 3 that albeit the positive effect of absorptive capacity on investment pattern, resource revenues fail to increase investment at home in the long run for resource dependent countries, and yet contributes more to investing abroad while neglecting domestic investment needs that shall expand the non-resource sector along the growth path. Our index highlights a very important points, the influence of absorptive capacity to bring investment back home somehow reaches a ceiling. Beyond this ceiling, absorptive capacity is not significant to the investment pattern ratio.

3.3.1.2. Political Economy

Another explanation for lower investments is that the presence of natural resources encourages corruption and rent seeking activities and suppress transparency (Sala-I-Martin & Subramanian 2003). Usually in resource abundant countries, civil servants, ministers, and bureaucrats, distract money that is usually meant for investments. Another key issue facing natural resource countries is that the ruling elites always seek to start new inefficient public investment projects while dropping existing ones. This happens because it is more difficult to extract rent from maintaining existing projects due to its low cost nature. If we investigate countries with major natural resource rents and regardless of their disappointing governance quality relative to their income, their fiscal space
facilitated their regimes to maintain the rentier state where inefficient government expenditures played a key role in preventing any sustainable development in the long run.

Besides evidence for rent seeking activities, patronage, clientelism, and corporatism, resource rich countries initiated major institutional reforms to enhance their economic competitiveness through policies that promote non-resource sectors hoping to be better positioned in international markets. However, due to the inefficiency of such reforms, the misplacement of resources away from productive activities persisted regardless of their efforts. The decision to move from one economic activity to another requires a concrete evaluation of the return of each activity (Mehlum et al., 2006). Obviously, on average, in resource rich countries rent seeking activities have been more profitable than others.

People’s attitude toward authority practice is tamed by government revenues extraction from resource rents rather than cutting it from people’s income as taxes —people might underestimate transparency, and accountability due to almost zero taxes. Looking at economic outcomes trajectories, we can see that most of these resource rich countries experienced a drop in their per capita income over the years and their negligible progress in governance quality can be arguably linked to many disappointing economic and social outcomes that are a result of policy failure. For example, according to the World Governance Indicators (WGI), most of these countries experienced minimal change in their governance quality between 1996 and 2012, while facing major obstacles such as corruption, lack of competition, unsustainable fiscal stances, limited access to finance and quality education, low accountability, and no budgetary information among others. During the same period such countries grew at a slower pace annually, lower than most resource poor emerging economies especially those in East Asia. Further, natural resources also tend to decrease political stability and encourage civil conflicts. Norway was successful in defining the resource revenue management process politically, thus it deserves more attention from other resource rich countries such as Libya, Iran, Russia, Saudi Arabia, Sudan, and Venezuela among others (IMF 2011). The Norwegian oil and gas reserves were defined as a common property to all Norwegian, and defined the legal right of all Norwegian to benefit from these resources. Moreover Chile and Botswana utilized resource rents in investing domestically in growth promoting activities, and avoided excessive inefficient government spending.
In model 3 we add a corruption index (Higher index means less corruption) from the International Country Risk Guide to check the effect of corruption on investment pattern. The effect of lower corruption is positive and significant in all countries. This adds additional evidence on the role of lower corruption to promote investments.

4. Final Remarks

Recently, prices of natural resources dropped by almost 60 percent (since 2014), with no prospects of higher prices in the short and the medium run. This drop should call for an urgent action to promote diversified investments domestically while dropping those projects that are inefficient. Efforts in resource dependent economies could edge toward hedging growth volatility risks from one side and entrench sustainable and diversified growth in the long run from the other side. In this paper, we do not claim that resource rich countries should not invest internationally, neither following the Hartwick rule of investing all depleted capital in physical capital as the only key for sustainable development. We do claim that such countries should proportionally invest more domestically to have a balanced growth in the long run. This wasn’t the case in previous decades, where international asset investments were relatively more in all resource dependent economies. We do stress the rigorous role of macroeconomic and sectoral policies that shall lead gradually to less reliance on resource income in the long run. We do claim that the dependence on resource revenues should decrease below a certain threshold so that natural resource windfalls will affect the evolution of investments positively. This could only happen when countries advance their absorptive capacity starting at early stages of development. Natural capital revenues contribute to domestic allocation in the form of physical capital investments only after dramatically expanding the non-resource sector. However, leaving natural resource rents per GDP at high levels will alter domestic investments and reduce the possibility of sustained economic growth, especially after total resource depletion.

Usually, investments at home will materialize in current and future consumption, however, investing internationally will save consumption only to future generations and subject to international market risks and population growth. As seen in our analysis, at a certain level of resource dependency, natural resources is deterring to domestic allocation of revenues, which in the long run might affect the return on investments and decrease domestic investment competitiveness compared to international markets. The key challenge of such countries will be how to raise their domestic return
to investment. It is the government’s duty in such countries, to establish cross cutting policies that expand the non-resource sector bearing in mind current essential consumptions needs and the significance of decreasing their resource sector to be a complement to national income rather than being the main contributor to income. This paper shows the edge where resource rents starts to be growth promoting through bringing more money back home for capital investments rather than shipping investments abroad.

Future analysis will include finding a robust measurement for volatility to be included in the regressions. Further, we will add additional institutional variables that include public administration management indicators as the issue of investment decision is also blamed to bad public financial management.
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Brown, P.R., Jacobs, B., and Leith, P. (in press) Participatory monitoring and evaluation to aid investment in natural resource manager capacity at a range of scales. Environmental Monitoring and Assessment


# Annex One

## Table 2: Classifying Resource Rich Countries by Low and High Ratio of Resource Rents per GDP

<table>
<thead>
<tr>
<th>Percentiles</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.043</td>
<td>1.364</td>
<td>1.710</td>
<td>1.910</td>
<td>1.926</td>
<td>2.097</td>
<td>2.443</td>
</tr>
<tr>
<td></td>
<td>(10.7)**</td>
<td>(10.8)**</td>
<td>(15.5)**</td>
<td>(18.0)**</td>
<td>(16.1)**</td>
<td>(10.2)**</td>
<td>(9.66)**</td>
</tr>
<tr>
<td>Low Resource Rents per gdp</td>
<td>0.260</td>
<td>0.233</td>
<td>0.158</td>
<td>0.150</td>
<td>0.181</td>
<td>0.255</td>
<td>0.291</td>
</tr>
<tr>
<td></td>
<td>(3.66)**</td>
<td>(2.52)*</td>
<td>(1.96)*</td>
<td>(1.92)*</td>
<td>(2.07)*</td>
<td>(1.70)</td>
<td>(1.572)</td>
</tr>
<tr>
<td>High Resources Rents per gdp</td>
<td>0.003</td>
<td>-0.311</td>
<td>-0.486</td>
<td>-0.581</td>
<td>-0.601</td>
<td>-0.519</td>
<td>-0.575</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(-3.19)**</td>
<td>(-5.70)**</td>
<td>(-7.06)**</td>
<td>(-6.49)**</td>
<td>(-3.27)**</td>
<td>(-2.9)**</td>
</tr>
<tr>
<td>GDP Per-Capita Growth</td>
<td>0.174</td>
<td>0.329</td>
<td>0.054</td>
<td>-0.164</td>
<td>-0.150</td>
<td>-0.445</td>
<td>-1.617</td>
</tr>
<tr>
<td></td>
<td>(0.69)</td>
<td>(1.011)</td>
<td>(0.18)</td>
<td>(-0.59)</td>
<td>(-0.48)</td>
<td>(-0.84)</td>
<td>(-2.46)*</td>
</tr>
<tr>
<td>Government Spending</td>
<td>-0.198</td>
<td>0.005</td>
<td>-0.172</td>
<td>0.115</td>
<td>-0.259</td>
<td>-0.799</td>
<td>-0.837</td>
</tr>
<tr>
<td></td>
<td>(-1.53)</td>
<td>(0.029)</td>
<td>(-1.18)</td>
<td>(0.81)</td>
<td>(-1.63)</td>
<td>(-2.94)*</td>
<td>(-2.49)*</td>
</tr>
<tr>
<td>Inflation</td>
<td>-0.002</td>
<td>0.005</td>
<td>0.004</td>
<td>0.004</td>
<td>0.002</td>
<td>0.002</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(-1.45)</td>
<td>(3.09)**</td>
<td>(2.86)</td>
<td>(2.96)**</td>
<td>(1.54)</td>
<td>(0.62)</td>
<td>(-1.23)</td>
</tr>
<tr>
<td>Savings Per GDP</td>
<td>0.127</td>
<td>0.152</td>
<td>0.069</td>
<td>0.054</td>
<td>0.073</td>
<td>-0.083</td>
<td>-0.336</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(1.048)</td>
<td>(0.54)</td>
<td>(0.44)</td>
<td>(0.52)</td>
<td>(-0.35)</td>
<td>(-1.15)</td>
</tr>
<tr>
<td>Net Interest Rate Spread</td>
<td>-0.051</td>
<td>-0.040</td>
<td>-0.039</td>
<td>-0.033</td>
<td>-0.059</td>
<td>-0.043</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(-10.73)**</td>
<td>(-6.48)**</td>
<td>(-7.17)</td>
<td>(-6.34)**</td>
<td>(-10.17)</td>
<td>(-4.33)</td>
<td>(-0.68)</td>
</tr>
<tr>
<td>Observations</td>
<td>1638</td>
<td>1638</td>
<td>1638</td>
<td>1638</td>
<td>1638</td>
<td>1638</td>
<td>1638</td>
</tr>
</tbody>
</table>

Notes: The numbers in parentheses are t-statistics. Variables were taken from the World Bank Indicators and Lane-Milesi-Ferretti (2010) lane's data set. Note that the significance level is: * p<0.05; ** p<0.01.
TABLE 3: EFFECT OF RESOURCE RENTS ON INVESTMENTS AFTER CONTROLLING FOR ABSORPTIVE CAPACITY.

<table>
<thead>
<tr>
<th>Percentiles</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.04</td>
<td>-0.16</td>
<td>-0.23</td>
<td>-0.35</td>
<td>-0.37</td>
<td>-0.39</td>
<td>-0.38</td>
</tr>
<tr>
<td></td>
<td>(-3.1)**</td>
<td>(-9.5)**</td>
<td>(-6.2)**</td>
<td>(-7.2)**</td>
<td>(-7.8)**</td>
<td>(-7.5)**</td>
<td>(-5.9)**</td>
</tr>
<tr>
<td>Low Natural Resource Rents</td>
<td>-0.03</td>
<td>-0.03</td>
<td>-0.03</td>
<td>-0.01</td>
<td>0.00</td>
<td>0.09</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(-2.6)**</td>
<td>(-1.9)*</td>
<td>(-1.4)</td>
<td>(-0.4)</td>
<td>(-0.02)</td>
<td>(3.30)*</td>
<td>(3.28)*</td>
</tr>
<tr>
<td>High Natural Resource Rents</td>
<td>-0.14</td>
<td>-0.19</td>
<td>-0.19</td>
<td>-0.21</td>
<td>-0.21</td>
<td>-0.11</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>(-8.75)**</td>
<td>(-9.3)**</td>
<td>(-7.6)**</td>
<td>(-6.7)**</td>
<td>(-6.60)**</td>
<td>(-3.15)*</td>
<td>(-2.03)*</td>
</tr>
<tr>
<td>Government Spending</td>
<td>0.01</td>
<td>0.005</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>(1.713)</td>
<td>(0.4)</td>
<td>(-0.2)</td>
<td>(-0.07)</td>
<td>(0.03)</td>
<td>(-3.1)*</td>
<td>(-0.5)</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(10.5)**</td>
<td>(6.2)**</td>
<td>(4.1)**</td>
<td>(9.8)**</td>
<td>(16.6)**</td>
<td>(14.5)**</td>
<td>(24.1)**</td>
</tr>
<tr>
<td>Savings Per GDP</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.04</td>
<td>-0.02</td>
<td>0.00</td>
<td>-0.02</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>(0.3)</td>
<td>(-0.22)</td>
<td>(-1.8)</td>
<td>(-0.8)</td>
<td>(2.79)*</td>
<td>(-1.77)</td>
<td>(0.851)</td>
</tr>
<tr>
<td>Corruption</td>
<td>0.03</td>
<td>0.05</td>
<td>0.07</td>
<td>0.09</td>
<td>0.11</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>(10.5)**</td>
<td>(11.8)**</td>
<td>(13.2)**</td>
<td>(14.9)**</td>
<td>(15.6)**</td>
<td>(18.1)**</td>
<td>(15.2)**</td>
</tr>
<tr>
<td>Absorptive Capacity:</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(4.1)*</td>
<td>(3.2)*</td>
<td>(3.1)*</td>
<td>(2.2)*</td>
<td>(2.1)*</td>
<td>(1.2)</td>
<td>(0.9)</td>
</tr>
<tr>
<td>Controlled for Country Dummy</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Notes: The numbers in parentheses are t-statistics. Variables were taken from the World Bank Indicators and Lane- Milesi Ferretti (2010) data set. Note that the significance level is: * p<0.5; ** p<0.01.
ANNEX 2

We follow the same methodology suggested by Federici and Mazzitelli (2005) to create an index using Dynamic Factor analysis. We use annual data for GDP, population, manufacturing, high tech production, education, and financial market capitalization, to estimate our absorptive capacity index. We take the first factor that includes the highest variability. Next we rank countries based on their first factor estimate and also present the time series evolution of the factor for each country. To measure the variability of our factors, we use $J$ variables and $NT$ observations, where $N$ is the number of countries and $T$ is the number of years. Notationally,

$$ X(I; J; T) = x_{ijt}; \ i = 1, ..., N \ ; \ j = 1, ..., J \ ; \ t = 1, ..., T $$

Decomposing the generic element

$$ x_{ijt} - \bar{x}_j = (x_{ijt} - \bar{x}_{ij}) + (\bar{x}_{jt} - \bar{x}_j) \quad (2) $$

where $\bar{x}_j$ is overall average of variable $j$ and $x_{jt}$ is average of variable $j$ at period $t$ over $N$ countries.

In vector form,

$$ x_{it} - \bar{x} = (x_{it} - \bar{x}_t) + (\bar{x}_t - \bar{x}) \quad (3) $$

where $x$ is the overall average of the variables and $x_t$ is the average of variables over $N$ countries. Therefore, overall dispersion in data is given by

$$ S = \frac{1}{NT} \sum_{i,t}(x_{it} - \bar{x}_t)(x_{it} - \bar{x}_t)' + \frac{1}{NT} \sum_{i,t}(\bar{x}_t - \bar{x})(\bar{x}_t - \bar{x})' \\
+ \frac{2}{NT} \sum_{i,t}(x_{it} - \bar{x}_t)(\bar{x}_t - \bar{x})' $$

where the terms on RHS could be written as

$$ \frac{1}{NT} \sum_{i,t}(x_{it} - \bar{x}_t)(x_{it} - \bar{x}_t)' = \frac{1}{T} \sum_{t=1}^T [\frac{1}{N} \sum_{i=1}^N (x_{it} - \bar{x}_t)(x_{it} - \bar{x}_t)'] \quad (5) $$

Error! Bookmark not defined. $= \frac{1}{T} \sum_{t=1}^T S(t)$ \quad (6)

Error! Bookmark not defined. $= S_T$ \quad (7)

$$ \frac{1}{NT} \sum_{i,t}(\bar{x}_t - \bar{x})(\bar{x}_t - \bar{x})' = \frac{1}{T} \sum_t (\bar{x}_t - \bar{x})(\bar{x}_t - \bar{x})' \quad (8) $$

Error! Bookmark not defined. $= S_{\ast T}$ \quad (9)

$$ \frac{2}{NT} \sum_{i,t}(x_{it} - \bar{x}_t)(\bar{x}_t - \bar{x})' = 0 \quad (10) $$
The above decomposition shows the total variability of $x_{ijt}$ can be written as

$$S = S_T + S_{\ast T}$$

(11)

where $S_T$ is the $J \times J$ variance covariance matrix of indices reflecting the within time variability of the indices while $S_{\ast T}$ is the $J \times J$ variance-covariance matrix of the indices using $T$ observations where each observation is averaged over $N$ countries per period. So $S_{\ast T}$ represents the between time variation of the data.

**RESULTS**

Based on the previous theoretical model, we got the following results of our index for the countries with available data:

**FIGURE 4: AVERAGE PERFORMANCE OF ALL COUNTRIES**

![Average Performance of All Countries](image)

The table above shows the average performance of all surveyed countries over the year of the Survey. The highest performers are industrialized countries, where most natural resource countries are performing poorly. Among the resource rich nations, natural resource dependent economies are performing below average.