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Department of Economics

Institutions, Commodity Dependence and Economic Growth: Evidence from Latin America

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Master in Economics

Supervisor:
PhD Sofia de Sousa Vale, Assistant Professor,
ISCTE-IUL

October, 2023

BUSINESS
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Acknowledgments

Prior to acknowledgments, I would like to express my joy for what this thesis became. I am glad I investigated a topic I find interesting and could learn more about it.

In 2020 I worked in Colombia, and I spent one year there. I witnessed thousands of Venezuelans walking in the road's side, only with a bag and their kids hand in hand and begging for money in the streets. They were escaping from a country rich in oil but with destructive institutions. It prompted me to choose the topic of the present thesis.

I would like to acknowledge my family for the good example they provide me every day and for prioritising my education.
To friends who make life much funnier and more colourful.
To colleagues, and to colleagues with whom I have become friends. Together we have shared the ups and downs of these two last years of academic journey.
A warm acknowledgment to our professors for the good job they did. Especially I must highlight the role of Professor Sofia Vale, this thesis supervisor, who, during this last year, did not give me the fish, rather taught how to fish by myself. Whose patience, pragmatism and good judgment contributed a lot to the work presented here.

To a closing chapter, and many more to come!

Resumo

Este estudo examina 14 países da América Latina, ao longo de um período de 51 anos (1971-2021), e tem como propósito avaliar a hipótese de existência de uma "resource curse". Bem como, o papel que as instituições nela desempenham. Os países foram divididos, em dois grupos, em função da sua qualidade institucional, má e média/boa e os recursos naturais divididos entre energéticos e agrícolas. Os resultados ressaltam o papel das instituições como tampão contra os efeitos negativos de uma grande dependência de rendimentos provenientes de recursos naturais.

As evidências apontam fortemente para a existência de "resource curse" quando os países têm más instituições. Isto significa que os países com más instituições não podem evitar os efeitos prejudiciais de uma elevada dependência de recursos naturais no crescimento económico. Isto acontece com o rendimento de matérias-primas energéticas, no caso das matérias-primas agrícolas, verificou-se que estas têm um impacto positivo no crescimento económico para ambos os grupos de países. O estudo faz um resumo da história da região e analisa a relação entre matérias-primas, instituições e desempenho económico ao longos dos tempos.

As presentes conclusões poderão ter implicações práticas nas políticas públicas. Não apenas para a América Latina, mas para os países em desenvolvimento. Nós apoiamos a ideia de que os países devem procurar melhorar a sua qualidade institucional, de maneira a alcançar crescimento económico sustentável.

Classificação JEL:

N16: América Latina • Caraíbas

Q01: Desenvolvimento Sustentável

Palavras-Chave:

América Latina; Crescimento Económico;

Qualidade Institucional; Dependência de Recursos Naturais;

Maldição dos Recursos Naturais;

Abstract

This study examines 14 Latin American countries over a period of 51 years (1971-2021) and aims to evaluate the hypothesis of the existence of a "resource curse". As well, the role that institutions play in it. The countries were divided into two groups according to their institutional quality, poor and medium/good, and the natural resources were divided into energy and agricultural. The results emphasise the role of institutions as a buffer against the negative effects of a high-income dependence from natural resources. The study overviews the history of the region and analyses the relationship between natural resources, institutions and economic performance over time.

The evidence strongly points to the existence of a "resource curse" when countries have bad institutions. This means that countries with bad institutions cannot dodge the detrimental effects of a high dependence on natural resources on economic growth. This is the case with the income from energy commodities, in the case of agricultural ones, they were found to have a positive impact on economic growth for both groups of countries.

These conclusions could have practical implications for public policy. Not just for Latin America, but for developing countries. We support the idea that countries should pursue to improve their institutional quality in order to achieve sustainable economic growth.

JEL Classification:

N16: Latin America • Caribbean

Q01: Sustainable Development

Keywords:

Latin America; Economic Growth;

Institutional Quality; Commodity Dependence;

Resource Curse;

Acronyms

CEPAL - The Economic Commission for Latin America

DCCE – Dynamic Common-Correlated Errors

DOLS – Dynamic Ordinary Least Squares

GDP – Gross Domestic Product

ISI – Import Substitution Industry

UNCTAD - The United Nations Conference on Trade and Development

USA – United States of America

VIF – Variance Inflation Factor

Index

Index of Tables

Index of Equations

Preamble

When reading about Latin America it might look like it is a region trapped in a vicious cycle of political instability, endless corruption and a profoundly divided society between poor and rich. Many authors use a hopeless tone when describing the region. As if it would be a victim of the same “magical determinism” that conducts the Buendía family's destiny.

While this thesis was being written, Peru was stricken by widespread social unrest after a failed presidential coup. The Brazilian official Presidential workplace was invaded by supporters of the opposition party, after their election loss. In Ecuador, a presidential candidate was murdered while leaving an election rally. Central America seems to be winking an eye at authoritarianism (again). Chile and Colombia, in the last couple of years, were at the stage of massive and violent protests, which led them to, drastically, change the colours of their governments.

This description may induce the distracted reader into the common and superficial idea that each Latin American country is just another “Banana Republic”.

Despite these recent happenings, the reality that Latin America has changed mainly for the better in the last decades. Poverty rate fell from 45.3% in 2002 to 29.81% in 2018 and the lower-middle class grew. In 2000 only 21% of 18- to 24-year-olds in the region were enrolled in higher education. By 2013 that figure had leapt to 43%, according to the World Bank.

Introduction

In the beginning of the 2000s Latin America experienced a period of high economic growth, which has not been seen in several prior decades. This growth was attributed to a "commodities boom," which implies that the regions' growth was stimulated by sizable increases in the price of commodity exports (Rosnick & Weisbrot, 2014).
Besides economic growth, an improvement in major macroeconomic variables was also verified, as well as in the well-being of its population. Poverty rates fell to the lowest times ever, consumption increased, unemployment dwindled and it was the only region of the world, where in the beginning of the century, inequality lowered (despite remaining one, if not the highest of the world). Although this outstanding performance, as soon as the commodities prices started sinking, so did Latin American economies, exposing all the flaws that underlie this region. A period of apparent calmness and prosperity quickly yielded its place to old concerns, such as social unrest and political instability.

Wealthy natural endowments, such as having rich soil, and an abundance of minerals, gemstones, crude oil, or natural gas, can be seen as a blessing or a curse (van der Ploeg, 2011). On one hand, there are countries which use its natural wealth to improve its growth and development. This is the case of Norway, Canada or Australia, which belong to the richest nations of the world. On the other hand, most countries that are endowed of natural resources cannot be considered economically rich countries. This is the case of many Latin American and African countries, despite their rich natural endowments, their economies are not diversified and their GDP *per capita* is low. For decades these facts have puzzled economists and social scientists, who, looking from different scholar perspectives, have tried to answer it.

The purpose of this present thesis is to empirically assess the hypothesis of a resource curse, and in the affirmative case, if institutions can conditionate it. To achieve this, the mute effect of institutions on shaping a society and therefore, an economy, will be explored. The study will tap into the way raw materials have been explored for centuries and contributed decisively to a pattern that characterises the region's economies. Acemoglu and Robinson (2010) consider institutions to be the fundamental cause of economic growth. Observing how institutions can shape a society, Acemoglu, et al. (2005) argue that some institutions "encourage people to innovate, to take risks, to save for the future, to find better ways of doing things, to

learn and educate themselves, solve problems of collective action and provide public goods. Others do not." (p.397) The resource curse hypothesis holds that resource-abundant countries tend to perform more poorly in terms of sustainable growth than resource-poor countries (Mikesell, 1997). Thereby, a country, whose economy is highly dependent on commodity rents tends to present a slower, and more erratic growth rate than resource-poor countries. It has a harmful effect on social and political well-being, as well (Ross, 2015).

As a practical example of the damaging effect of high dependence on commodities rents, we can look to the last commodity boom (2000-2014), in which some striking takeaways emerge. For countries that have a big income dependence stemming from commodities, during periods when prices boom, their leaders look flawless. They enjoyed high levels of popularity among their folks. Nevertheless, when the tide goes down (a euphemism for dropping prices) this popularity tends to vanish as quickly as it had gone up. This leads to a polarisation of public opinion, and sometimes, to an attempt of subversion of democratic institutions. It is somehow related to the region's permeability to exogenous shocks. As demonstrated by Campello and Zucco Jr. (2016), the likelihood of a president's reelection could increase from 22.2% to 60% if favoured by the price of commodities and the FED interest rate.

The present study adds some features to achieve more accurate results. Following Collier and Goderis (2012), it separates energy and agricultural rents. Additionally, it separates countries according to their institutional quality, which allows to distinguish the effect of energy and agricultural rents on economic growth given the type of countries' institutions. The data comprises a panel of fourteen countries covering fifty-one years (1971-2021). We apply a Dynamic Common Correlated Error (DCCE) estimator that enables to spot different dynamics for short and long-run effects and combine variables with different orders of integration.
The present work contributes to the literature on resource curse and institutions in Latin America. The approach referred above offers more accurate and deeper insights on the relationship between institutions and natural resources. Furthermore, it comprises a large time series, comprising fifty-one years, which allow us to capture different paradigms of the recent economic history of the region. The paper draws some important conclusions on the role of institutions dealing with resource dependence, in developing countries, and opens the door for further investigation on the topic.

Our main conclusions suggest that there is a resource curse, for energy commodities, when a country has bad institutions. It means that rents from energy resources, such as oil or gas, impact negatively economic performance when bad institutions are present. For countries with medium/good institutions, we could not find evidence that energy commodities' rents have a negative impact on economic growth. Rents stemming from agricultural resources were found to have a positive impact on both groups of countries.

The thesis is organised as follows. The next chapter, chapter 2, will present a framework on Latin American economic history, overviewing its main milestones, and aiming to contextualise the region's present economic reality. Chapter 3 presents and discusses the literature review. Chapter 4 details the empirical methodology employed to assess the proposed hypothesis, this chapter also presents the results and pursues a discussion about it. In the last chapter is reported the conclusions and a summary of the undertaken work.

Framework – Latin American Economic Context

When Spanish explorers reached South America in the early 16th century, they heard stories about a tribe of natives high in the Andes mountains in what is now Colombia. When a new chieftain rose to power, his rule began with a ceremony at Lake Guatavita. Accounts of the ceremony vary, but they consistently say the new ruler was covered with gold dust, and that gold and precious jewels were thrown into the lake to appease a god that lived underwater. The Spaniards started calling this golden chief El Dorado, "the gilded one." [1]

This section aims to contextualise the topic of the present thesis. It will drive us through the winding and long history of Latin America and its relationship with commodities. Reviewing the previous literature on the exploitation of raw materials and how it shaped the region's economies. It will dig into the (many times overlooked) role of institutions in economic performance. The tangled, but non-consensual, relationship between commodities, institutions and growth will be explored. The term “region” is employed throughout the paper as a synonym for Latin America. The terms “commodity”, “raw materials” and “natural resources” are used as synonyms.

According to an ECLAC report, the region has almost 20% of the world’s oil reserves, at least one quarter of the stock of its strategic minerals and 30% of its primary forest (CEPAL, 2023). Whether it is agricultural, energetic, or mining, the region has a long history related to natural resources.

Brief Latin America Economic History

By the 1830s, most of the region had achieved its independence from its former colonisers. For most of the first century after it, all republics in Latin America followed a policy of commodities export-led growth. They favoured trade liberalisation, deviating from the mercantilist approach from the colonial times (Topik, et al., 2006). A remarkable case is that of Argentina, which benefited from the commodity lottery, was among the twelve richest

[1] Extract from a National Geographic’s article on the legend of “El Dorado”

countries in the world in the 1920s in terms of real income per capita, despite numerous deficiencies in economic policy (Bulmer-Thomas, 1994).

Import-Substitution-Industry

This economic approach went on until the Great Depression of 1929. In its aftermath, some ideas about alternative economic approaches started brewing among several Latin American economists. In the subsequent decades, the Developmentalist literature highlighted the danger of a strong reliance on natural resources. Raul Prebisch and Hans Singer pointed out that countries reliant on natural resources exports would be exposed to a secular decline in their terms-of-trade *versus* industrialised nations. They observed that during the Great Depression, the prices of raw materials fell further and faster than did the prices of manufactured goods. This view contributed to a model of development which characterised Latin American economies, for some decades, until the 1970s, the Import Substitution Industry (ISI). It advocated the raising of quotas and tariffs on imported manufactured goods. ISI looked to decrease the dependence on imported goods and protect and foster local industries to spur economic growth.

Debt Crisis

In the beginning of the 1980's the region was confronted with the most traumatic economic event in Latin America's economic history, in José António Ocampo's words. The Latin American Debt Crisis. This period ended up being known as the Lost Decade. The region's *per capita* GDP shrank for three years in a row. Rate poverty climbed sharply and just equalised 1980's numbers in 2004 (Ocampo, 2014). A total of sixteen Latin American countries were unable to serve their debt payment obligations and entered default.

Around the same period, the region's political landscape changed. A series of countries overturned their dictators and became democracies. It brought pro-market reforms, which were instrumental in putting an end to endemic macroeconomic instability, by advancing export diversification and strengthening fiscal and monetary discipline. However, for Astorga (2010)

the promise of a new period of high and sustained economic growth in more open and competitive economies did not materialise.

Commodity Boom

During the first decade and a half of the 21st century, Latin America was under the spotlight for its economic and social achievements. Inequality decreased, poverty fell to its lowest ever in history, and economic growth demonstrated an all-time high. The main reason which prompted this outstanding performance was the surge in commodity prices, mainly driven by an increase in Chinese demand. It increased fiscal revenues in the region, which allowed Latin American governments' capacity to pursue fiscal policies designed to curb income inequalities (Clifton et al., 2020).

After a brief overview of Latin America's most important milestones in its economic history, we will focus on the role of institutions in economic growth and its relationship with commodity dependence.

Literature Review

Institutional Quality

Many authors have contributed to building the concepts of good or bad institutions or good or bad governance. For the present study we will consider the definition of the World Bank. The one used to quantify the variable Institutional Quality in its database.

Institutions can be understood as a source or a consequence of economic performance. While Acemoglu, et al. (2019) affirm that good institutions cause growth, on the other side, Glaeser, et al. (2004) defend that poor countries get out of poverty through good policies, often pursued by dictators, and subsequently improve their political institutions. Despite the disagreement on what comes first, whether good institutions or economic development, it looks legitim to say they have a close relationship.

Origins of Latin American Institutions

The articles which seek to track and justify the underlying nature of Latin America's institutions present different views. It is commonly accepted that the region's institutions are characterised by, to a higher or lower degree, high inequality in income and wealth, imbedded corruption practices and the importance of connections to achieve proceeds. However why they are this way is a matter of discussion.

Geography, factor endowments, such as climates, soils, and the density of native populations, contributed to an early inequality in Spanish America (Engerman & Sokoloff, 2002).

Some studies adopt a comparative approach between North America (USA and Canada) and its Latin neighbours, to understand the reasons which led to a greater development in the northern part of the American continent. North (1989) and Coatsworth (1993) contrast the Iberian with the English institutional heritage, to explain the differences in development. From the English side, countries were subjected to common law, protection of property rights, the almost absence of state monopolies and the English finance revolution. These characteristics contrast with a bureaucratic structure, repeated bankruptcies, sharp tax increases, a caste system, and the seizure of properties and financial assets on the Spanish side. This contrasts with the findings of Williamson (2015) who states, that it is a myth, that high inequality is rooted in its colonial past. For the author it only became high during the commodity boom of

1870–1913. The relative inequality level gap increased in the twentieth century, when the region missed the Great Egalitarian Levelling, which took place almost everywhere else.

Commodities, Institutions and Growth

Mehlum, et al. (2006) found, that the natural resource endowment is not a curse *per se*. It is conditional on bad or good institutions, or grabber or producer-friendly, as the authors describe them. Collier and Goderis (2012) also draw similar conclusions. They show that commodity booms lead to unconditional positive short-term effects on output. However, non-agricultural booms in countries with poor governance have adverse long-term effects which fade the short-run gains. It suggests, that it is important for researchers to detail their data on the type of institutions and commodities, and distinguish between short- and long-term effects of natural resources dependence.

According to The United Nations Conference on Trade and Development (UNCTAD), a country is considered to be commodity export-dependent when more than 60% of its total merchandise exports are composed of commodities. In 2021, the same organisation noted that 14 out of 33 countries in the region are commodity-dependent, and another seven countries have a commodity share of 50% to 60%.

The association between resource dependence and economic growth poses a conundrum that many economists, from different schools of thought, have tried to solve. Studying this relationship may look paradoxical. Some nations, such as Great Britain, Germany and the U.S., took advantage of their natural resources, especially coal, to rapidly industrialise. This could suggest, that resource rich countries would have an edge on economic growth and development. However, if randomly picked, a country, rich in natural endowments, there is a higher likelihood, that it is associated with problems, such as slow growth, an undiversified economic structure, income volatility, macroeconomic instability, Dutch disease, illicit financial flows, and poor economic linkages (Ross, 1999; UNCTAD, 2021). The understanding of this paradox leads to the present research.

Sala-i-Martin and Subramanian (2003) show, that there is an inverse relationship between resource dependence and economic growth and it is mainly caused by the degradation that resource abundance imposes on a country's institutions. On the other hand, Alexeev and Conrad (2009) argue, that the relationship between resource abundance does not contribute to

slow long-term growth, and the role of institutions on it has been misunderstood. Similar findings were elaborated by Brunnschweiler and Bulte (2008), arguing that resource abundance spurs growth and institutional quality. Toscani (2017) found, that the extractive sector has a positive impact on many national and sub-national economies in Latin America. Menaldo (2016) debunks the resource curse hypothesis and argues for an institutions' curse. For the author, weak states are blessed by their resources: greater oil means more development and democracy.

Commodity Dependence and Income Volatility

Countries which are highly dependent on income stemming from commodities revenue, tend to present higher degrees of macroeconomic volatility (UNCTAD, 2013). Astorga (2010) conducted an analysis covering 105 years of economic growth in Latin America found evidence, that an unstable and unpredictable macroeconomic environment has been a significant drag on growth and investment in the region. Ocampo (2017) considers that Latin America has been a victim of the macroeconomic vulnerabilities generated by commodity cycles. Stressing the region's incapacity to develop appropriate countercyclical macroeconomic policies. It goes accordingly with a World Bank Report of 2016 that highlights the importance of saving rates to neutralise commodity price cycles. Thus, demonstrating that countries with low saving rates are more exposed to a downturn in prices.

For highly dependent countries the way its commodities windfalls are employed is critical to the long-term wealth creation. For Toscani (2017) a country must invest in exploration or productive human and physical capital so that growth can increase together with wealth, but if the revenues are spent on current expenditures, it might not happen.

Besides affecting institutions and income volatility, resource dependence has an impact on other areas. Some authors elaborated a concept, which is known as Dutch Disease. The term Dutch Disease was firstly coined as the adverse effects on Dutch manufacturing of the natural gas discoveries of the nineteen sixties, essentially through the subsequent appreciation of the Dutch real exchange rate (Corden, 1984). Applying it to commodities exporters means, that these countries often have an overvalued currency, which hampers the attempt to diversify the economic structure because exports from other sectors become not competitive. Although interesting, it is not the aim of the present study to dwell on its effects on economic growth.

An indirect way how institutions impact economic growth is through productivity. Fernandez-Arias, et al. (2005) consider that institutional quality positive effects on growth are likely to be channeled primarily through an efficiency improvement. This goes in line with Sawyer (2010) and Cole, et al. (2005), who notice that TFP stagnation is connected with policy reasons that have impeded either the adoption of superior technologies or its most efficient use.

Overviewing the region's economic history over the last 200 years, connecting it with commodities exploitation and the role of institutions, allows one to better understand where the current region's position comes from. It might look like the region is stuck in a perpetual cycle alternating between bonanzas underlined on commodity prices and busts underpinned on sinking prices and reckless management.

In the upcoming chapter of this study, the methodology behind our empirical model will be presented; it assesses if there are tracks of resource curse and, if confirmed, what is the role of institutions, when dealing with it.

Methodology

Data

For this empirical exercise, a balanced panel of 14 Latin American countries was built, gathering yearly data from 1971 until 2021. The countries that were included in this study are displayed in Table 14, in the Appendix. The countries and period were chosen given the balanced data sets obtained for all the variables tested in the model. Except for TFP, the data was sourced from the World Development Indicators (WDI), World Bank. TFP data was obtained from the Penn World Table – international comparisons of production, income, and prices, version 10.0.

The dependent variable is real GDP *per capita* in USD (constant prices 2015 USD). Gross Domestic Product *per capita* at constant levels is the variable that more accurately can reflect economic growth. It excludes the effects of inflation and population growth. Since the variables' measurement is USD, it was converted into log form to overcome the nonlinearity problem and standardise the data uniformly, as suggested by Wooldridge (2012).

For the World Bank Commodity Price Data, two different Commodities rent indices were included: One which accounts for energy commodities and another one for agricultural ones. These variables are used as proxies for these countries' commodity dependence. They are treated separately, because previous literature has found evidence that they can have a different impact on economic growth. Collier and Goderis (2012) show that agricultural commodity contributes positively for economic growth and non-agricultural ones have a detrimental effect on it. Ross (2014) approaches the resource curse, just for oil and gas, and states that, agricultural products are rarely seen as part of the resource curse, given that they are produced, not extracted.

Several macroeconomic variables, widely found in the empirical growth literature, were added to the model as control variables. Trade openness is measured as the ratio of trade (the sum of exports and imports) to GDP. Inflation is measured by the annual percentage change in the consumer price index. International reserves are the value of foreign reserves, not including gold, as a percentage of GDP. Finally, the level of total factor productivity, at current purchasing power parities relative to the US (USA=1).

According to Nweley and Stouli (2021), control variables provide important means of controlling for endogeneity with multidimensional heterogeneity. Therefore, they were chosen given their importance as proximate growth determinants in previous literature. Among them, we consider trade openness to represent the degree to which a country's economy is connected with its peers. Reserves expresses the capacity level to which an economy is prepared to handle countercyclical measures. This feature gains special importance in commodity export countries, whose economy tends to follow the cycles of commodity prices. The inflation rate can be a mirror for macroeconomic instability, which was widespread in the region until the 1990s. Gregorio (1992) found inflation negatively impacting the region's economic growth, by lowering the investment rate. TFP accounts for the technological level embedded in an economic process. According to Comin (2010), it determines how efficiently and intensely the economic inputs are utilised in production.

Economic Growth Conditioned on Institutional Quality

The main goal of this research is to assess whether economic growth is somehow conditioned by countries' institutional quality. When we tried to collect data with an annual periodicity to represent the quality of institutions, we found variables from 2002 onwards. This feature did not allow us to use institutional quality as a variable, otherwise, we would not have had a balanced panel, which is a required condition.

Despite this inconvenience, a way was found, in order to test the initial hypothesis that economic growth may be conditioned on institutional quality by building a dummy variable for institutional quality.

The World Bank assigns the country's score, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5. Also, it includes six dimensions of governance: Voice and Accountability; Political Stability and Absence of Violence/Terrorism; Government Effectiveness; Regulatory Quality; Rule of Law; and Control of Corruption.

The data was divided into two groups, given its institutional quality score in the year 2019 (prior to the impact of the measures taken to tackle COVID-19, which has prompted a general downgrade in institutional quality scores). Countries that scored less than -3 points were classified into the bad institutions group, while the medium/good institutions group comprises countries that scored more than -3 in this variable. The countries' scores range from -4.54 for

Bolivia to 5.41 for Uruguay. In the Appendix, Table 14 presents detailed information on the countries and their institutional quality score.

With this procedure, our goal is to evaluate whether the quality of institutions has an impact on the way that commodities rents affect economic growth. Our assumption, following previous studies (e.g., Mehlum, et al. (2006)), is that countries with bad institutions are more permeable to the existence of a resource curse.

Model Specification

The empirical approach implemented in this study begins with a simple modified specification of the growth equation.

$$Y = (ER\ , AR\ , T\ , R\ , INF\ , TFP) \tag{1}$$

In which the level of a country's output measured by the log of real *per capita* GDP (Y) represents economic growth that depends on commodities rents (Energy, ER and Agricultural rents, AR) and on macroeconomic variables (Trade Openness, T , Reserves, R, Inflation rate, INF, and Total Factor Productivity, TFP). The general growth equation, which is a modified version of Mauro (1995), can be written as presented:

$$Y_{i,t} = \alpha_i + \alpha_1\, ER_{it} + \alpha_2\, AR_{it} + \alpha_3\, T_{it} + \alpha_4\, R_{it} + \alpha_5\, INF_{it} + \alpha_6\, TFP_{it} + \varepsilon_{it} \tag{2}$$

In equation (2), $\alpha 1$, $\alpha 2$, $\alpha 3$, $\alpha 4$, $\alpha 5$, and $\alpha 6$ are the coefficients, and i and t are the ith country and tth time period, respectively (i = 1, 2,..., N = 14;t = 1,2,...,T = 51). Y is the economic growth measure, ER is the energy rents index measured by the percentage of rents stemming from energy commodities (i.e. oil, gas, coal and others) to GDP, AR is the agricultural rents index measured by the percentage of agricultural commodities rents (i.e. soybeans, grains, forest products, etc.) to GDP, T is trade openness, R is the percentage of foreign reserves (does not include gold) to GDP, INF is the inflation rate and TFP is total factor productivity. ε_{it} is the stochastic error term.

Estimation Strategy

This study estimates the above equations using the Common-Correlated Effects Estimator (CCE) (Pesaran, 2006). This estimator has been increasingly used since it can correct errors associated with cross-sectional dependence data and it allows to distinguish between short and long-run relationship between variables (Chudik & Pesaran, 2013). Another advantage is its applicability to both stationary and non-stationary data (de Calvacanti, et al., 2015) since this technique enables to override the order of integration of the variables. Kapetanios, et al. (2011) show that cross-sectional averages keep correcting for the bias introduced by the presence of unobserved common factors when these factors are non-stationary.

To check the model robustness, we perform a Dynamic OLS (DOLS), as proposed by Stock and Watson (1993). The DOLS estimator is used to estimate the long-run association between the variables, enabling to combine alternative orders of integration and being robust to problems of autocorrelation. It thus allows us to ensure the stability and validity of our previous results.

Panel Unit Roots, Cross section dependence and Cointegration tests

Dealing with panel data compels to examine cross-section dependence of the panels, the order of integration of the variables (stationarity), and cointegration to understand which tests fit the data better.

The first step analysing this sort of data is to assess the cross-section dependence (CSD). For this analysis a CD Pesaran test will be employed. Ignoring CSD could lead to inconsistent results (Andrews, 2005). Given the data gathered, it would not be a surprise if we would face some challenges with CSD, since this study dwells on countries within the same region. Guloglu and Ivrendi (2010) in a prior study on the same region, found evidence of cross section dependence.

Pesaran's CSD equation is given as:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\widehat{\rho_{ij}}\right) \rightarrow N(0,1)$$

(3)

The null hypothesis of no cross-sectional dependence is tested using Pesaran's CSD statistic.

After examining for CSD, the next step is to evaluate the order of cointegration of the variables in the model. When it comes to testing for stationarity there are first- and second-generation tests. However, in panels where CSD is present the first-generation panel unit root tests may provide misleading results (Dogan & Seker, 2016).

To get more accurate and robust results, the second-generation unit root tests, namely, CADF (Cross-sectional augmented Dickey-Fuller) and CIPS (Cross-sectional augmented Im, Pesaran and Shin) tests will be employed, followed by Pesaran (2007).

Thereafter, having tested for the presence of unit roots, we can go for the Panel Cointegration technique that aims to gauge the long-term causality among variables. According to Lau, et al. (2019) when CSD exists in the data, the results from the Pedroni and Kao cointegration tests may not be robust. Given this, we will use the panel cointegration technique suggested by Westerlund (2007). The Westerlund cointegration test expression is as follows:

$$\alpha_i(L)\Delta y_{it} = \delta_{1i} + \delta_{2i}t + \alpha_i(y_{i,t-1} - \beta'_1\chi_{it} + \lambda_i(L')\,\upsilon_{it} + e_{it})$$

(4)

Empirical Results and Discussion

Table 1 presents a summary and description of the variables used for this study.

Table 1 Variables description and source

Variables	Acronym	Definition and measurement unit	Source
GDP *per capita*	GDP	Log of real GDP *per capita* (constant 2015 US$)	World Bank Data Base
Energy commodities index	ER	Percentage of rents stemming from energy commodities to GDP	World Bank Data Base
Agricultural commodities index	AR	Percentage of rents stemming from agricultural commodities to GDP	World Bank Data Base
Trade Openness	T	Percentage of trade (exports + imports) to GDP	World Bank Data Base
Reserves	R	Percentage of foreign reserves (does not include gold) to GDP	World Bank Data Base
Inflation Rate	INF	Annual percentage change in the consumer price index	World Bank Data Base
Total Factor Productivity	TFP	Total Factor Productivity, at current PPPs (USA=1)	World Penn Tables

Table 2 Variables Descriptive Statistics – Medium/Good Institutional Quality Countries

Variables	Mean	Standard Deviation	Maximum	Minimun	Skweness	Kurtosis
GDP	8.659998	.448805	9.692283	7.557244	.1192399	2.499213
Energy Rents	3.106604	3.887832	18.69436	0	1.520002	4.974874
Agricultural Rents	.7969857	1.141623	11.91274	.0164828	4.039134	27.50633
Trade Openness	55.5173	30.08253	166.6982	14.39088	1.355358	4.919637
Reserves	6.784882	7.348098	37.95425	.0960592	1.725297	5.905198
Inflation	43.23104	350.1527	7481.664	- 1.550275	18.7329	379.4414
TFP	1.073762	.1697939	1.61163	.701454	.8718203	3.619486

Note: GDP is in log form.

Table 3 Variables Descriptive Statistics – Bad Institutional Quality Countries

Variables	Mean	Standard Deviation	Maximum	Minimun	Skweness	Kurtosis
GDP	7.749717	.290739	8.386728	7.270391	.3149166	1.962247
Energy Rents	2.22231	3.186741	14.03988	0	2.006757	6.524942
Agricultural Rents	1.224074	1.051253	5.889747	.196859	2.514312	9.972733
Trade Openness	65.842	26.68707	136.4898	24.93225	1.108812	3.301816
Reserves	8.394257	9.89324	42.83514	.2517477	1.706712	5.441728
Inflation	98.89227	954.192	11749.64	-.4535919	12.02712	147.205
TFP	1.078317	.1324791	1.448439	.889426	.8820814	2.75692

Note: GDP is in log form.

Tables 2 and 3 present the variables' descriptive statistics, divided by institutional quality group. Some differences can be observed. Countries, where bad institutions are the rule, we notice a lower GDP mean and the inflation mean is significantly higher, which might indicate a higher degree of macroeconomic volatility. For rents to GDP, about energy rents it is higher for the medium/good institutions group, and agricultural rents are higher as a percentage of GDP in countries with bad institutions.

Table 4 presents the correlation coefficients amongst variables.

Table 4 Correlation Matrix

Probability	GDP	ER	AR	T	R	INF	TFP
GDP	1.0000						
Energy Rents	-0.0467	1.0000					
Agricultural rents	-0.1217	-0.2815	1.0000				
Trade Openness	0.0577	-0.2343	0.1393	1.0000			
Reserves	0.3268	0.1210	-0.0794	0.1183	1.0000		
Inflation	-0.0771	0.0785	-0.0357	-0.0654	-0.0630	1.0000	
TFP	-0.1487	0.0191	0.0918	-0.1252	-0.2815	0.0341	1.0000

Table 5 Heteroscedasticity and Multicollinearity Tests

Breusch-Pagan/Cook-Weisberg test for heteroscedasticity		
Chi2(1) = 4.68		
Prob > chi2 = 0.0305		
Variance Inflation Factor Test		
Variable	VIF	1/VIF
Energy Rents	1.17	0.852494
Agricultural Rents	1.11	0.902507
Trade Openness	1.11	0.902090
Reserves	1.14	0.877919
Inflation	1.02	0.982797
TFP	1.11	0.898694
Mean VIF	1.11	

The Breusch-Pagan test for heteroscedasticity showed that our data is homoscedastic at 1% statistical significance level (see Table 5). Additionally, we could not detect multicollinearity problems as can be attested by the Variance Inflation Factor Test also in Table 5.

Diagnostic Tests

Table 6 presents the outcomes for cross-sectional dependence for each variable covered in the study. Performing this test, we can understand whether or not the cross-sections in a panel dataset are not independent of each other. For instance, if a shock in a given country of the sample would impact others. It is plausible to assume, that within the same region countries have a higher degree of dependence.

The results of the Pesaran CD test for cross-sectional dependence showed that there is cross-sectional dependence in the entire panel dataset. All variables reject the null hypothesis of cross-section independence, at 1% significance level.

Table 6 Cross sectional dependence test.

Variables	CD-test value	p-value	corr	Abs(corr)
GDP	60.33*	0.000	0.886	0.886
Energy Rents	25.62*	0.000	0.376	0.427
Agricultural Rents	30.55*	0.000	0.448	0.522
Trade Openness	29.62*	0.000	0.435	0.463
Reserves	54.88*	0.000	0.806	0.806
Inflation	18.72*	0.000	0.275	0.297
TFP	30.58*	0.000	0.458	0.590

Note: * represents 1%, level of significance

Table 7 Panel unit roots test

Variables	CIPS		CADF	
	Level	First difference	Level	First differences
GDP	-2.100	-4.737*	-2.599*	-4.152*
Energy Rents	-2.060	-5.439*	-1.998	-4.680*
Agricultural Rents	-2.875*	-6.148*	-2.553*	-5.526*
Trade Openness	-1.655	-6.097*	-1.764	-4.948*
Reserves	-1.891	-5.560*	-1.988	-4.481*
Inflation	-3.465*	-5.855*	-3.435*	-6.118*
TFP	-1.890	-5.573*	-2.260**	-4.419*

Note: * and ** represent 1% and 5% level of significance, respectively.

Table 7 presents the result of the two second-generation unit root tests, namely, CIPS and CADF, for the variables used in the current study. Both tests were firstly performed at level and then in first differences. For CIPS, the results for the variables in levels show that agricultural rents index and inflation rate are stationary, both at 1% significance level. For CADF, the results for the variables in levels show GDP *per capita*, agricultural rents index and inflation rate as stationary at 1% significance level, while TFP is stationary at 5% significance level.

When performing the first differences, the output shows that all the variables are stationary for both tests, at the 1% level of significance. Overall, we can conclude that the variables are integrated of order one.

The results displayed in tables 8 and 9 confirm the assumption of the existence of long-term cointegration among variables. Two Westerlund cointegration tests were performed, given the institutions type. It tests if some panels are cointegrated. For both we can reject the null hypothesis of no cointegration with a 1% and 5% significance level, for medium/good and bad institutions, respectively. It strongly points towards long-term cointegration among the variables. These results provide us with a solid background to examine the long-run impact of the explanatory variables on the dependent one.

Table 8 Westerlund cointegration test - Countries with Medium/Good Institutions

Alternative Hypothesis	Statistic	p-value
Some panels are cointegrated	4.2998*	0.0000

Note: * represents 1% level of significance, respectively.

Table 9 Westerlund cointegration test – Countries with Bad Institutions

Alternative Hypothesis	Statistic	p-value
Some panels are cointegrated	1.8483**	0.0323

Note: ** represents 5% level of significance, respectively.

Estimation

We proceed by estimating two models, one comprising countries that are classified as having good institutions and another one for countries with bad institutions, whose results are displayed respectively in tables 10 and 11.

Table 10 Results for Commodity Rents impact on economic growth for Medium/Good Institutions countries

Variable	Coefficient (%)	Standard Error	Z (%)	P>|Z| (%)
Short-Run				
GDP lagged	.4199147*	.1632077	2.57	0.010
Energy Rents	.1692265	.1037133	1.63	0.103
Agricultural Rents	.0513973	1575448	0.33	0.744
Trade Openness	-.0009856	.0009984	-0.99	0.324
Reserves	-.002978	.003503	-0.85	0.395
Inflation	.0011278	.0011971	0.94	0.346
TFP	.9308564*	1677108	5.55	0.000
Long-Run				
Energy Rents	-.3260462	.4336297	-0.75	0.452
Agricultural Rents	.956954***	.550374	1.74	0.082
Trade Openness	0023107	.0022813	1.01	0.311
Reserves	-.0215338	.0134956	-1.60	0.111
Inflation	-.0128692	.0080148	-1.61	0.108
TFP	2.215712*	.7169689	3.09	0.002
Constant	-.5800853*	.1632077	-3.55	0.000

Note: Results of dynamic common correlated effect (DCCE) estimation for Medium/Good Institutions

*, **, *** represent 1% and 5% level of significance, respectively.

The dependent variable is log of GDP

Table 11 Results for Commodity Rents impact on economic growth for Bad Institutions countries

Variable	Coefficient (%)	Standard Error	Z (%)	P>|Z|
Short-Run				
GDP lagged	.0868705	.0780596	1.11	0.266
Energy Rents	-.0228362*	.0018286	12.49	0.000
Agricultural Rents	.0311548*	.0071617	4.35	0.000
Trade Openness	.0004807	.001685	0.29	0.775
Reserves	-.0063497*	.0012656	-5.02	0.000
Inflation	-.0010311	.0006423	-1.61	0.108
TFP	.7220967*	.0870442	8.30	0.000
Long-Run				
Energy Rents	-.025449*	.0033051	-7.70	0.000
Agricultural Rents	.0332446*	.0051748	6.42	0.000
Trade Openness	.0008722	.0020228	0.43	0.666
Reserves	-.0069992*	.0012981	-5.39	0.000
Inflation	-.0012183	.0007216	-1.69	0.091
TFP	.818622*	.1650769	4.96	0.000
Constant	-.9131295*	.0780596	-11.70	0.000

Note: Results of dynamic common correlated effect (DCCE) estimation for Bad institutions countries

* represents 1% level of significance.

The dependent variable is log of GDP

Robustness Estimation

Table 12 Results for Robustness Check for Medium/Good Institutions countries

Variable	Coefficient (%)	Standard Error	Z (%)	P>|Z|
GDP lagged	.9936*	.04009	221.98	0.000
Energy Rents	-.000241	.00051	-0.47	0.636
Agricultural Rents	.001575	.00157	-0.36	0.717
Trade Openness	.0000797	.0000597	1.33	0.182
Reserves	.0006193**	.0002934	2.11	0.035
Inflation	-.0000172**	.000007	-2.30	0.021
TFP	.007908	.01101	0.72	0.473

Note: Results of dynamic OLS (DOLS) estimation for Medium/Good institutions countries

* and ** represent 1% and 5% level of significance, respectively.

Table 13 Results for Robustness Check for Bad Institutions countries

Variable	Coefficient (%)	Standard Error	Z (%)	P>|Z|
GDP lagged	1.000874*	.0003672	2725.55	0.000
Energy Rents	-.0003578*	.00129	-2.77	0.006
Agricultural Rents	.0016191*	.00044	3.64	0.000
Trade Openness	.0000215	.0000134	1.6	0.110
Reserves	.0005522*	.0000531	10.39	0.000
Inflation	-1.39	.00000543	-2.56	0.108
TFP	-.0014979	.0029869	-0.5	0.616

Note: Results of dynamic OLS (DOLS) estimation for Bad institutions countries

* represents 1% level of significance.

Commodity Rents

Tables 10 and 11 display the results of our estimations for medium/good and bad institutions, respectively. Some outcome differences can be observed between countries with bad *versus* medium/good institutions. For countries with bad institutions, there was strong

evidence that energy rents hurt economic growth. By contrast, for rents stemming from agricultural commodities, positive effect on economic growth at 1 percent significance was found.

The results for countries with medium/good institutions present marked differences. Even if the model loses statistical significance, it allows us to make some interesting inferences. However, for the long-run equation, the regressor loses its significance. This could indicate that compared to countries with bad institutions, energy rents can impact differently the long-run economic performance of a country with medium/good institutions. Therefore, we cannot confirm the assumption, that there is a resource curse for countries with medium and good institutions.

Agricultural rents are shown to have a positive coefficient at 10 percent significance, in the long run, in line with what was found for countries with bad institutions.

The results obtained with the DOLS estimator, presented in tables 12 and 13, confirm the previous findings of our DCCE estimator. For countries with bad institutions, energy rents harm economic growth, while agricultural rents contribute positively to it. In both cases with a 1% level of significance. For countries with medium/good institutions, for both variables, the estimators do not present statistical significance.

These results point towards the existence of a resource curse effect, conditioned on the countries' quality of institutions. This finding goes in line with Mehlum, et al. (2006), who argue that the combination of grabber-friendly institutions and resource abundance leads to low growth. As observed by Auti (2000), commodity exports sparked a contest for rents that usually fostered fractional or predatory political states. For Ross (2014), three harmful effects tend to be felt in resource, mainly oil-rich countries. It usually fosters the durability of authoritarian regimes, promotes certain types of corruption, and helps trigger violent conflict in low- and middle-income countries. The authors highlight the perverse relationship between rich natural resources' endowment and economic growth when weak institutions are present.

Mehlum, et al. (2012) analysed the case of Norway, where good institutions deal with a high abundance of natural resources. They observed that these institutions provide protection of property rights and little corruption. The revenues of the resources are allocated productively and for the benefit of the general population, not just the elite. They notice, as well, a good management of savings rate to counter the boom-and-bust cycles of oil prices. To Holden (2013), there is a view among Norwegian decision-makers that the resources belong to the

nation, and that the development should benefit the society as a whole, including future generations.

The sharp differences between the way energy and agricultural commodities influence growth were explored by Collier and Goderis (2012). The authors argue it corresponds to whether or not the activity generates rents. Agricultural commodities can be produced in many different locations, so competitive entry tends to drive profits to normal levels. In the other side, the non-agricultural commodities are all extractive, its production is dependent upon the presence of the resource in the ground. As Landes (1999, p.173) observed about the effect of high inflows of silver and gold in Spain in the sixtieth century. "Easy money is bad for you. It represents short-run gain that will be paid for immediate distortions and later regrets."

Other Variables

For countries where institutions are considered medium or good, TFP was found to have a strong positive elasticity in economic growth, both short- and long-run, at 1 percent significance level. For the other group of countries, similar findings are observed, although the impact is not so strong.

TFP is the variable that has the highest coefficient, it shows how crucial this variable is for growth. Daude and Fernández-Arias (2010) state, that productivity is key to the problematic economic development in the region, and it is half of its potential. According to Ghersi (1997), it is linked to the wide and unproductive informal sector in the region.

In countries with bad institutions, reserves to GDP appear to have a minimum, but negative, impact on growth, at 1 percent significance. This might go against the proposition that countries with volatile income ought to have reserves to handle the moments when this source of income is scarce. The inflation rate has a negative long-term impact on growth for countries with bad institutions.

For both the groups of countries trade does not present any statistical significance.

Conclusion

Over the years, many economists have wondered if an abundance of natural resources is a constraint or a driver of economic performance. The answers have been presented with some mixed results. A wealthy endowment in natural resources does not assure, *per se,* a positive or negative impact in an economy. What will, ultimately, define how it will affect the economy, is institutional quality. A country which has institutions that secure property rights, employ commodities' revenues effectively and present small corruption, is likely to growth at a favourable pace, despite its rich natural endowment.

Our purpose was to assess the hypothesis of a resource curse, depending on institutional quality in Latin America. To reach it, the present study used a long panel series of the last fifty years (1971-2021), for fourteen countries. As an empirical method, a Dynamic Common Correlated Error estimator (DCCE) was employed, which enabled to mix different orders of integration and distinguish for the short- and long-term effects.

This study stands out for the detailed evidence that were reached by dividing the countries by institutional quality and type of commodity. This allows to more accurate and meaningful results.

The findings strongly suggest, that institutions can act as a buffer for the negative impact of a high resource dependence on economic growth. Therefore, the evidence supports the hypothesis of resource curse conditioned on bad institutions and energetic resources. This suggests that commodity dependence will have a negative impact on economic performance when bad institutions are present and if the commodity which a country is dependent on is of the energy type, such as oil or gas. For countries where institutions are considered medium or good, the conclusions were not so clear.

Agricultural rents presented a positive and statistically significant impact on economic growth in both groups of countries. It can be somehow related with competitive dynamics that underly this sector, different from extractive resources.

It looks plausible to state that countries with undiversified economic structure and highly dependent on commodities rents should aim to reduce their dependence. It is easier said than done. Rents stemming from natural resources mean an assured source of income for countries. To curb these rents would mean a short-term reduction in the state capacity to

respond to basic needs and immediate problems. It means a less likelihood of re-election, as well.

The present findings can have practical implications in public policy, not only for Latin America, but for developing countries with similar economic structures and institutions, where a significant source of income stems from commodities. Local governments ought to make an effort to improve their institutional quality and international organisations should support these efforts to achieve more resilient and inclusive institutions.

This study presents some limitations, the number of countries used in the analysis due to the lack of available data. It could also have been important to have a proxy variable for institutional quality in the model, however we could not find it in the literature. For further investigation in the topic, we could suggest an approach that instead of dividing countries by institutional quality, would divide them for commodity dependence levels. The division could be made by percentage of rents to GDP, or percentage of commodity exports of total exports. Another approach would be to study periods of commodity boom prices, *vis-à-vis* other periods, to understand how economies and institutions react to this external shock.

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Appendix

Table 14 List of countries and institutional quality score

Countries	Institutional Quality Score	Institutional Quality Classification
Bolivia	-4.54	Bad
Brazil	-1.32	Medium/Good
Chile	5.00	Medium/Good
Colombia	-0.98	Medium/Good
Costa Rica	3.69	Medium/Good
Dominican Republic	-1.27	Medium/Good
Ecuador	-2.34	Medium/Good
Guatemala	-3.90	Bad
Honduras	-4.10	Bad
Mexico	-2.62	Medium/Good
Panama	0.63	Medium/Good
Peru	-0.44	Medium/Good
Paraguay	-2.06	Medium/Good
Uruguay	5.41	Medium/Good