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Economic Growth, Natural Mineral Resources and Education in Developing Countries

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Economic Growth, Natural Mineral Resources and Education in Developing Countries

Case of Study: The Democratic Republic of Congo

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Abstract

The contributions of education in achieving the modernization of developed countries has attracted much attention. Perhaps, underdeveloped countries have provided a limited contribution toward economic development and growth because educational funding was not a priority. Therefore, some underdeveloped countries, including the Democratic Republic of Congo, rely heavily on their natural resources for economic development and growth, minimizing the importance of high quality education in economic growth.

The question is: Why has the Democratic Republic of Congo not been able to transform its abundant resources into a blessing for a prosperous nation? And how does education contribute to economic growth and development in these types of economies? The impact of labor productivity, trade, technology, health, and income are important factors in any policy structure. Therefore, this work will be concerned with the production of human capital, which involves expenditures on formal and informal education to understand problems with low economic growth and how to deal with them in the Democratic Republic of Congo.

Many developing countries savings rates are too low despite their abundant natural resources. Because the Democratic Republic of Congo (DRC) is unable to increase its savings, it does not permit the country to achieve a targeted economic growth and stability rate. Foreign aid was provided in order to relieve the savings constraint and increase investments, thus leading to economic growth. However, the country is still

keeping the status quo rate of growth and was ranked second to last in 2014 in the world on the United Nations Development Programs (UNDP), Human Development Index. It has been ranked similarly for a number of years. The DRC has difficulty achieving the sustainable economic growth. We arrive to conclude that even with its abundant natural resources; it cannot achieve sustainable economic development without substantial investment in human capital.

My objective is to analyze if mineral endowments have, in fact, negatively impacted the historical long-run growth and development of mineral-rich countries such as the Democratic Republic of Congo. In order to reach this goal, this paper will examine the effects of some of the most important microeconomic variables such as education, natural resources, GDP, as well as, import and export in order to determine the impact of natural resources on the resource –rich countries.

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Introduction

Country Economy Background

The Democratic Republic of Congo is a nation endowed with vast wealth of natural resources. Its economy is slowly recovering after decades of decline. Systemic corruption since independence in 1960, combined with country-wide instability and conflict that began in the mid-90s has dramatically reduced national output, as well as, government revenue and increased external debt. Starting in 1976 the International Monetary Fund (IMF) provided stabilizing loans to the dictatorship. The President at the time, Mobutu Sese Seko, and his circle appropriated much of the money. The Democratic Republic of Congo's natural resources earnings should secure financing for the infrastructure needed for growth. However, with the installation of a transitional government in 2003 after peace accords, economic conditions slowly began to improve as the transitional government reopened relations with international financial institutions and international donors. At the same time, the government began implementing reforms.

Progress has been slow to reach the interior of the country although clear changes are evident in Kinshasa and Lubumbashi provinces. An uncertain legal framework, corruption, and a lack of transparency in government policy are long-term problems for the mining sector and for the economy as a whole**.** Much economic activity still occurs in the informal sector and is not reflected in GDP data. Renewed activity in the mining sector, which is also the resource for the most export income has boosted Kinshasa's fiscal position and GDP growth in recent years. The global recession cut economic

growth in 2009 to less than half its 2008 level, but growth returned to around 7% per year in 2010 through 2012.

The DRC signed a Poverty Reduction and Growth Facility with the IMF in 2009 and received $12 billion in multilateral and bilateral debt relief in 2010, but the IMF at the end of 2012 suspended the last three payments under the loan facility-worth $240 million –because of concerns about the lack of transparency in mining contracts[1]. However, there is a series of discussions among development economists over the role of mining in developing countries. Primary resources industries and the mining industry, in particular, has long been the pariah of development economics. Lewis (1984, 1989) argued that "mineral –rich countries are not said to have development advantages, but development problems."[2] A review of literature will help us to understand the context of the resource curse and the Dutch disease, as well as, a contribution to the theory of economic growth.

[1] Democratic Republic of the Congo Economy Overview, *CIA World factbook*, June 30, 2015, accessed July11, 2015,http://www.indexmundi.com/democratic Republic of the Congo economy overview.html.

[2]Stephen R Lewis, *"Development Problems of the Mineral-Rich Countries,"* in Moshe Syrquin, Lance Taylor and Larry E. Westphal (Eds.) *Economic Structure and performance: Essays in Honor of Hollis B. Chenery* (Orlando, FL: Academic Press, Inc., 1984), 157-77.

Chapter 1: The Democratic Republic of Congo Economic Context

The Democratic Republic of the Congo (Kinshasa) owns some of the world's richest mineral deposits, but its mining potential remains largely unexploited. The most important mineral resources exploited included cobalt, copper and diamonds. The country also produces some gold, tin, iron, nickel, and tantalum, zinc, niobium/columbium, uranium, silver, coal, crude oil, gemstones, tungsten, cadmium, and crude oil, among others. According to the US Geological Society (USGS), in 2010, the country's share of the world's cobalt production amounted to 51%; tantalum, 14%, gem-quality diamonds, 5%, and 3% copper and tin each. In 2012 the numbers decreased, the country's share of the world's industrial diamond production was estimated to 21%; tantalum, 12%, gem-quality diamond, 5%, copper, 3%, and tin, 2% and cobalt, 55% with about 3.4 million tons in reserves[3]. The Democratic Republic of the Congo (Kinshasa) possess about 3% of the global copper reserves and 45% of global cobalt reserves, 25% of the global diamond reserves, and reserves of some precious metals such as gold and tantalum[4].

[3] Thomas R. Yager, "The Mineral Industry of Congo (Kinshasa)," *U.S. Geological Survey Minerals Yearbook-2010* 1, no. 9 (May 2012): 1, accessed April 19, 2015,http://minerals.usgs.gov/minerals/pubs/country/2010/myb3-2010-cg.pdf.

[4] Ibid., USGS Minerals Yearbook-2011, 2012 (June 2014).

Table 1.1. The Country's share of the world's production accounted to in percentage (2008-2012)

Year	2008	2009	2010	2011	2012
			Minerals		
Cobalt	**45**	**40**	**51**	**53**	**55**
Industrial diamond	**30**	**31**	**25**	**34**	**21**
Tantalum	**-**	**9**	**14**	**13**	**12**
Gem-quality diamond	**6**	**6**	**5**	**7**	**5**
Copper	**2**	**2**	**3**	**3**	**3**
Tin	**-**	**4**	**3**	**2**	**2**

Source: US. Geological Survey Minerals Yearbook

In relative terms, the Democratic Republic of Congo (Kinshasa) is the largest cobalt producer globally. It boasts the 10th highest gold reserves globally, and has the largest diamond reserves in Africa[5]. Cobalt is used in the preparation of magnetic, corrosion resistant and high strength alloys. This material also gives a distinctive deep blue color to glass, ceramics, inks, paints and varnishes. It is the second biggest earning export product, after being overtaken by copper in 2011.

Copper is the large export-earning product in Democratic Republic of Congo (DRC). In 2011 there was an estimated 20 million tons of copper reserves which accounted for over 30% of export receipts. Copper has excellent electricity conductivity; it is an ideal metal for manufacturing electrical wires. Coltan [6]is in huge demand by the electronic industry.

[5]Nina Corneiro,"Uk Investors Eye up the Continent's Burgeoning Opportunities,"*PM Communication*, December 6, 2015, under "P.2-3," www.thedfolio.com/files/file/report-56618261ec192.pdfworl.

[6] Coltan (short for columbite–tantalite and known industrially as tantalite) is a dull black metallic ore from which the elements niobium and tantalum are extracted.

The Democratic Republic of the Congo contains 80% of the world's Colton reserves. Tantalum used in the production of electronic component is an essential metal in the production of cell phones, laptops, IPods, jet engines, rockets, cutting tools, camera lenses, X-ray film and other related products. The natural mineral resources in the Democratic Republic of Congo has had a negative impact on the country, amassing substantial wealth for few while causing insecurity and detriment to the masses, plunging them in misery and poverty. It has raised billions of dollars for international financial markets while a poor miner earns only $1 for the 2 pounds of Colton he produces.

In addition, not all the country benefits from the vast hydroelectric potential. The roaring waters of the Congo River have the power to illuminate all Africa; unfortunately the hydroelectric power remains largely unused. The Inga Dam alone, along the Congo River, if well completed, has the potential capacity to generate 40,000 to 45,000 MW of electricity, which could fulfill the electrical needs of the entire southern African region. This water resource could also generate an important investment to the country's economic growth, if the country invested in itself to its full potential. Scientists have calculated that the entire Congo basin accounts for 13% of global hydropower potential which is estimated at 100,000 MW, but only 2.5 % has been developed to-date. DRC's water resource potential was estimated at 19,967 m^3/year per inhabitant in 2008.

Despite its reserves of petroleum, natural gas, coal and a potential hydroelectric power only 6% of the country has access to electricity with a population of 75.5 million people. Because of the ongoing political uncertainties and resulting lack of interest from investors, Inga Dam's potential has been limited. Surpassed only by the basin of the Amazon, the Congo River basin encompasses the world's second largest rain forest.

Opportunities to the river and its tributaries to generate hydropower are enormous where much of the trades of Central Africa pass along of the river. The country has not overcome the significant challenges in the area of infrastructure caused by the war. The instability and conflicts destroyed some of the existing infrastructure so that they have a remarkable negative impact on the development. The rational exploitation of these resources represents an exceptionally high quality platform for sustainable development and the promotion for green growth[7]. An **i**nadequate electric supply is a significant constraint on the development of the mining sector.

Economic Growth and Sectorial Productivity Performance

After a decade of fluctuation, the state increased its control of the economy. Economic growth in the DRC viewed expansion, reaching a real GDP growing at an average rate. The present table shows the average growth rate of the Democratic Republic Democratic of Congo's economy from 2005 to 2015.

Table 1.2. Real GDP Growth in % (2005-20015)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Real GDP	6.1	5.3	6.3	6.2	2.9	7.1	6.9	7.2	8.5	8.6	8.5

Sources: International Monetary Fund (IMF) World Economic outlook (WEO) database, October 2014

[7] African Development Bank, "Democratic Republic of Congo, 2013-2017 Country Strategy Paper," *African Development Bank* (June 2013): 6-7, accessed March 20, 2015,http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Democratic Republic of Cong 2013-2017 Country Strategy Paper.pdf.

GDP growth experienced a significant drop in 2009 to 2.9% from 6.2% in 2008. This was due a decline in demand for commodities and inflation, as well as the revived violence in eastern regions. However, the country's economy rose during the following years, because of the recovery of activities in the wake of ongoing improvement in the political and security condition. Also contributing to the improvement was the hike in the cost of goods and services on the international markets, especially copper and cobalt. Growth has primarily been driven by private investment in the mining and trades sectors as well as an increase in public investment, especially in construction[8]. In fact, based on their contributions to the GDP, mining, agriculture and trade were the key sources of economic growth for the country.

However, despite the DRC's vast, fertile and mineral rich land, the sources of growth remain barely diversified and the structural distribution of GDP has continued unchanged over the last decade. In the past, agriculture offered direct employment to more than 70% percent to the labor force and produced 40 % of the GDP. Nevertheless, agriculture productivity has not recorded a substantial growth and its contribution to exports has declined continuously. This is due to the lack of credit both public and private investments in agriculture, as well as, in the country's energy and transportation infrastructure. Despite a wealth of underexploited forests, fisheries and farmland, it is likely that conflict, inadequate government support for farming and ongoing instability will ensure that this potential remains untapped.

[8] Ibid., 2.

Some experts indicated to the New Agriculturist journal that "without security and stability, foreign investment will continue to be hampered and infrastructure projects will not see the light of day. DRC has greater potential than many of its African neighbors to lift its population out of extreme poverty, but its agriculture sector needs wholesale reform, with the support of the government and the private sector."[9] As a starting point, however, we can look at the obvious contributions to the Congolese economy. Table 1.2 shows the relative contributions of sectors associated to the natural resources.

Table1.2. **Sector percentage contribution to GDP (2008)**

Year	2008
Agriculture, hunting, forestry and Fishing	38.2
Electricity, Water, Gas	0.6
Mining and Quarrying	14.1
Manufacturing	4.1
Construction	7.4
Wholesale and retail trade	21.4
Transport Storage and communication	6.2
Market Services	6.1
Government Services, Defense and Social security	1.9

Source: Focusafrica.gov.in. Sector profile DRC

The most important sectors are agriculture 38.2%, trade 21.4% and the mining sector 14%. The manufacturing industry only represents 4.1% of the GDP and construction 7.4%. The Democratic Republic of Congo's tariff rate is 11.0 %. Bureaucratic and regulatory barriers impede the free flow of trade and discourage foreign

[9] "Country Profile- Democratic Republic of Congo," *New Agriculture*, January 2009, under "2," accessed March 20, 2015, http://www.new-ag.info/en/country/profile.php?a=641.

direct investment. In addition, the lack of these infrastructures constitutes to be a major obstacle for the country to realize the sustainability of its immense agro-industrial and mining potential to aid economic growth. In a vast country with limited ways of communication, the development of a transportation network has a significant positive impact on economic growth and stability. The maintenance of infrastructure and productive capital was neglected and postponed indefinitely. These actions lead to the severe decline of economic activities for decades.

Since 2002, mining has played a crucial role in the major infrastructure developments for the country. Economic growth has remained strong and the country has had positive prospects. The mining sector has contributed heavily to the country's economic growth reversal. According to the World Bank study, the mining sector accounted for an estimated 12% of the country's GDP in 2012 comparatively to 11.5 % in 2011. The country resumed large investments in mining development and equipment. As result, production levels in 2011 surpassed their previous high point achieved in 1984. The nature of the expansion of the mining industry, and thus economic growth within the country, relies heavily on Foreign Direct Investments (FDI) and external debt.

By the abundance of natural resources that the country surrounds, the mining sector continues to attract attention and receive interest from investors with risk; unfortunately large corporations and the politically connected are the beneficiaries of this expansion resulting in the lack of transparency and governance. In this case, the opaque contract of infrastructure and mining deals, in the Sino-Congolese relationship, only increase uncertainty. Chinese construction companies and the DRC's state copper company have signed a contract in which mineral resources would be exchanged for

infrastructure. The Chinese partners are set to provide $9 billion in financing; while a 19 percent "internal rate of return has been pledged."[10] However, little information is publicly available about financial aspects of the deal, including the sales price of minerals, as well as the planned cost of the infrastructure projects. Although the government does not provide the estimates of FDI by sector, some research undertaken by Oxford Policy Management (OPM) indicates that the mining FDI in less-developed countries with mineral-rich resources often makes up 60-90%. The Chinese involvement in the DRC is expected to be a significant source of FDI in the medium to long term.[11]

In all, mining remains a major contribution to the DRC's economy and generates an important share of economic activity compared to most other countries. As a developing country with an abundance of natural mineral resources, investment is one of the important factors to the DRC's economic progress[12]. The scarce domestic funding needs foreign investment in order to produce minerals. Mineral sources generate three quarters of the DRC's exports. Total mineral related exports have grown rapidly, from less than $1 billion in 2002 to almost $ 5 billion in 2011. During this period mineral exports have averaged 75% of total exports.[13] According to the United Nations Conference on Trade and Development data, the balance of payment contributions from mining has an important impact on the economic growth and leading the exports earning

[10] *KPMG GLOBAL MINING INSTITUTE*, Democratic Republic of Congo Mining Guide, 2014, 16-17.
[11] Ibid.
[12] Ibid.
Oxford Policy Management, The Impact of Mining in the Democratic Republic of Congo, October 2013, 12-13, accessed January 20, 2015, http://www.opml.co.uk/sites/default/files/DRC mining report OPM Final Eng.pdf.

from mining to surpass the value of imports.[14] With regard to investment projects, an international mining company, Ivanplats's discovery of Africa's largest high-grade copper deposit and the world's largest underdeveloped high-grade copper deposit in the DRC has an immense potential to increase FDI.

Country Social Economic Situation

Although the DRC is endowed with valuable mineral, forestry and agricultural resources, the country's development has been slow on account of years of instability and armed conflicts. The population has grown at around 2.9 percent a year which is one of the highest rates worldwide, while the investment are limited to the mining regions and the capital. Despite the immense resources and the stability of macroeconomic driving to strong economic growth, paradoxically the population remains desperately poor, with an estimated capital GDP per capita of just $241 in 2013 according to the IMF's October 2013 estimates. The rise of poverty finds its explanations by the rapid population growth, inefficient use of existing resources and the unequal sharing of the country's revenue.

The DRC with a development index score of 0.304 ranks lowest in the 2013 United Nations Human Development Index (HDI) and occupies the 186th position with Niger. The HDI inspects statistically, life expectancy, education, and income indices used to rank countries into four tiers of human development. According to the report of the African Development Bank, overall human development indices have significantly improved, but for the DRC, they remain far below the average of Sub-Sahara African

[14] Ibid.

countries, characterized by high poverty so 71 percent of the population lives below the average poverty headcount. Despite some improvements, infant/child and maternal mortality rates remain among the highest in the world, while 10% of the population live with the virus of HIV/AIDS, and suffers of malaria leading to cause of morbidity.

Regarding basic education, the efficiency and quality of the education system remain very low with only 18 percent of pupils advancing to the secondary level of education.[15] With regard to employment, the country registers a high unemployment rate of 73%. The country faces a major employment crisis particularly for its youth, with about 70% of the young population being unemployed. The lack of effective policy to address the inadequate infrastructure, combined with political instability in parts of the country, could mean that the situation will be unchanged for several years.

The mining industry accounts for approximately one sixth of the total official employment rate. An estimate from 2008 suggested there were 50,000 legally employed workers, including permanent and contract employees.[16] This would represent a sixth of estimated total DRC formal sector employees of 300,000 (World Bank 2012). However, it is worth noting that the legally employed sector of employees represent as little as 1% of the total DRC labor force of approximately 30 million (World Bank 2012). According to a 2013 report by the charity organization World Vision, "children as young as eight years old are forced to work in artisanal mines". According to the same report, "as many as 40% of workers in artisanal mining in the DRC are children, even if there is a law that

[15] *KPMG GLOBAL MINING INSTITUTE,* Democratic Republic of Congo Mining Guide, 2014, .12.

[16]Ibid. 18.

prohibits child labor; the practice remains widespread owing to spotty enforcement and corruption."[17]

Additionally, around only 100 new graduates are able to find job among the 9,000 students graduating from the Congolese universities and colleges each year.

Democratic Republic of Congo's Dutch Disease and Resource Curse

Meier and Stiglitz (2001), demonstrated that the prospect of large increases in the flow of resources from wealthy to poor countries may have undesirable side-effects, particularly those associated with the "Dutch Disease". High and sustained inflows of aid, as well as, a windfall of natural resource, may have much the same effects of Dutch Disease which can lead to an appreciated exchange rate and wage inflation. These effects thus add to a loss of markets and unemployment in export and import-competing sectors. The fear is that high inflows of natural resources may thus prove to be a "curse" by contributing to worsening of their export sectors.[18] Sachs and Warner (1995, 1997) within the literature on the Resource Curse Theory explain the argument behind Dutch Disease and indicate that "a focus on the natural resource exportation will have negative effects on other sectors of industry within the country, through the appreciation of currency and the resource movement effect" (Gylfason, 2001).

[17]Ibid.

[18] Pauline Mercieca, "Aid and Economic Growth in Developing Countries: A Literature Review," *Bank of Valletta Review* no. 41 (Spring 2010): 16-17, accessed April 26, 2015, https://www.bov.com/documents/bov-review-41-paper-1.

The concept also explains the apparent relationship between the increase in exploitation of natural resources and a decline in the manufacturing sector. The term Dutch Disease was conceived in 1977 to describe the decline of the manufacturing sector in the Netherlands when they discovered a large natural oil supply in 1959. Today, the term refers to countries that have abundant resources but fail to produce self-sustaining growth. The risks of Dutch Disease develop when large inflows of revenue, associated with resource extraction, lead to an appreciation of the real exchange rate through nominal exchange rate appreciation, higher domestic inflation, or a combination of both. Such developments make imports cheaper, undermining the competitiveness of other tradable sectors and reducing diversification.[19] To date, there is no explicitly documented case of mineral resource Dutch Disease on the Democratic Republic of Congo economy. An OPM[20] case study found that in mining regions dollar inflation did not differ from elsewhere (OPM 2011). Moreover, since the DRC is only partly a monetary economy any general caused by such inflows would be expected to have a very limited impact on the lives of the vast majority of Congolese.[21] The DRC's significant reliance on mineral exports carries risks of Dutch Disease that need to be carefully managed. However, there has been little evidence of the "resource curse". Of course, according to OPM, " failure to put in place adequate institutions to manage volatile commodity prices can lead to financial stress when commodity prices drop: during the financial crisis of 2008-2009,

[19]Oxford Policy Management, "The Impact of Mining in the Democratic Republic of Congo," *Oxford Policy Management*, 2013, 1-31, accessed January 24, 2015,http://www.opml.co.uk/sites/default/files/DRC%20mining%20report%20-%20OPM%20-%20Final%20Eng.pdf.

[20] Oxford Policy Management (OPM) is a development and research based consultancy company that has 30 years' experience in providing rigorous analysis, policy advice management and training services to national governments, international aid agencies and other public sector and non-government organisations.

[21] OPM, Democratic Republic of Congo mining report 2013.

the Congolese Franc depreciated significantly increasing import costs of necessary supplies such as petroleum."[22]

Most of the Congolese natural mineral resources are politically volatile with several local conflicts ensuing over the control or distribution of wealth. This wealth has been the main source of national revenue for many years. The evidence shows that in most countries with enormous natural resources, these natural endowments demonstrate the existence of a curse more than a blessing. The Democratic Republic of Congo arguably is one of the most endowed countries in the world owing to the abundance of every natural resource. From rare minerals for manufacturing computer chips to vast forest resources the DRC has it. Experts have estimated that the Congo Basin alone can produce enough food crops to satisfy the nutritional requirements of nearly half the population of the world. This potential wealth however, contrasts sharply with the extreme poverty of the people of this country. According to some statistics, an average Congolese earns an annual income of less than US $100. State revenue represents less than US $1 billion for a country whose population is estimated about 75 million with a land area of 2,243,000 square kilometers. From this, it is clear that the natural resources of this country benefit neither the state nor the local communities. On the contrary, they seem even to become a sort of curse because of the repeated war situations they engender and the political and economic instability they create for this country.[23] The Democratic Republic of Congo has revived a political Dutch Disease where natural resources lead to

[22] Ibid.

[23] Francis Xavier Tuokuu, "Africa's Dutch Disease: The Way Forward," *GhanaWeb*, October 2012, accessed March 26, 2015,http://www.ghanaweb.com/GhanaHomePage/NewsArchive/Africa-s-Dutch-Disease-the-way-forward-252041.

slower economic growth by generating and reinforcing the elites power due to their greater share of national income. The impact of this power allows them to obtain a large share of the resource rent and these impacts to economic decline associated with the Dutch Disease, which, in turn, increases income inequality.

Democratic Republic of Congo Economic Growth Issues

With all these abundant resources that the Democratic Republic of Congo has, the government should build for its citizens a vibrant manufacturing sector, with better infrastructures that facilitated the environmentally sustainable distribution and production of goods. Money should be invested in better education or intellectual resources that generate new products, as well as, employment opportunities. A better health care delivery system, housing, sufficient per capita income and higher standards of living are all needed to strengthen the DRC. While in other countries where these natural resources don't even exist, efforts are made by these governments and people to develop their countries. Countries such as Germany and Netherlands in Europe, and Japan, South Korea and Taiwan in Asia don't possess as many natural resources as the Democratic Republic of Congo but all those countries achieved prosperous export industries based on manufactured goods and accelerated economic growth through hard work, industrialization and education. These countries transitioned from less developed countries into developed countries. In Japan, only 16% of the land is cultivable as most parts of it are mountains. Yet, Japan produces enough to feed its people and accounts among the seven most industrialized countries in the world in spite of these resource constraints. Some natural resource –rich countries for example, Botswana and Indonesia,

have performed far better than others in resource wealth management and long-term economic performance. They have seen their economy grow. Botswana used its diamond resources to become the fastest growing economy in the world. This proves that the curse is optional and can be avoided in the Democratic Republic of Congo and other countries with rich-mineral resources.

The origin of development economics is credited to Argentinian economist Raul Prebisch, who, in the 1930s, was seeking response to Argentina's balance-of-payments problems. Investigating possible causes and responses, he suspected a declining terms of trade for primary commodity exporters such as Argentina. Using British trade data from 1876-1947, - a data series that has been criticized as misleading, he deduced that there was a sharp drop in the terms of trade for primary product exporters in the 1920s, with a slight recovery in the late 1030s. Despite this late upward trend, Prebisch theorized that the terms of trade would continue to fall. In his view, suggesting that primary resource exporting countries such as Argentina could never expect to follow a path of export-led growth. He advocated government intervention to promote industrialization of the Latin American countries.[24] Despite early criticism, Prebisch's writings and influence via the Economic Commission for Latina America (ECLA) led to wide acceptance of the premise that industrialization was the key of growth. Prebisch also wrote that the idea of growth through industrialization would not be promoted by solely concentrating on the expansion of primary resource exports in exchange for manufactured import because minerals were singled out as undesirable economic growth. So the "Prebisch Hypothesis"

[24] Diana Hunt, *Economic Theories of Development: An Analysis of Competing Paradigms* (UK: Harvester Wheatsheet, 1989), 145-48, Barnes and Noble Nook.

of falling off relative prices of raw materials was widely taken to mean that developing countries should shun their dependency on natural resource export by promoting industrialization.[25] Prebisch's initial explanation for the phenomenon was very straightforward: poor countries exported primary commodities to the rich countries that then manufactured products out of those commodities and sold them back to the poorer countries. The "Value Added" by manufacturing a usable product always cost more than the primary source used to create those products. Therefore, poorer countries would never be earning enough from their export earnings to pay for their imports. Prebisch's solution was similarly straightforward: poorer countries should embark on programs of import substitution so that they need not purchase the manufactured products from the richer countries. The poorer countries would still sell their primary products on the world market, but their foreign exchange reserves would not be used to purchase their products from abroad. Three issues made this policy difficult to follow. The first is that the internal markets of the poorer countries were not large enough to support the economies of scale used by the richer countries to keep their prices low. The second issue concerned the political will of the poorer countries as to whether a transformation from being primary products producers was possible or desirable. The final issue revolved around the extent to which the poorer countries actually had control of their primary products, particularly in the area of selling those products abroad. These obstacles to the import substitution policy led others to think a little more creatively and historically at the relationship between rich and poor countries. At this point dependency theory was viewed as a possible way of explaining the persistent poverty of the poorer countries. The traditional

[25] Ibid.

neoclassical approach to economics said virtually nothing on this question except to assert that the poorer countries were late in coming to solid economic practices and that as soon as they learned the techniques of modern economics, then the poverty would begin to subside. However, Marxists theorists viewed the persistent poverty as a consequence of capitalist exploitation. Moreover a new body of thought, called the World Systems Approach, argued that the poverty was a direct consequence of the evolution of the international political economy into a fairly rigid division of labor which favored the rich and penalized the poor.[26]

Chapter 2: Literature Review

Theory of Economic Growth and Development

In general terms of the word, people understand economic development as a sustained increase in national output as well as the standard of living for the people.

Former Director of World Development Institute, Paul P. Streeten, defines development such as "an attack on the chief evils of the world today: malnutrition, disease, illiteracy, slums, unemployment and inequality". Measured in terms of aggregate growth rate, development has been a great success. However, in terms of jobs, justice and the elimination of poverty, it has been a failure or only a partial success. James D. Wolfensohn, president of World Bank indicates that " our new framework is a holistic and integrated approach to development strategies and programs that highlights

[26] Vincent Ferraro, *Dependency Theory; an Introduction; in the Development Economics Reader* (London, Routlege: Giorgio Secondi, 2008), 58-64, accessed December 27, 2015, https://www.mtholyoke.edu/acad/intrel/depend.htm.

the interdependence of all aspects of development strategy- social, structural, human, institutional, environmental economic and financial[27]". Sherman Robinson (1972) used "economic growth" and "economic development" as basic terms to describe the transformation of an economy over time. He defined the "economic growth" as increases in aggregate product, either total or per capita, without reference to changes in the structure of economy or in the social and cultural value systems. On the other hand, he indicates that "economic development" is defined to include not only growth but also social and cultural changes which occur in the theorists who have focused on theories and patterns of structural change, used modern economic theory and statistical analysis in an attempt to portray the internal process of structural change that a typical developing country must undergo if it is to succeed in generating and sustaining a process of rapid economic growth.[28] In this, development is perceived as a multidimensional process involving the reorganization and reorientation of entire economic and social system. Theorists of the 1950s and early 1960s viewed the process of development as a series of successive stages of economic growth through which all countries must pass. It was primarily an economic theory of development in which the right quantity and mixture of saving, investment, and foreign aid were all that was necessary to enable developing nations to proceed along an economic growth path that historically had been followed by the more developed countries. However, in the 1970s theorists focused on theories and patterns of structural change, used modern economic theory and statistical analysis in

[27] Michael P. Todaro and Stephen C. Smith, *Economic Development*, 8th ed. (Boston-MA: Addison -Wesley Higher Education Group, 2003), 110-41.

[28]Sherman Robinson, "Theories of Economic Growth and Development: Methodology and Content," *Economic Development and Culture Change* 21, no. 1 (Oct. 1972): 54-67, accessed March 30, 2015, http://www.jstor.org/1152904.

attempt to portray the internal process of structural change that a typical developing country must undergo if it is to succeed in generating and sustaining a process of rapid economic growth. On the other hand, the international dependence revolution viewed underdevelopment in terms of international and domestic power relationships. It emphasized the need for major new policies to eradicate poverty, to provide more diversified employment opportunities, and reduced income inequality. In the 1980s and early 1990s, the counterrevolution economists, sometimes called neoliberal, emphasized the beneficial role of free markets, open economies, and privatization of inefficient public enterprises. According to this theory, failure for a country to develop is due to expositive external and internal forces as expounded by dependence theories. Rather, it is primarily the result of too much government intervention and regulation of the economy[29]. Walt W. Rostow, an American economic historian, indicates that the "transition from underdevelopment to development can be described in terms of a series of steps and stages through which all countries must proceed."[30] One of the principal strategies of development necessary for any takeoff is the mobilization of domestic and foreign saving in order to generate sufficient investment to accelerate economic growth. In fact, Rostow and others defined the takeoff stage precisely in this way. Countries that were able to save 15% to 20% of GNP could grow ("develop") at a much faster rate than those that saved less. Moreover, this growth would then be self-sustaining. The mechanisms of

[29]Michael P. Todaro and Stephen C. Smith, *Economic Development*, 8th ed. (Boston-MA: Addison -Wesley Higher Education Group, 2003), 111

[30] Ibid., 112.

economic growth and development, therefore, are simply a matter of increasing national savings and investment.[31]

Foreign Aid and Economic Growth

John Maynard Keynes (1930) argued that governments could stimulate development by financing investments. In fact, Keynes' ideas for domestic economics were taken by a new breed of development economists who argued that investment in developing countries could be stimulated by injections of cash from overseas. The logic of these new developing theories, which Hollis Chenery and Alan Strout are proponents, were simple: investments are determined by savings and savings are determined by per capita income.[32] Since poor countries have low incomes and accordingly, low savings, they are caught in vicious equilibrium traps whereby higher income does not lead to increased savings but only results in higher population growth. Thus, it was argued that investment financed by foreign aid would dissolve the vicious circle of productivity and growth. Following this theory, it was assumed that donors can simply calculate the financing gap, which is the difference between domestic savings and the level of investment required for targeted rate of economic growth, and thereby fill it with aid[33]. Thus, to remove the shackles of poverty, many African countries for example, received substantial aid over a sustained period, amounting to approximately $400 billion from 1970 to 2000 around $35 per capita per year. In Africa, aid as a percentage of Gross

[31] Ibid. ,115.

[32] Pauline Mercieca, "Aid and Economic Growth in Developing Countries: A Literature Review," *Bank of Valletta Review* no. 41 (Spring 2010): 3, accessed April 26, 2015, https://www.bov.com/documents/bov-review-41-paper-1.

[33] Ibid.

National Income (GNI) grew continuously between 1970 and 1995, starting at around 5 percent and peaking at around 18 percent in 1995. During the 1970s, when the percentage of aid as a proportion of GDP was still relatively low, GDP growth per capita was high. In the late 1970s, the proportion of aid grew dramatically but GDP growth collapsed, and was even negative for several years.[34]

In addition, Horrod and Domar (1947 and 48) assumed that there is an excess supply of labor and that growth is constrained only by the availability and productivity of capital. Since savings in developing countries are likely to be too low to achieve a target growth rate, foreign aid was needed in order to relieve the savings constraint and increase investment thus leading to economic growth.[35]

The Solow neoclassical growth model remains developed by Robert Solow as the basic point of reference for the literature on economic growth and development. It implies that economies will conditionally converge to the same level of income, given that they have the same rates of savings, depreciation, labor force growth, and productivity growth. Thus, the Solow model is the basic framework for the study of convergence across countries.[36] Solow predicts conditional convergence. This means that countries with similar characteristics converge to the same steady state and the savings rate of both countries remains equal. The key modification from the Harrod-Domar (or AK) growth model is that the Solow model allows for substitution between capital and

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[34]Zulfiquer Ahmed Amin, "Does Aid Reduce Poverty?," *Daily Star*, October 19, 2007, accessed March 2, 2015,http://archive.thedailystar.net/newDesign/story.php?nid=7920

[35] Pauline Mercieca, "Aid and Economic Growth in Developing Countries: A Literature Review," *Bank of Valletta Review* no. 41 (Spring 2010): p.3, accessed April 26, 2015, https://www.bov.com/documents/bov-review-41-paper-1.

[36] Michael P. Todaro and Stephen C. Smith, *Economic Development*, 8th ed. (Boston-MA: Addison -Wesley Higher Education Group, 2003), 113

labor. In this process, it assumes that there are diminishing returns to use of these inputs. The key implication is that, unlike the Harrod-Domar (or AK) analysis, the Solow model consistently increases the equilibrium K*. That is, after the economy has time to adjust, the capital-labor ratio increases, and so does the output-labor ratio, but not the rate of growth.[37] Moreover, simulation based on cross-national data suggests that if ***s*** is increased, the economy may not return even-way to its steady state for decades.[38] In fact, an increase in savings may substantially increase the growth rate for many decades to come. Both theoretically and empirically, the link between the rate of savings and the rate of growth remains controversial.[39] Robert Solow attempts to explain long-run growth by looking at capital accumulation, labor or population growth, and increases in productivity, commonly referred to as technological progress. According to Solow, the output or GDP grows as result of these three factors.

Shenery and Strout (1966) identified a foreign exchange gap, noting that developing countries are unlikely to have the export earnings required to import capital goods for investment. They identified also that foreign aid could help fill this gap. In addition, Bacha (1990) and Taylor (1990) recognized that some governments of developing countries simply do not have the revenue raising capacity to cover a desired level of investment. Thus, it was concluded that foreign aid provided directly to the government could potentially relax this fiscal gap as long as it was used for investment purposes. Positively, gap models assert that foreign aid can supplement savings, foreign

[37] Ibid., 141.
[38] Ibid. , 143.
[39] Ibid.

exchange and domestic revenue. This allows for a greater level of savings and investments that lead to economic growth.[40]

Addison argued that one can be more certain that aid will reduce poverty through growth when aid itself is used to invest in the livelihoods of the poor. Aid that finances pro-poor public spending on services and infrastructure improves the productivity of the poor as well as their human development indicators more broadly.[41].

In fact, policy, institutions and governance are important factors, whereby the basic idea is that aid is more effective by the quality of policy and institutions.[42] According to the World Bank (1998), aid does help to increase growth, but only in countries with sound economic management or good governance.[43] However, many other researchers concluded that aid had a positive impact on growth for developing countries with good fiscal monetary and trade policies and a negative impact on growth for these with bad fiscal monetary and trade policies. In fact, aid constitutes an advantage for the economic growth of the developing countries that are seeking help with their economic growth. Those countries receive money and may invest it into their economies which help to create more jobs for the people, better infrastructure, and stabilize their economy, fighting hunger, saving lives and providing the citizens with clear water, energy, medicine and so on. China's GDP growth rate increased 9.65% from the investment of the foreign aid into its nation's economy. Unfortunately, corruption is a

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[40] Pauline Mercieca, "Aid and Economic Growth in Developing Countries: A Literature Review," *Bank of Valletta Review* no. 41 (Spring 2010): P.3, accessed April 26, 2015, https://www.bov.com/documents/bov-review-41-paper-1.

[41] Ibid,p.7

[42] Ibid., 3.

[43] Ibid., 7.

big issue of foreign aid. Foreign aid money that is being given to sustain the economic growth of the country passes directly into the pockets of the government officials instead of increasing savings and investment. For example, President Mobutu Sese Seko of Zaire from 1965-1997 was thought to have stolen $5 billion from its nations aid supply. Thus, the nations who provide such aid in countries with bad fiscal and monetary trade policies should monitor and control their funds as well as help government officials to place the money in the useful sectors. By doing so, it will reduce the chance of corruption and eradicate dependency of the provided foreign aid.

Lewis, on the patterns- of-development analysis of structural change focuses on the sequential process through which the economic, industrial, and institutional structure of an underdeveloped economy is transformed over time to permit new industries to replace traditional agriculture as the engine of economic growth. In contrast to the Lewis model and the original stages view of development, increased savings and investment are perceived by patterns-of-development analysts as necessary but not sufficient conditions for economic growth.[44] In addition to the accumulation of capital, both physical and human, a set of interrelated changes in the economic system is needed to transition into a modern one. These structural changes involve virtually all economic functions, including the transformation of production and changes in the composition of consumer demand, international trade, and resource use as well as changes in socioeconomic factors such as urbanization and the growth and distribution of a country's population. Therefore, the analysis of the empirical structure – change emphasizes both domestic and international

[44] Abdul Majid Mat Saleh, Halta Solhee Mohd, and Yusuf Kasim, *Socio-Economic Development in Sarawaki: Policies and Strategies for the 1990s.* (Malaysia: Angkatan Zaman Mansang 1990), 1-3.

constraints on development. The domestic ones include economic constraints such as government policies and objectives and international constraints include access to capital, technology and international trade. Thus, the differences in development level among developing countries are largely ascribed to both domestic and international constraints. However, it is the international constraints that make the transition of currently developing countries different from that of now industrialized countries. To the extent that developing countries have access to the opportunities presented by the industrial countries as sources of capital, technology, and manufactured imports as well as markets for exports, they can make the transition at an even faster rate than that achieved by the industrial countries during the early periods of their economic development.[45]

The late Havard B. Chenery and his colleagues examined patterns of development for numerous developing countries during the postwar. Their empirical studies of countries at different levels of per capita income led to the identification of several characteristic features of the development process.[46] In fact, the neo-Marxist, neocolonial view of underdevelopment attributes a large part of the developing world's continuing and worsening poverty to the existence and policies of the industrial capitalist countries of the Northern Hemisphere and their extensions in the form of small but powerful elite or comprador groups in the less developed countries[47]. Underdevelopment is thus seen as an externally induced phenomenon, in contrast to the linear-stages and structural-change theories 'stress on internal constraints such as insufficient saving and investment or lack

[45] Michael P. Todaro and Stephen C. Smith, *Economic Development*, 8th ed. (Boston-MA: Addison - Wesley Higher Education Group, 2003), 121-122

[46] Ibid.

[47] Ibid., P.124

of education and skills. Revolutionary struggles or at least major restructuring of the world's capitalist system are therefore required to free dependent developing nations from the direct and indirect economic control of their developed-world and domestic oppressors.[48] One of the most forceful statements of the international-dependence school of the thought was made by Theotonio Dos Santos:

> "Underdevelopment, far from constituting a stage of backwardness prior to capitalism, is rather a consequence and a particular form of capitalist development known as dependent capitalism…. Dependence is a conditioning situation in which the economies of one group of countries are conditioned by the development and expansion of others. A relationship of interdependence between two or more economies or between such economies and the world trading system becomes a dependent relationship when some countries can expand through self-impulsion while others, being in a dependent position, can only expand as a reflection of the expansion of the dominant countries, which may have positive or negative effects on their immediate development. In their case, the basic situation of dependence causes these countries to both backward and exploited. Dominant countries are endowed with technological, commercial, capital and socio-political predominance over dependent countries-the form of this predominance varying according to the particular historical moment – and can therefore exploit them, and extract part of the locally produced surplus. Dependence, then, is based upon an international division of labor which allows industrial development to take place in some countries while restricting it in others, whose growth is conditioned by and subjected to the power centers of the world."[49]

Resources Curse versus Economic Growth and Failures

The idea that natural resources might be more of an economic curse than a blessing began to emerge in the 1980s. Richard Auty was the first to use the term resources curse thesis in 1993. He described how countries rich in natural resources were unable to use that wealth to boost their economies and, how counter- intuitively, these countries had lower

[48] Ibid.
[49] Ibid.

economic growth than countries without an abundance of natural resources. According to him, the fact that many resource-rich developing countries in terms of economic development, is the crucial point of the resource curse theory[50]. Auty (1993), in Sustaining Development in Mineral Economies: The Resource Curse Thesis notes:

> "This study confirms the skepticism of Gel (1988) concerning the advantages of a bountiful natural resource endowment and it also reinforces the resource curse thesis, (a thesis suggesting that) not only may resource-rich countries fail to benefit from a favorable endowment, they may actually perform worse than less well-endowed countries "(1993, pp. I. 124)

After Auty, Marcatan Humphreys, Jeffrey D. Sachs and Joseph E. Stiglitz have done also a lot of researches into the elements of the resource curse theory. Their focus of the Resource Curse Theory, as part of the wider Neoliberal economic theory[51] (Colclough, 1995) is mostly on endogenous causes of poor economic growth due to two main reasons: "Dutch Disease" and "Rent seeking". They experienced that countries with large awards of natural resources, often perform worse in terms of economic development and good governance than do countries with fewer resources, despite the prospects of wealth and opportunity that accompany the discovery of the natural resources. Of course, the notion that those countries with abundant natural resources don't perform economically as well as those without dates back to Adam Smith. Far from being a blessing, minerals have an adverse impact. This is because commodity exporters

[50] Richard Auty, *Sustaining Development in Mineral Economies: The Resource Curse Thesis* (London, NY: Routledge, 1993), I-124.

[51] C Colclough, *Structuralism Versus Neo-Liberalism. in C. Colclough,* (Oxford: Oxford University Press, 1995), 1-26.

face a decline over time in the relative prices of their product and also because of the "Dutch Disease" whereby the resource sector drives up the value of the local currency, hurting the competitiveness of manufacturing of exports.[52] Gylfason (2001) argues that this export of those resources in large quantities will lead to the appreciation of said state's currency, as there is a higher demand for that currency in order to purchase these natural resources.[53] This will make the other sectors of economy to become damaged, such as the manufacturing industry. As the result of an appreciation of the currency in effect raises the price of exports from the state and therefore makes them less competitive on the international markets.[54]

But the lack of natural resources has not proven to be a fatal barrier to economic success.[55] Delong and Williamson (1994) in their work, "Natural Resources and Convergence, in the Nineteenth and Twentieth Centuries" indicates the observation that the resource-poor economies can sometimes outperform resource-rich economies is nothing new in the field of economics.[56] Typical examples are the resource –poor Netherlands performed better than Spain, a resource-rich economy country with the overflow of gold and silver from its colonies in the New World in the seventeenth

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[52] Mark Tran, "Are Natural Resources a Blessing or a Curse for Developing Countries?," The *guardian*, Thursday 25 October 2012, under "1-3," accessed August 5, 2015,http://www.theguardian.com/global-development/2012/oct/25/natural-resources-blessing-curse-developing-countries.

[53] Thorvaldur Gylfason, "Natural Resources, Education, and Economic Development," *European Economic Review* 45, no. 6 (May 2001): 847-59.

[54] Ibid.

[55] Marcatan Humphreys et al., *Escarping the Resource Curse* (New York: Columbia University Press, 2007), 1-20.

[56] Jeffrey D. Sachs and Andrew M. Warner, "Natural Resource Abundance and Economic Growth," *Center for International Development and Haward Institute for international Development* (1997): 1-50, accessed January 8, 2015, http://www.cid.harvard.edu/ciddata/warner_files/natresf5.pdf.

century. Many economists demonstrate how in the seventeenth, nineteenth and twentieth centuries, resource poor Switzerland and Japan have enjoyed an excellent economic performance compared with resource rich Russia. Japan and Korea have succeeded in becoming world-class steel producers despite their virtual complete dependence on imports of iron ore.[57] More recently, in the past thirty years, the world's star performers have been the resource-poor Newly Industrializing Economies of East Asia—Korea, Taiwan, Hong Kong, Singapore—while many resource-rich economies such as the oil-rich countries of Mexico, Nigeria, and Venezuela, have gone bankrupt.[58]

On the other hand, it is well known that some rich-countries in natural resources have performed far better than others in resource wealth management and long-term economic development. Those countries benefit from their natural resources contributing to economic development of the country and their population may profit from the revenue and survive on a higher standard of living. United Arab Emirates has turned its resource curse into a blessing. Its government debt is very small, inflation is low, and hydrocarbon wealth has been used to modernize infrastructure, create jobs, and establish a generous welfare system, free education and health care.[59]

In Chile, as in other mineral-based economies, the mineral industry developed the first railways and modernized agriculture through direct investment linkages. Investments of the local mining elite encouraged urban development, banking, improved winemaking

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[57] Ibid.

[58] Ibid.

[59] AfricanBank2007, *Natural Resources for Sustainable Development in Africa* (New York: Oxford University Press, 2007), 1-97, accessed March 9, 2015,http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/African%20Development%20Report%202007.PDF.

and production of guano and Nitrate.[60] In Australia, early gold mining encouraged the inflow of both skilled immigrants and overseas investment, resulting in the ultimate diversification of the economy.[61]

In addition, Norway has shown remarkable growth of manufacturing and the rest of the economy compared with its neighbors despite phenomenal growth in oil export since 1971.[62] Norway is one of the least corrupt countries in the world and enjoys well-developed institutions, farsighted management and market friendly policies.[63] Today, it is raking among the top 10 world's largest petroleum exporters and fourteen largest oil producers. Over nearly half a century, petroleum has added some US $ 1,600 billion to the country's GDP, and the petroleum sector represents 21 percent of the country's total value of creation.[64] All those countries, while profiting from their natural resources, have managed to diversify their economies and developed innovative industries with new technologies.

After all, natural resources increase wealth and purchasing power over imports, so that resource abundance might be expected to raise an economy's investment and growth rates as well. The experiences of these countries suggest that the resource curse phenomenon is neither universal nor inevitable.

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[60] Grahm A. David, "Learning to Love Dutch Disease: Evidence from the Mineral Economies," *World Development* 23, no. 10 (1995): 1765-79.

[61] C.R Doran, *An Historical Perspective on Mining and Economic, in L.h. Cook and M.g. Porter."the Minerals Sector and the Australian Economy" George Allen andUnwin* (Sydney: Monash University, 1984), 37-84.

[62] Frederick Van der Ploeg, "Natural Resources: Curse or Blessing?," *Journal of Economic Litterature* 49, no. 2 (2011): 366-420.

[63] Ibid.

[64]Heikki Holmas and Joe Oteng Adjei, *Breaking the Mineral and Fuel Resources Curse in Ghana* (Paris: OECD, 2012), 123-31, accessed March 20, 2015, http://dx.doi.org/10.1787/dcr-2012-16-en.

To be exact, the resource curse thesis and Dutch disease are two different issues. In essence, the Dutch disease results in a medium term deindustrialization of the economy.[65] According to Kremer (1986), the name "Dutch disease" reflects the difficulties the Netherlands faced as its tradable sectors shrank in 1970s in response to increases in natural gas production from the Groningen fields. Following the discovery of natural gas in the North Sea, Holland witnessed several negative effects as well. First, the country's manufacturing sector declined throughout the 1960s and into the 1970s. Second, manufacturing employment declined steadily during the same time. For example, in 1964 the Netherlands had 1,823,000 workers in industry, but 1986 the number had fallen to 1,381,000 a 25% reduction in the industry jobs.[66] This happened once the Dutch found that their manufacturing sector suddenly started performing more poorly than anticipated.

Resource-rich countries that similarly experience a decline in preexisting domestic sectors of the economy are now said to have caught the "Dutch disease". The idea behind this Dutch disease is that extra wealth generated by the sale of natural resources induces an appreciation of the real exchange rate (a higher price relative of non-traded goods), decline of the trade sector and the expansion of the non-traded sector. Its adverse effects may lead to the paradoxical deindustrialization. In addition, Dutch disease may lead to making exporting non-natural resource commodities more difficult

[65] Graham A. Davis in Learning to Love the Dutch Disease: Evidence from the Mineral Economies. P.1768

[66] David Rudd, "An Empirical Analysis of Dutch Disease: Developing and Developed Countries". (Honors Projects Paper62, Illinois Wesleyan University, Spring 1996), 1-54, accessed March 12, 2015, http:// digitalcommons.Iwu.edu/econ_honproj/62.

and competing with imports across a wide range of commodities almost impossible (Called the "spending effect").

Foreign exchange earned from the natural resource, meanwhile may be used to purchase internationally traded goods, at the expense of domestic manufacturers of the goods. Simultaneously, domestic resources such as labor and materials are shifted to the natural resource sector (called the "resource pull effect"). Consequently, the price of these resources rises on the domestic market, thereby increasing the costs to producers in other sectors.

All in all, extraction of natural resources sets in motion a dynamic that gives primacy to two domestic sectors- the natural resource sector and the non-tradables sector, such as the construction industry-at the expense of more traditional export sectors. In the Dutch case, this was manufacturing; in developing countries, it is agriculture. Such dynamics appear to occur widely, whether in the context of Australian gold booms in the nineteenth century, Colombian coffee in the 1970s, or the looting of Latin America's gold and silver by sixteenth-century Spanish and Portuguese imperialists.[67]

Mining has become disfavored for more emotive reasons; the colonial nature of mining and the dominance of the multinational firm in early international mining activities led certain developing-country economists to view mining as detrimental to national development. Among primary production activities, mining was singled out as contributing to the backwardness of developing countries, both for alleged monopolistic purchasing of labor and its facilitation of discrimination of backward people"(Myint,

[67] Marcatan Humphreys et al., *Escarping the Resource Curse* (New York: Columbia University Press, 2007), 1-20.

1954). According to Neo-Marxists , Baran and Frank indicate that mining has been facilitating the laying of the foundations of large capitalist enterprises, which in turn propagated the imperialist capitalism that was to create a vast pool of pauperized labor. It has also been accused of having drained the capital out of the colonies, rendering them "Superexploited" and backward until the point of independence and liberation from colonial ties.[68]

Another resource curse argument is the allegation that mineral economies have not developed as quickly as other economies as a result of the persistent abuse and mismanagement of minerals rents. That is, the mineral economies may have started from a higher base in 1970 due to their advantageous mineral endowments, but these mineral windfalls induced government behavior that, in the long run, provided little or even negative to the economy.[69] Rent-seeking is an endogenous factor related to the resource curse and consisting in practice of increasing income without increasing productivity or the amount that is produced.[70] Rent-seeking can be both legal, for example lobbying, and illegal, such as bribes.

A common theme of the models of rent-seeking behavior is that political institutions conductive to rent-seeking underline failures of societies to realize benefits from natural resource wealth. The term "rent-seeking" was introduced by Krueger (1974), but the fundamental theory had already been developed by Tullock in 1967 in his seminal work "The Welfare Costs of Tariffs, Monopolies, and Theft". Although

[68] Graham A. Davis in Learning to Love the Dutch Disease: Evidence from the Mineral Economies. P.1768

[69] Marcatan Humphreys et al., *Escarping the Resource Curse* (New York: Columbia University Press, 2007), 1-20.

[70] The Economist, 2013.?

originally developed to explain the social the social welfare losses involved in the establishment of monopolies, tariffs, and subsidies, models of rent-seeking behavior have been at the forefront of recent attempts to explain. Natural resource wealth is a curse rather than a benefit to societies when property rights are not well defined or respected and the wealth becomes a rent-seeking prize.[71]

Anecdotal evidence, for example from Venezuela and Nigeria is consistent with the notion that rent-seeking by political elites is responsible for the resource curse. The oil price jump of 1979-81 induced Venezuela to increase public spending on infrastructure and industrial policy, which mainly benefitted political elites; the increase was so dramatic that that Venezuela ran a current account deficit despite a large, favorable shift in its terms of trade[72].

In Nigeria, for example, which is rich in oil, income became highly concentrated during the oil price run-up between 1970 and the early 2000s. By 2000, the share of income controlled by the richest 2% of the population equaled that of the poorest 55%; in 1970, the richest 2% earned as much as the poorest 17% in 1970. The fraction of Nigerians who subsist on $ 1 per day or less rose from 26% to 70% over the same time period.[73] By contrast, institutions that have been relatively discouraging rent-seeking

[71]Roger D. Congleton, Arye L. Hillman, and Kai A. Konrad, "Forty Years of Reaserch on Rent Seeking: An Overview," *Springer Science and Business Media* (2008): 1-61, accessed March 24, 2015, http://www.tax.mpg.de/fileadmin/TAX/pdf1/2008-introduction_rent_seeking_june_16_2008.pdf.

[72]Philipp R. Lane and Aaron Tornell, "Power, Growth and the Voracity Effect," *Journal of Economic* 1, no. 1 (1996): 213-41, www.jstor.org/stable/40215916.

[73] Frederick Van der Ploeg 2011, PP.367-8

activity, which can explain the more favorable outcomes in resource-rich countries such as Norway, Chile, Malaysia and Botswana.

The extraction of mining requires some form of authorization from the government that leads to close ties between extraction corporations and the government. The role of political institutions is the principal issue to all rent-seeking models on the resource curse. In the resource-rich countries, the resource abundance tends to be a curse only when governance institutions are weak. However, there are many reasons to make them weaker. They are unable to handle conflicts and significant income inequality is less able to resist to economic shocks, with growth tending to slow down or fail as result. These countries are also more vulnerable to civil strife and wars because of weakened institutions are even less able to contain the resulting social pressure and conflict over the distribution of resources.[74]

Sachs and Warner (1997, 2001) provided some of the earliest cross-country, cross-sectional empirical evidence that natural resource abundance is associated with lower economic growth. They emphasized the "Dutch Disease" as an explanation. In fact, Dutch disease theory postulates that a natural resource boom causes a country's exchange to appreciate, making its manufacturing exports less competitive. This theory of Dutch disease views manufacturing exports as the engine of growth, while resource exports are

[74] Manuella Appiah and Ting Zhang, *Escaping the Resource Curse in Sub-Sahara Africa*, Policy Brief /4. (The Hague, Netherlands: The Hague Institute for Global Justice, 2013), accessed March19, 2015,http://www.thehagueinstituteforglobaljustice.org/wp-content/uploads/2015/10/PB4-Escaping-Resource-Curse-Sub-Saharan-Africa.pdf.

not, leading them to conclude that a resource boom that crowds out manufacturing will retard growth.[75]

Another factor is the lack of political freedom and democracy. Michael Ross has found tentative support for three causal mechanisms between oil wealth and the lack of political freedom and democracy. First, government uses their oil revenues to relieve social pressures that might otherwise lead to demands for accountability (for example, through lower taxation, greater spending on patronage, and the prevention of investment in human capital that may promote democratic governance). Second, oil wealth allows governments to spend more on internal security, which may block the population's democracy aspirations (either due to self-interest or as response to ethnic or regional conflicts). Third, oil wealth may be not translated into economic development that results in cultural and social changes (such as occupational specialization, and higher levels of education). This presents a challenge to the democracy. These mechanisms, as Ross has demonstrated, are applicable not only to oil but also to other nonfuel mineral resources.[76] Consequently, we can conclude that mineral resources, as well as the lack of political freedom and democracy are interlocked in a cycle process. Countries rich in resources are less likely to have democratic political systems.

Moreover, high levels of corruption present the most obvious political risk that can arise from large holdings of natural resources. The short run availability of large financial assets increases the opportunity for the theft of such assets by political leaders.

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[75]Jeffrey D. Andrew and Andrew M. Warner, "Natural Resources and Economic Development: The Curse of Natural Resources.," *Natural Resources and Economic Review* 45 (2001): 827-38.

[76] Manuella Appiah and Ting Zhang, *Escaping the Resource Curse in Sub-Sahara Africa*, Policy Brief /4. 2013

Those who control these assets can use that wealth to maintain themselves in power, either through legal means (e.g. spending in political campaigns) or coercive ones (e.g. funding militias).[77] According to Leite and Weidmann (!999), not surprising, statistical studies that seek to account for variation in levels of corruption across different countries find that natural resource dependency is a strong predicator.[78]

However, corruption related to natural resources takes many forms. International mining and oil companies that seek to maximize profits find that they can lower the costs of obtaining resources more easily by obtaining the resources at below market value by bribing government officials, rather than by figuring out how to extract the resources more efficiency. In other cases, the natural resource is sold to domestic firms at bellow full value, with government officials either getting a kickback or an ownership share. In practice, the risk of corruption in resource-rich countries is very large and the costs of such corruption to the national economy are enormous.[79] Then, in relying on external incomes rather than on domestic revenue, states have less of a need to develop a bureaucratic apparatus to raise revenue.[80] As indicated by Ross (2004), the need to collect taxes is widely thought to have contributed to the emergence of strong state and even democratic institutions in many Western countries.[81] Therefore, the lack of reliance on tax revenue in favor of reliance on external sources of revenue is thus thought to hinder the development of effective states in many resource-rich developing countries.[82] Since a

[77] Marcatan Humphreys et al., *Escarping the Resource Curse* (New York: Columbia University Press, 2007), 1-20.

[78] Ibid, P.11.

[79] Ibid.

[80] Ibid.

[81] Ibid.

[82] Ibid.

resource-rich country's revenue is largely independent of the strength and success of the overall economy, the government of the resource-rich country has less of a need to engage in activities that support the economy.

Furthermore, bad fiscal policies that tend to be kept in place by governments also play important roles. One example is the tendency to borrow excessively, especially during periods when the prices of resources on the international market are high. Once the resources run out or the price falls, financial crisis and hampered economic development are inevitable, and often throwing the borrowing countries into deep debt crisis. Governments also face considerable challenges in their dealings with international corporations, which have great interest and expertise in the sector and extraordinary resources on which to draw.[83]

There are also exogenous factors on an international level that contribute to the resource curse. The postcolonial legacy is one of the contributable factors which delayed the economic growth of the colonial period. The political structure, culture, and general policy handed over to the rulers of left behind by the colonial powers were not based on the choice, consent, will, and purpose of the citizens.

In addition, the volatility of natural resource revenues contributes also to the resource curse. Research shows that rich-countries producing natural resources are more susceptible to fluctuations in commodity markets. An economic argument for why volatility hampers economic growth is that firms are more likely to hit liquidity constraints and thus cannot afford to innovate, which depresses growth, especially in

[83] Manuella Appiah and Ting Zhang, *Escaping the Resource Curse in Sub-Sahara Africa*, Policy Brief /4. 2013

economies with poorly developed financial institutions.[84] A political argument is that during the commodity booms countries often engage in a public spending bonanza that is unsustainable and needs to be reversed when global commodity prices collapse and revenues decrease.[85] Resource-rich countries have also experienced a long-term decline in the terms of trade. Over time, natural resource export revenue buys fewer and fewer imported capital goods, thereby inhibiting development-creating investment in an economy. The declining terms of trade means that growth in countries relying on the export of primary commodities is relatively weak over time and those prospects for development are constrained.

Another contributing factor is the often-unfair processes used to negotiate clauses contained in bilateral and multilateral agreements between investors and host-country governments. The power imbalance between weak national governments and powerful multinational companies frequently results in contracts with revenue distribution agreements that do not take into account compensation for many of the negative social, economic, and environmental impacts generated by the resource exploitation. The final factor is illicit financial flows, which corruption in resource-rich countries enables. Potential revenues from natural resources are diverted out of the resource-rich countries rather than being utilized by those countries governments for investment infrastructure and the development of other sectors. Corruption can be the source of illicit funds to be laundered, a way of facilitating the creation of illicit funds, or a way of enabling an illicit flow.[86] A concerted international effort is necessary to help overcome the resource curse.

[84] Ibid.
[85] Ibid.
[86] Ibid., P.8

The most commonly used framework to understand the real effects of mineral booms is a small-open economy version of the static Ricardo-Viner model, better known as the specific factor model. This model assumes that an economy has two sectors: a tradable sector, which is decomposed into a manufacturing industry and a mineral/energy industry; and non-tradable sector. Each sector uses a specific factor of production. The mineral sector uses a natural resource like mineral resource to produce concentrates or refined products, while the manufacturing and the non-tradable sector employ different type of capital.[87]

Chapter 3. Human Capital and Economic Growth

Many economic analyses indicate that poor countries, with low ratios of capital to labor, have high marginal products of capital and thereby tend to grow at high rates. This was reinforced in extension of the neoclassical models Solow (1956), Cass (1965), and Koopmans (1965) that show international mobility of capital and technology.

[87]Graham A. Davis, "Trade in Mineral Resources," *World Trade Organization: Division of Economics. Colorado School of Mines* (2010): 1-42, accessed May 19, 2015,https://www.wto.org/english/res_e/reser_e/ersd201001_e.pdf.

Robert J. Barro, in his studies for 98 countries in the period 1960-1985 using a school – enrollment rates as proxies for human capital, indicated "that for a given starting value of per capita GDP, a country's subsequent growth rate is positively related to initial human capital."[88] Because the poor country's human capital exceeds the amount that typically accompanies the low level of per capita income, these countries tend to grow faster than rich countries.

Therefore, human capital plays a crucial role in a number of models endogenous economic growths. In this, most countries and international organizations have invested in education as a part of the development strategies of economic growth. In recent decades, the data shows an important improvement in school attainment across the developing world. Most researches emphasize the role of cognitive skills in promoting economic growth and find an explanation for the influence of the human capital growth. The importance of the human capital becomes strong when the focus turns on the role of school quality.

Cognitive skills of the population, rather than simple school attainment related to individual earnings, add to the distribution of income and most importantly to economic growth. The current research indicates that both basic skills and advanced skills are important, particularly for developing countries.[89] However, it is not appropriate to simply presume that any spending on schools is a productive investment that will see the

[88] Robert J. Barro, "Economic Growth in a Cross Section of the Countries," *Quarterly Journal of Economics* 106, no. 2 (1991): 407-49, 10.2307/2957943.

[89] Erick Alan Hanushek, "Economic Growth in Developing Countries: The Role of Human Capital," *Economics of Education Review* 37 (2013): 204-12, accessed March 29, 2015, http://hanushek.stanford.edu/sites/default/files/publications/Hanushek%202013%20EER%2037.pdf.

returns estimated for attainment. But it is instead necessary to ascertain two things: how various investments translate into quality and how that quality relates to economic returns.

Productively, with the impact of human capital and growth, it is possible to assess the position of developing countries and their prospects for the future. To provide perspective, international development agencies have pursued the expansion of schooling as a primary component of development. However, developing countries need to redesign educational policies for promoting productivity in different sectors of the economy by developing highly skilled manpower and addressing their development needs for rapid industrialization.[90]

The impact of education in achieving the modernization of the industrially advanced countries may be evaluated under various points of view. Recently the interests of countries have centered on the role of education in achieving their economic development.

The countries such as Japan and West Germany reconstructed their economic losses suffered from the war and following spectacular economic growth. This prosperity was deemed as the miracle in the current world. Japan's economic growth finds explanation on human factors as knowledge and talents accumulated since pre-War periods. It is also said that political, social and cultural factors undoubtedly contributed to the economic growth of the developed countries such Japan, Canada, Western Germany,

[90] Adiga Kausar Kiani, "The Role of Education on Economic Growth in Pakistan," *Federal Urdu University of Arts, Science and Technology* (2010): 1-23, accessed March 2, 2015, http://linc.mit.edu/linc2010/proceedings/session14Kiani.pdf.

Israel, the U.S.S.R. and the U.S.A. Those countries which have achieved rapid economic growth have one factor in common: namely, the important role of their educational institutions. The educational systems of these countries were modernized and strongly oriented toward technological progress and economic development.

Japan's modern education also had been developed in this direction. If we compare Japan's economic growth with other countries, is the overcoming disadvantage by the introduction and diffusion of a modern educational system.[91]

Historically, Japan, was a relative latecomer to industrialization when compared with nations in Western Europe and North America. Yet, it is the first non-Western nation that entered the epoch of modern economic growth. The primary national goal of modern Japan, after the Meiji restoration of 1868, was to match modern economic strength of Western nations. This motivation has been reflected in its progress in education. To achieve this goal, it was considered necessary to promote industries by means of borrowing modern technologies from the West.[92] Leaders in the Meiji government recognized that effective borrowing of Western technologies could not be achieved without developing a modern educational system that would be able to produce a highly qualified workforce.[93] The first results show up that after World War II. Japan achieved a high standard of living and approached the economic level of developed Western countries, in advance of other Asian-African countries, despite its limited natural

[91] Japan, Ministry of Education, *Japan's Growth and Education* (Tokyo: Ministry of Education, 1963), 1-243.

[92] Yoshihisa Godo and Yujiro Hayami, "Catching up in Education in the Economic Catch-Up of Japan with the United States, 1890-1990," *Economic Development and Cultural Change* 50, no. 4 (2002): 961-78, accessed March 25, 2015, http://www.jstor.org/stable/10.1086/342762.DOI: 1086/342762.

[93] Ibid.

resources. It simply imported the large quantities of natural resources that it needed to produce goods for consumption at home and abroad. Like Japan in Asia, Denmark in Europe is mentioned as a country that overcame such disadvantages of underdeveloped status, overcrowded population and scarcity of natural resources. A common basis for the economic development in Japan has been the introduction of a modern educational system, especially the spread of general elementary education to farm families who constituted the major part of the labor force in the period of modernization.[94] Thus, the role of education in achieving economic development in Japan and Denmark is a concrete example for other developing countries to imitate in order to attain effective economic growth of their countries.

Economic Growth and Education in Developing Countries

Many facts can be related to the unsustainable economic growth in the developing countries, such as low level of physical and human capital, high fiscal deficit, increasing foreign debt and debt serving, unfavorable weather, a high inflation rate, a mounting fiscal deficit, political instability, corruption and other factors. Education is one of the fundamental factors that can lead to achieving sustainable economic development. As we already said above, no country can attain this point without substantial investment in human capital. Education makes people understand themselves and the world. It raises

[94] Japan, Ministry of Education, *Japan's Growth and Education* (Tokyo: Ministry of Education, 1963), 1-243.

people's productivity and creativity. It also promotes entrepreneurship and technologies advances.

In fact, we cannot separate the economic growth and Education. They are correlated. In term of this correlation, some predominant economists have analyzed the relationship between education and economic growth and viewed that education is strong predictor of economic growth.

For example, Adam Smith in 18th century and Alfred Marshall in the 19th century (two important figures for the economics profession), addressed the question of how individual investments in "education" influence the wealth of nations. There is the hypothesis that people who go to school (for a number of years) are more productive (earn higher wages).[95] Recently Stevens and Weale (2003) determined a relationship between education and economic growth through parameters of the inefficiency model. They used micro and macro level data. However at the macro level, the study showed the similar percentage of returns ranged from 6-12 percent per annum.[96]

To the most casual observer it must seem that there is a link between scientific advance and the way in which education has facilitated the development of knowledge. People with only very limited education often find it difficult to function at all in advanced societies. Education is needed for people to benefit from scientific advance as well as to contribute to it. Certainly, education by itself does not guarantee successful development; greater access to education has contributed and contributes to higher rates

[95] Riel Miller, "Education and Economic Growth: From the 19th to the 21st Century," *Cisco.Public* (2012): 7-20, accessed March 20, 2015, https://www.cisco.com/web/strategy/docs/education-and-Economic-Growth.pdf.

[96] Philip Stevens and Martin Weal, "Education and Economic Growth," *National Institute of Economic and Social Reaserch* (2003): 6-29, accessed March 30, 2015,http://cee.lse.ac.uk/conference_papers/28_11_2003/martin_weale.pdf.

of economic growth. As an instrument of development, education fosters and enhances work skills and life skills such as confidence and sociability. These skills in individuals promote economic growth on a societal level via increased productivity and potentially better governance.[97]

Moreover, the recent World Bank study Globalization, Growth, and Poverty: Building an Inclusive World Economy, by David Dollar and Paul Collier, describes how 24 developing countries that integrated themselves more closely into the global economy experienced higher economic growth, a reduced incidence of poverty, a rise in the average wage, an increased share of trade in gross domestic product, and improved health outcomes.[98] These countries simultaneously raised their rates of participation in higher education. Indeed, the countries that benefited most from integration with the world economy achieved the most marked increases in educational levels.[99]

It is reasonable to believe that changing education would directly lead to a change in economic outcomes. The simple explanations of economic implications of education are that educational quality, measured by cognitive skills, has a strong impact on individual earnings. More than that, however, educational quality has a strong and robust influence on economic growth. In both areas, there is credible evidence that these are truly causal relationships.[100]

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[97] Adiga Kausar Kiani, "The Role of Education on Economic Growth in Pakistan". P. 2

[98] Paul Collier and David Dollar, *Globalization, Growth, and Poverty: Building and Inclusive World Economy (Policy Research Reports)* (Washington: World Bank Publications, 2001), 1-188.

[99] Dominic J Brewer and Patrick McEwan, *Economic of Education* (Oxford: Elsevier, 2010), under "65," accessed February 15, 2015, https:books.google.com/books.

[100] Eric A. Hanushek and Ludger Wobmann, "The Role of Education Quality in Economic Growth," *World bank Policy Research Working paper 4122* (2007): under "2," accessed March 1, 2015, https://openknowledge.worldbank.org/bitstream/handle/10986/7154/wps4122.txt?sequence=2&isAllowed=y.

Even though it is common to treat education and schooling synonymously, it is important to distinguish between knowledge and skills on the one hand and schooling in the other hand. This semantic distinction has important substantive foundations. Cognitive skills may be developed in formal schooling, but they may also come from the family, the peers, the culture, and so forth. Moreover, other factors obviously have an important impact on earnings and growth. For example, overall economic institutions – a well-defined system of property rights, the openness of the economy, and the security of the nation – can be viewed almost as preconditions to economic development. And, without them, education and skills may not have the desired impact on economic outcomes.[101] It is undoubted that those skills in individuals promote economic growth on a societal level through increase.

In sum, both the quality of the institutional environment and the quality of education seem to be important for economic development. Indeed, the effect of educational quality on economic growth seems to be significantly larger in countries with a productive institutional framework, so that good institutional quality and good educational quality can reinforce each other in advancing economic development, productivity and potential better governance.[102]

Trends in Education

Yet, while recognizing the impact of these overall institutions, we find that schools can play an important role. Quality schools can lead to improved educational

[101] Ibid.
[102] Ibid.

outcomes. However, we can ask each other the question to know where developing countries stand? Given the crucial importance of cognitive skills for economic development, many researches documented how the developing countries are far in this regard. The lack of quality of schooling in the less developing countries in terms of educational enrollment and attainment have been documented and are well known. While almost all Organization for Economic Co-operation and Development (OECD) countries have universal school attainment to grade 9, essentially all developing regions are far from that. From the data of an average African country, only 13% of each cohort finishes grade 9 and less than 30% in Central America and South and East Asia. Even in South America, only 43%, although on the other hand only 17% of a cohort do not complete grade 5 (which often serves as an initial indication of basic literacy and numeracy rates.[103] In West and Central Africa, 59% of each cohort did not even complete grade 5, and 44% never enrolled in school in the first place. It is notable across countries, however, that the lack of grade 5 attainment is at least as often due to dropping out of school than due to never enrolling. In any event, while the pattern of educational attainment varies greatly across countries and regions, the lack of quantitative educational attainment from universal completion of basic education – be it grade 5 or grade 9 – is immense in the majority of developing countries.[104]

In many developing countries, the share of any cohort that completes lower secondary education and passes at least a low benchmark of basic literacy in cognitive skills is below one person in ten. Thus, the education deficits in developing countries seem even larger than generally appreciated. Several additional references for examples

[103] Ibid.
[104] Ibid.

of extremely low educational performance of children even after years of schooling from different developing countries are provided in Pritchett (2004). With this dismal state of the quantity and quality of education in most developing countries, the obvious remaining question is what can be done? Because the quality of education is often poor in some developing countries, parents are forced to pay for additional tutoring to enable children to pass tests. Developing countries, while improving in school attainment, have not improved in quality terms. Therefore, the developing countries, without improving school quality, will find it difficult to improve their long run economic performance. In fact, even the resource constraints that developing countries overcome, some of them frequently feel it very important to make decisions and look how to spread resources providing as great of coverage as possible for its school or to concentrate resources on those students identified as the best. Education has been found a major source of productivity growth in the post-war era, and because education increases productive human capital, it contributes to overall increase in economic growth. It is estimated that from 1948 to 1973, education and its innovations accounted for two-thirds of the increase in U.S. economic growth.

Mankin, Romer and Weil (1992) incorporated in the production function physical and human capital investment rates separately, thereby providing a link between education expenditure and growth.[105] The endogenous model by Lucas (1988) allowed the "external effects and thus long run growth is now a function of physical and human

[105]N. Gregory Mankin, David Romer, and David N. Weil, "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economic* 107, no. 2 (1992): 407-37, accessed March 5, 2015, http://www.qje.oxfordjournals.org/content/107/2/407.short/2118477. doi.10.2307/2118477.

capital"[106]. Dowrick, (2003) and Lindahl, (1999) indicate that an increase in the country's average level of schooling by one year could increase economic growth by 6% to 15% whereas, according to Heckman and Masterov (2004), a decline in labor force quality could cut the rate of productivity growth attributed to education by one-half or more over next 20 year, limiting wage growth and fiscal revenues and ultimately standard of living[107].

A research paper entitled "Knowledge and Development – A Cross-Section Approach", by Derek and Dahlman examines a very broad range of knowledge related determinants of economic growth employing cross-section regression that span 92 countries for the period of 1960-2000. The authors find that the stock of human capital, the level of domestic innovation and technological adaptation; as well as, the level of information and communication technologies, infrastructures all exerts statistically significant effects on long-run economic growth.[108] Some macroeconomic studies of the education show that the variations of growth rates among countries can be explained partly by the initial level of human capital. Boutrolle (2003) in her review of econometric models that test the impact of average education level in the population on economic growth for a sample of developing countries in Middle East and Asia, finds that only the number of graduates or tertiary education seems to have a positive and significant relation to growth. She also finds that the effect of different levels of education varies according to the economy's level of development.[109]

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[106] Robert Jr. Lucas, "On the Mechanics of Economics Development," *Journal of Monetary* 22, no. 1 (1988): 3-42.

[107] Anita P. Patel, "Role of Education in Growth and Development of Indian Economy," *International Research Journal*(?): 312-17.

[108] Ibid.,P. 313

[109] Ibid.

It also appears that the proportion of secondary school graduates in the labor force in the main human capital indicator correlate with economic growth (Avakov, 1987; Mamohon, 1998). According to models developed by Sorenson (1999) and Funke and Strulik (2000), when a country reaches an advanced development level, the role of human capital on economic growth moves from a direct impact through increasing the capacity of the labor force as a whole to manage innovation and technical progress. It is higher education and research that contributes to innovations and their diffusion.

Most countries with high enrolment ratios in higher education became "leaders" in technology, with high levels of achievement in technology. In fact, the role of education in economic growth for developing countries is highly significant such as the research on India also proves it. In one of the earliest attempts to estimate the contribution of education to increase in productivity, quality of labor force and economic growth in India, the relative contribution to increase in productivity per person was estimated to be as high as 14.01 percent during 1948, 49 to 1968, 69; and 0.36 percent of improvement indicates Dholakia (1974).[110] As per the later studies by Psacharopoulos (1973), the contribution of education to economic growth in India was asserted to be as high as 34.4 percent.[111] The study of Sivasubramonian (2004) estimated the sources of the economic growth in India between 1950- 51 and 1999 -2000, and found that education, along with land, labor and physical capital contributes significantly to economic growth. Along with increased educational requirements, new skill requirement have also emerged.[112]

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[110]Bakul H. Dholakid, "The Sources of Economic Growth in India," *Borada good Companion* (1974): 246-67, accessed February 7, 2015,http://www.Jstor.org/stable/27765600.

[111] Ibid.

[112]Ibid.

Aspects of Education in Resource-Rich Countries

Along with the natural resources literature review, studies show that education as a form of investment especially suffers in resource-rich countries. Schooling in this environment is more of a consumption good than an investment good. Quality is likely to suffer. The labor market in a capital-intensive economy offers little benefit for moderate levels of education.[113]

In fact, when the countries begin relying on natural resources wealth, they seem to forget the need for a diversified and skilled workforce that can support other economic sectors once resource wealth has dried up. As a result, the share of national income spent on education declines, along with secondary school enrollment and the expected years of schooling for girls. While the costs of such declines might not be felt in the short term, as capital-intense activities take up a larger share of national production, their effects are likely to become more significant in the longer run as soon as economies start trying to diversify.

Human capital investment is an essential part of wealth when a country's wealth depends on investment in manufacturing or other productive activities; human capital investment is an essential part of wealth creation. In the other hand, when a country's wealth arises from an endowment of natural resources, investment in a workforce is not necessary for the realization of current income. Without a focus on wealth creation, or

[113] Ibid.

sustainability, insufficient attention will be paid to investments in human capital or other productive investments.[114]

[114] Marcatan Humphreys et al., *Escarping the Resource Curse* (New York: Columbia University Press, 2007), 1-20.

Chapter 4. Solow Neoclassical Growth Model and Our Model

The Solow neoclassical growth model for which Robert Solow has received the Nobel Prize is known as a model of economy growth. It remains a basic point of reference for the literature on growth and development. It helps us to understand the key factors, which determine why some countries have experienced rapid economic growth while others have stagnated and remain desperately poor.

Solow's model of economic growth implies that economies will conditionally converge to the same level of income, given that they have the same rates of savings, depreciation, labor force growth, and productivity growth. It explains how long-run growth rate of economy depends on savings, population growth and technological change.

Solow expanded on the Harrod-Domar formulation by adding a second factor, labor, and introducing a third independent variable, technology, to the growth equation. Unlike the fixed-coefficient, constant-returns-to-scale assumption of Harrod-Domar model, Solow's growth model exhibited diminishing returns to labor and capital separately and constant returns to both factors jointly.

Technological progress became the residual factor explaining long-term growth. Its level was assumed by Slow and other growth theorists to be determined exogenously, that is, independently of all others factors. More formally, the Solow neoclassical growth model is based on a standard aggregate production function in which

$$\mathbf{Y= \ K^{a}(AL)^{1-a}}$$

Where

Y = Gross domestic product,

K = Capital Stock

L = Labor

A = Labor productivity, which grows at an exogenous rate.

It is implied that for developed countries, this rate has been estimated at about 2% per year. It may be smaller or larger for developing countries, depending on whether they are stagnating or catching up with the developed countries, ***α*** represents the elasticity of output with respect to capital (the percentage increase in GDP resulting from a 1% increase in human and physical capital). It is usually measured statistically as the share of capital in a country's national income accounts. Since α is assumed to be less than 1 and private capital is assumed to be paid its marginal product, so that there are no external economies, this formulation of neoclassical growth theory yields diminishing returns to capital and labor.

Based on Slow model, output (GDP) grows as a result of tree factors, which are the increase in labor quantity and quality (population growth), increase in capital (by saving and investment) and by technological progress. In Solow model equation $\mathbf{Y= AK}^{k}$ the output per worker is a function that depends on the amount of capital per worker. The more capital with which each worker has to work, the more output that worker can produce. The labor force grows at ***n*** per year, and labor productivity growth, the rate at which the value of ***A*** in the production function increases occurs at rate ***α.***

The total capital stock grows when saving are greater than depreciation, but capital per worker increases when savings are also greater than what is need to equip new workers with the same amount of capital as existing workers have, and that causes the investment per worker to increase. Because of diminishing marginal returns, the increase in investment or saving per worker gets smaller and smaller as the capital ratio increases.

The Solow equation below gives the growth of capital-labor ratio, **k** and shows that the growth of **k**, depends on savings *sf(k),* after allowing for the amount of capital required to service depreciation, δk, and after capital widening, that is, providing the existing amount of capital per worker to net new joining the labor force, nk, that is,

$$\Delta k = sf(k) - (\delta + n)k$$

The Solow model growth is a simplified expression of the famous equation in the Harrod-Domar theory of economic growth, assuming that *A* remains constant, in this state, output and capital per worker are no longer changing, known as the steady state. If A is increasing, the corresponding state will be one in which capital per effective worker is no longer changing. In that case, the number of effective workers rises as *A* rises; this is because when workers have higher productivity, it is as if there were extra workers on the job. An increase in A will shift the production function at all levels of the capital-labor ratio, leading to higher level of real GDP per worker and higher standard of living. Thus, changes in total factor productivity assume that improvements in technology or efficiency affect capital and labor equally. In Solow model, the decrease or the increase in capital-labor ratio ($\Delta k < 0 / \Delta k > 0$) continues until $\Delta k = 0$, which occurs when the capital-labor ratio equals k^* in steady state of its economy. The k^* means the level of

capital per worker when the economy is in its steady state represents the equilibrium. The economy will return to its stability if k is higher or lower than k^*.

In case of increasing the rate of saving s, a temporary increase in the rate of output growth will be realized as we increase *k* by raising the rate of saving. We return to the original steady-state growth rate later, though at a higher level of output per worker each year. The key implication is that, unlike in the Harrod-Domar (or AK) analysis, in the Solow model an increase in *s* will not increase growth in the long-run, and so does the output-labor, but not the rate of growth.

Considering the technology change, new technology, new methods of organization production and improvement skill level of the labor force make workers more productive and so increase the effective of labor. We measure the labor input in effective units, LxE where E= efficiency of labor so, the production function is: Y = F(K,LxE). The labor input in the population can increase if the number of workers increases or if the efficiency of the existing workers improves.[115]

Hypothesis

In fact, there is evidence that an abundance of natural resources can hurt economic growth indirectly by unleashing forces that hamper the development of the national economy, primarily through the seeking rent, Dutch disease and neglect of education. When starting to think about those effects of natural resources on economic

[115]Robert M. Solow, "A Contribution to the Theory of Economic Growth," *Quartely Journal of Economics* 70, no. 1 (1956): 65-94, accessed March 10,2015, http://www.econ.nyu.edu/user/debraj/Courses/Readings/Solow.pdf

growth, a rapidly expanding body of research has attempted to discern empirical growth relationship across countries. We may prove this proposition by using an endogenous growth model of an economy with natural resources and then subject it to empirical tests in a cross-sectional of 33 underdeveloped and developed countries, from the years 2005 to 2013. The natural resource were measured as exports of primary product as a percentage of GDP in 2005 and other variables with natural resources dependences as the share of natural capital in total capital included human and physical capital, gross fixed capital formation, import, education, health, gross domestic production and GDP per capita growth rate.

We are hypothesizing that there is a linear positive relationship between the variables and predicting that when there is an increase in natural resources, there is also an increase in the other dependent variables in terms of economic growth. We specified a linear model to use for estimation of the theoretical model. After collecting and processing the data, we estimated our empirical model. We then interpreted and statistically evaluated the estimated model.

Theoretical Framework and Econometric Methodology

Theoretical Economic Model

Below is a mathematical summary of theoretical factors that we hypothesized are impacted by the curse of resources. The positive signs above each variable indicate the relationships that we have hypothesized. All the relationships are hypothesized to be

positive. In sum, our model hypothesizes that when there is an increase in natural resources there is also an increase in the other dependent variables.

InGDPC = In (CAPC + LaborC + mine) +R + D

Where:

In GDPC represents the logarithmic change of GDP per capita rate between 2005 to 2013, LaborC, is the share of natural capital in total capital included human and physical capital, Mine represents the fraction of mining production of each country, as the measurement of resource abundant. The other control variable that exert influence on the long-term economy is D, which is a dummy variable indicating whether a country was developed or less developed.

Econometric model with General Specification

To make a theatrical model econometric, the stochastic term has to be specified. We assume that it is a normally distributed classical error term. The equation in its general econometric form is expressed below:

$$InGDPC = (InCAPC + InLaborC + In\min e + D) + \varepsilon_i$$

Or *In GDP = In (Capc +LaborC) + R + D*

Where:

$InGDPC$ = the average growth rate of logarithm per capita

InCAPC = change of the Gross capital formation (ratio)

In LaborC = share of natural capital in total capital (ratio)

In Mine = the fraction of mining production of each country.

D represents rich and low developed countries.

ε_i = scholastic classical normally distributed error term

In order to estimate the econometric model form, a function form has to be specified. We hypothesize that the function form is linear. This form of the equation is expressed below. This is the equation that we estimate:

$$InGDPC = \beta_1 + \beta_2 In\ capc + \beta_3 InLaborC + \beta_4 Inmine + \beta_6 D + \varepsilon_i$$

The null and alternative hypothesis for each coefficient is summarized below. We hypothesized that each of our theoretical parameters were not all positive. Thus, we expected not to be able to reject the null hypothesis in all our five cases.

One part of this project is the estimation. This was accomplished by estimating the partial regression coefficient. However, in order to determine if the estimates are representative of a broader phenomenon, we need to do inference. To do this we need to test the each partial regression coefficients for statistical significance. We used t-test to do this. The t-test requires stating the decision rule prior to estimate and determine whether it is necessary to reject the null hypothesis. The decision rule to reject the null hypothesis is based on two criteria. The first is that the critical t-value. It should be less than the absolute value of the calculated t-value. The second criterion is that the sign of the estimated coefficient has to agree with the alternative hypothesis. If both conditions are met, we will reject the null hypothesis. The implication is that the coefficient is statistically significant at the level of significance we have selected. Alternatively, if we

cannot reject the null hypothesis our coefficients are not significant. SAS calculates the t-value on the basis that the coefficient is equal to zero. For a one-sided test, rejection of the null hypothesis is evidence supporting our alternative hypothesis and that we have statistical support for our alternative hypothesis. For one-side test for 1 percent significant at the critical t-test for 230 degree of freedom is equal to 2.326. For one-side test for 5 percent significance at t for 230 degree of freedom is equal to 1.645. We decided to use 5% level critical t value for stating purposes. We had 230 degrees of freedom based on a sample size of 235 and 5 parameters to be estimated, included 306 number of observations read and 71 numbers of observations with missing values. Because the t-table does not have 230 degree of freedom as an option, we use ∞ critical t above to 120.

In addition, we have used the Durbin-Watson d statistic in order to detect serial correlation. Because most regression problems involving time series data exhibit positive autocorrelation, the hypotheses usually considered in the Durbin-Watson test are

$$H_0: p = 0$$

$$H_1: p > 0$$

The test statistic is defined as

$$d = \frac{\sum_{i=2}^{n} (e_i - e_{i-1})^2}{\sum_{i=1} e_1^2}$$

Where e_i = the observed and predicted values of the response variable for individual i.

d becomes smaller as the serial correlations increase. Upper and lower critical values, d_U

and d_L have been tabulated for different values of k (the number of explanatory variables) and n.

If $d < d_L$	reject H_0: $p = 0$
If $d > d_U$	do not reject H_0: $p = 0$
If $d_L > d < d_U$	test is inconclusive.

In theory, the fundamental assumptions in linear regression are that the error terms ε_i have mean zero and constant variance and uncorrelated [E (ε_i) = 0, Var (ε_i) = σ^2, and E (ε_i ε_j) = 0]. For purposes of testing the hypotheses and constructing confidence intervals we often added the assumption of normality, so that ε_i are NID $(0, \sigma^2)$. Some applications of regression involve a regressor and response variables that have a natural sequential order over time. Such data is called time series data. The regression models using time series data occur relatively often in economics, business, and some fields of engineering. The assumption of uncorrelated or independent errors for time series data exhibit serial correlation, that is, [E (ε_i ε_j) $\neq$ 0]. Such error terms are said to be auto correlated. However, the Durbin-Waston test is based on the assumption that the errors in the regression model are generated by a first-order autoregressive process observed at equally spaced time periods, that is,

$$\varepsilon_t = \mathrm{p}\, \varepsilon_{t-1} + a_t$$

Where ε_t the error term in the model at time period t is, a_t is an NID $\left(0, \sigma_a^2\right)$ random variable, and $p(|p|<1)$ is the autocorrelation parameter. Thus, a simple linear regression model with first-order autoregressive errors would be

$$y_t = \beta_0 + \beta_1 x_t + \varepsilon_t$$

$$\varepsilon_t = \rho \varepsilon_{t-1} + a_t$$

Where γ_t and χ_t are the observations on the response and regressor variables at time period t.

Situations where negative autocorrelation occurs are not often encountered. However, if a test for negative autocorrelation is desired, one can use the statistic 4−d. Then the decision rules for H0: ρ = 0 versus H1: ρ < 0 are the same as those used in testing for positive autocorrelation. It is also possible to conduct a two-side test (H0: ρ = 0 versus H1: ρ 6= 0) by using both one-side tests simultaneously. If this is done, the two-side procedure has Type I error 2α, where α is the Type I error used for each one-side test.[116]

Procedure

We used a multivariate linear regression with ordinary least squares to estimate the coefficients. The software used for the regression was SAS version 9.2. Data was selected and collected from different sources. The data set consists of 235 observations collected over nine most recent time periods (2005-2013) from 33 developed and underdeveloped

[116] Douglas C. Montgomery, Elizabeth A. Peck, and G. Geoffrey Vining, *Introduction to Linear Regression Analysis*, 3rd ed. (New York: John Wiley & Sons, INC, 2001), 1-610.

countries that we saved to Excel and then processed prior to loading it into SAS. Finally, we ran our linear regression model in SAS.

In addition, we used the Durbin- Watson d test is the most celebrated test for detecting serial correlation. The Durbin-Watson d statistic is quite similar to the use of t and F tests. A great advantage of the d statistic is that it is based on the estimated residuals, which are routinely computed in regression analysis. Because of this advantage, we are recommend reporting the Durbin-Watson d along with summary measures, such as R^2, t, F and adjusted R^2 . The upper and the lower Durbin- Watson d test critical values (d_U an d_L) depend on the number of explanatory variables, the sample size, and the level of significance of the test. We also ran the OLS regression and obtained the estimated residuals. We computed d from the Lgdpc function. For the given sample size and given number of explanatory variables we found out the critical (d_U and d_L) values. Using SAS version 9.2 software, we performed an exact d test of autocorrelation which gives the p value of the computed d practically close to zero, thereby reconfirming our conclusion based on the Durbin-Watson d statistic table. We can also examine the residual by simply plotting them against time, the time sequence plot or plotting the standardized residuals.

Data

This paper considers data from three comparison sources: databank.worldbank.org, Groningen Growth and development (2013) Pen world tables' data and UNdata.org. Penn World Table (PWT) displays a set of national accounts, set of prices in common currency so that real quantity comparisons can be made, both between countries and over

time. It also provides information about relative prices within and between countries, as well as demographic data and capital stock estimates. The PWT uses the World Bank international comparison program data; the 146-country benchmark ICP detailed price comparisons. Major changes include the relative prices of export and import are measured, which permits a distinction between two measures of real gross national product (GDP), one aimed at capturing relative productive capacity; the method by which PPPs over time are estimated uses more of the historical price survey material; and measures of capital stock and (total factor) productivity are introduced.

The log of GDP per capita rate is the dependent variable in the linear regression estimation model. Any changes in living standards are detected readily changes in the GDP per capital. It is defined as a gross domestic product divided by midyear population. It is an indicator of how prosperous a country feels in respect to each of its residents, while Domestic Product or GDP is the market value of all final services and goods that are produced within a country in a specific period. The GDP looks the market value to arrive at a value that is then used to examine the growth rate of the economy as well as the overall economic health of the country being looked at. We used the logarithmic change of GDP per capita in order to have the variable normally distributed and assume constant elasticity over all values of the dataset.

The main independent variable we used is the change of the rate of gross capital formation. Gross capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Data for this variable was obtained from the World Data bank catalog. We used labor per capital as an additional independent variable in order to estimate labor. Data estimated is from the Penn World

Table 8.1. The data set provides an index of human capital per person, which is related the average years of schooling and the return to education. Mining data was collected from the World Bank International Comparison Program Database. Mining was defined as the fraction of mining production of each selected country. We finally selected some countries with high as well as low natural resources among the developed and underdeveloped countries.

Hypothesis Testing/ Results

In deciding whether to accept or reject the null hypothesis, a one tailed t-test was used with 231 degrees of freedom and 5% level of significance. We had 231 degrees of freedom with a sample size of 235. The summary of our hypothesis testing is below.

The decision ruled is to reject the null hypothesis H_0 if the observed value of the calculated t is larger in absolute value than the critical t of 1.645 and has the sign that agrees with the alternative hypothesis.

The critical t-value for a 5 % level of significance and 231 degrees of freedom was 1.645 and the calculated t value for the coefficient of change of the Gross capital formation (ratio), **Lcapc** as a portion of GDP was 10.80. Since the absolute value of the calculated t is lower than the critical t value, we cannot reject the null hypothesis. The beta coefficient for Lcapc is therefore not statistically significant at the 5% level. Although the sign of the estimated coefficient was as expected, the test indicated it was not statistically significant. Its slope coefficient was .35470. This is a change of the gross capital formation GDP.

The critical t-value for a 5 % level of significance and 231 degrees of freedom was 1.645 and the calculated t value for labor for capita was 10.62. Since the absolute value of the calculated t is lower than the critical t value, we cannot reject the null hypothesis. The beta coefficient for labor per capita is therefore not statistically significant at 5% level of significance. Although the sign of the estimated coefficient was as expected, the test indicated it was not statistically significant. Its partial regression coefficient was 2.04817. The decision rule for inference for the coefficient for labor per capita indicated that we cannot reject the null hypothesis of no relationship. The reason is that we must reject the null hypothesis H_0 if the observed value of the calculated t is larger in absolute value than the critical t and has the sign that agrees with the alternative hypothesis. This was not the case.

Our decision rule is to reject the null hypothesis H_0 if the observed value of the calculated t is larger in absolute value than the critical t of 1.645 and has the sign that agrees with the alternative hypothesis. The critical t-value was 1.645 for the 5% level of significance and 231 degrees of freedom while it was 4.46 for the calculated t value for the coefficient of mining as a proportion of GDP. We reject the null hypothesis because the calculated value of t is larger in absolute value than the critical t and has the sign that agrees with the alternative hypothesis. The coefficient for labor per capita as a proportion of GDP is therefore statistically significant at 5% level of significance. The sign of the estimated coefficient was as expected and the inference test indicated it was statistically significant. It is slope coefficient for mining as a proportion of GDP was 0.46520. Thus holding capital proportions and labor per capital constant, a proportional change of 0.01 of mining as a proportion of GDP increase the GDPC coefficient by 0.0046520

The proportion of 3.60317 was defined as an intercept term and always it is constant. We don't rely on it for inference even if it seems to be statistically significant.

We have a R^2 of 0.9654 which means that 96.54% is the result of a time –series regression with a good fit. We have two ways to measure mining. We can use dollar amount by country or use dummy High resources in mining or low. There are also different ways of reporting these results of regression analysis. In our case, we use the following format for Lgdpc[117].

$$Lgdpc = 3.60317 + 0.35470\text{Lcapc} + 2..04817 Llaborc + 0.46520 L\min e - 1.58419\text{D}$$

se =	(0.27912)	(0.03283)	(0.19037)	(0.10423)	(0.10765)
t =	12.91	10.80	10.76	4.46	(-14.72)

$\overline{R}^2 = 0.9654$ FV 1602.70 n = 235 Df = 231

Where the first set of parentheses are the estimated standard errors of the regression coefficients. The estimated standard errors have the same sign as calculated t-value. The sign of the standard error is positive because the sign of the estimated coefficient and t-value are positive and negative, because t-value is negative. In a second set, it estimated t-value. The sign of the t-value is always the same as the calculated t-value. A negative sign implies that the sample mean is less than the hypothesized mean. This would be evidence against the null hypothesis if (and only if) the alternative was that the true mean is less than the hypothesize value. We have F value equals to 1602.70 with a number of observation used equals to 235, the sample size, with 306 numbers of observations read and 71 with missing values. These results show that the logarithm of gdpc is positively related to the change of gross formation capital, labor capital, mining,

[117] In the appendix the second dummy variable regression results are also given.

rich countries but negatively related to the less developed countries. Besides, we used Durbin-Watson d test to test for serial correlation. The Durbin-Watson d statistic is quite similar to the use of t and F tests. The upper and lower critical values (d_U and d_L) depend on the number of explanatory variables, the sample size, and the level of significance of the test. For comparative purposes, we used the results based on autoreg procedure model under Durbin-Watson d test, the results are quite similar individually statistically significant to the proc reg procedure model. The AUTOREG procedure estimates and forecasts linear regression models for time series data when the errors are auto-correlated or heteroscedastic. The autoregressive error model is used to correct for autocorrelation, and the generalized autoregressive conditional heteroscedasticity (GARCH) model and its variants are used to model and correct for heteroscedasticity. For the logarithm of gdpc, if we have to set up the Durban-Watson d test, we opt to use a one side test with 95 percent confidence test for a regression equation of five explanatory variables with 235 observations. The results show that, based on the critical values for Durbin-Watson d statistic test for a 5 percent level of significance on one side test for Lgdpc function, the estimated d is 0.690, suggesting that there is positive correlation in the estimated residuals for 235 observations and k'= 4. The 5 percent critical d values are estimated such as d_L = 1.718 and d_U = 1.820. In Durbin –Watson d statistic, any estimated d must lie within statistical limits. In many situations, it was found that the upper limit d_U is approximately the true significance limit and therefore in case of d lies in indecisive zone, one can use the modified d test. That is not applied in our case. Our results can be expressed such as: if the hypotheses are $H_0 : P \leq 0$ (No positive correlation)

$H_1 : P > 0$ (Positive correlation). The appropriate decision rule is that if d < 1.718 reject H_0, and if d > 1.820 do not reject H_0, then if $1.718 \leq d \leq 1.82$. This is inconclusive.

Therefore, as a rule of thumb, if d is found to be 2 in an application, one may assume that there is no first-order autocorrelation, either positive or negative. By using this test, we determine that we have positive serial correlation.

The Durbin-Watson d statistic is the most commonly used method of detecting first-order serial correlation. We found the first-order correlation of 0.650. From our SAS system, we ran a d statistical of 0.690, which is less than the critical lower limit of the d test, then that we will lead us to reject the null hypothesis of no positive serial correlation and drive to conclude that we have statistical evidence of serial correlation at the 5 percent level of significance.

We have also tested the impact of education in Developed and Less Developed countries, our model shows a significant relationship between education and economic growth in less developed countries and we concluded that the education has a positive impact on economic growth in the underdeveloped than in the developed countries.

Lastly, a similar test for mineral resources and economic growth relationship for the Democratic Republic of Congo has been conducted. To illustrate the Democratic Republic of Congo case, we use the data given in the table country level model to run the regression and we obtained the following results:

$$Lgdpc = 2.18335 + 0.19662\text{Lcapc} + 4.45438Llaborc + 0.20758L\min e$$

se =	(0.73013)	(0.0733)	(2.50973)	(0.06292)
t =	2.99	2.68	1.77	3.3

$\bar{R}^2 = 0.986$ FV = 70.22 n = 1 Df = 0

These results reveal that the regression coefficient of 0.196621 is the partial regression coefficient of Lcapc. This indicates that with the influence of Laborc held constant, as capc increases, say, by a dollar, on average, gdpc increases by about 1.96 units. For more economically interpretable result, if the per capita GNP goes up by a thousand dollars, on average, the gdpc increases by about 1.96 per thousand capc.

Similarly, the coefficient of 4.45438, holding the capital input constant, a 1 percent increase the labor led on the average to about 4.45 percent increase in the output. The coefficient s of the Gross capital formation per capita and labor per capita as proportions of GDP were therefore statistically significant at 5% level of significance. The partial slope coefficient for mining as a proportional of GDP was estimated at 0.20758. Thus holding capital and labor per capita constant, a proportional change of change of 0.01 of mining as a proportion of GDP increase the GDPC coefficient by 0.0020758.

From a typically statistics viewpoint, the estimated regression fits well the data. Obviously, there is a statistically significant relationship on the country between GDPC and the mining variables. As suggests our result, mining is positively associated with economic growth .The R^2 value of 0.986 means that about 98.6 % of the variation in the average growth rate of logarithm per capita is explained by respectively the log of the gross capital formation, labor and mining production. The regression shows that there is not a case of any apparent causal relationship between the increase of the exploitation of mineral resources and the decline of the other sectors.

Overall, the results of our regression are consistent with the predictions of the economic growth. All the variables have positive signs and expected to influence the economic growth. After interpreting the results, as well as the natural resource abundant is positively associated by bureaucratic performance, the rule of law with more market-oriented economic policies, we conclude that the lack of the enforcement of the rule of law, corruption rooted in the institutions and the rent-seeking are the principal determinants and causality for the poor economic growth in the Democratic Republic of Congo. I believe for the government in following the recommendations and conclusion traced in this work as a learning process, the Democratic Republic of Congo will be able to transform its abundance resources into a blessing for a prosperous nation.

Conclusion and Recommendations

This paper concludes that analyzing the exogenous and endogenous causes for such poor economic growth defines the reasons of underdevelopment in the Democratic Republic of Congo. Initially, Congolese people have blamed country problems on colonization. The Belgians took away resources from the DRC which they used to develop their own country and left the DRC in an underdevelopment state. This argument has been described as being out-of- date. First of all, the DRC, as other African countries, plunged into loans and grants from foreign countries. This dependency on loans and grants was unfortunately accompanied by unfavorable conditions in exchange of natural resources and did not benefit to the population. These foreign capital flows did

not lead to increased growth and drove the country to a worsened economic performance. Congolese leaders have reserved the national resources for themselves and their comrades in the form of money mostly in foreign banks.

Many authors have investigated whether political instability in the recipient country matters for the natural mineral resources. Frequent political instability may lead to unpredictable changes in laws, regulations, government policies, taxation and expenditures and property rights. The uncertainty created by these changes reduces incentives toward investment and consumption, leading to lowering the Democratic Republic of Congo economic growth. However many researchers conclude that the economic growth related to natural mineral resources is more effective in politically stable environments, since natural mineral resources interacted with the political instability variable was negative and statistically significant. The Democratic Republic of Congo (DRC) has been in economic, societal and political turmoil for many years. According to the 2012-2013 Frase Index, 40% of investors would not pursue any investment in the Democratic Republic of Congo and 40% would be strongly deterred from investing due to political instability.

Natural resources may be under produced due to lack of effective property rights and high transaction costs. The Coase Theorem says that with-well defined property rights private, voluntary negotiations yield efficient outcomes, but high transactions costs may preclude such results. As outlined by Demesetz (1967), “more valuable resources tend to have precise property rights because it off sets the higher costs of defending and

enforcing rights."[118] The creation of property rights boosted mining investment. Many cases studies suggest an interesting hypothesis about transaction costs and the implications of property rights for turning the resource curse into a blessing. For example, if transport costs are relative to those of manufactured goods, extra resources lower the domestic price for a key input to manufacturing, giving domestic manufacturers a comparative advantage.[119]

Corruption is another major disincentive. Higher levels of corruption present the most obvious political risk that can arise from large holdings of natural resources. The short run availability of large financial assets increases the opportunity for the theft of such assets by political leaders. Those who control these assets can use that wealth to maintain themselves in power, either through legal means (e.g. spending in political campaign) or coercive ones (e.g. funding militias). Statistical studies that seek to account for variation in levels of corruption across different countries find that natural resource dependence is a strong predictor.[120] However, as we have explained above, corruption related to natural resources takes many forms. International mining companies that seek to maximize profits find that they can lower the costs of obtaining resources more easily by obtaining the resources at below market value-by bribing government officials-than by figuring out how to extract the resources more efficiently.[121] The adverse political effects associated with high levels of corruption and weak states ultimately have consequences

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[118] Harold Demesetz, "Toward a Theory of Property Rights.," *American Economic Review: Papers and Proceedings* 57, no. 2 (1967): 347-59, www.jstor.org/stable/1821637.

[120]Carlos Leite and Jens Weidmann, "Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth," *International Monetary Fund,* Working Paper 85, no.99 (1999): accessed January 23, 2015, http:ssrn.com/abstract=259928 or http//dx.doi.org/10.2139/ssrn.259928.

[121] Marcatan Humphreys et al., *Escarping the Resource Curse* (New York: Columbia University Press, 2007), 1-20.

for the political system itself.[122] In practice, the risks of corruption are very large in Democratic Republic of Congo and enormous are the costs of such corruption to the national economy. For example, access to natural mineral resources allowed Democratic Republic of Congo leaders successfully repress or co-opt their oppositions, and thus avoid having to relinquish power through electoral competition. Lack of good governance and transparency on natural mineral resources revenue has rendered this country backward. The Ibrahim Index 2012 scores the Democratic Republic of Congo 41 out of 52 nations (where 52 is the worst-performing country) for accountability, transparency, and corruption in the public sector[123]. Despite some progress, the regulatory environment still remains as a significant drawback.

The tax system is also perceived as a disincentive. Fraser index 2012/213 indicates that the taxation regime in the Democratic Republic of Congo is a deterrent to investment. In fact, the ideal tax revenue is for the purpose of raising essential revenue without excessive government borrowing. The financial gains are usually shared between business and government via taxes on a company during times of high profitability. However, in some countries such as the Democratic Republic of Congo, a further windfall profit tax or resource rent tax are often used with the purpose of attempting to capture "rents" from elevated prices, which can in turn temporarily enabling mining companies to earn profits far higher than the threshold rate of return. Because tax is so important, the government must look both how to raise more revenue

[122]Ibid.

[123]The Ibrahim Index is the most comprehensive collection of quantitative data on governance in Africa. Compiled in partnership with experts from a number of the continent's institutions, it provides annual assessment of governance in every African country.

and do so equitably. Tax justice is important on account that it allows the country to raise substantial revenue for needed public services, development and government infrastructure through a broad tax base.

In its Joint Staff Advisory Note in July 2013, the IMF classified the constraints and risks preventing investors from producing domestically and serving the relatively large local market into four broad categories: deficient infrastructure, poor governance and complex business regulations, high financing costs, and lack of trained workers. These factors deter investments into other sectors of the economy, and thus prevent the domestic economy from taking advantage of potential foreign interest. The government's inability to provide adequate infrastructure and failure to create a business environment conducive to economic growth, have marred the country for numerous years. Consequently, the mining industry has seen strong growth, but the private sector is largely underdeveloped.[124]

In the Democratic Republic of Congo, an uncertain legal framework conflicts with armed militias for control of eastern Congo's rich mineral deposits, endemic corruption, and lack of transparency in government policy are long-term problems for the mining sector and the economy as a whole. Protection of property rights remains weak and dependent on a dysfunctional public administration and judicial system. This plundering discourages economic activities within the DRC.

Recommendations

[124]*KPMG GLOBAL MINING INSTITUTE*, Democratic Republic of Congo Mining Guide, 2014, 12

Jeffrey Sachs shows the conditions which natural resources are likely to have adverse effects on other sectors of an economy. These effects can be avoided, however, and indeed reversed, with appropriate investment strategies. Ross, M. explores the advantages and disadvantages of the decentralization of mineral revenues and offers a series of guidelines for states that seek to better manage the distributional problems caused by mineral booms.[125] Paul Collier and Carline Laroche (2015) present a framework for natural resource management. They indicate that "natural resources can support sustainable and inclusive growth if the key policy areas in the natural resource management chain are tackled and strong institutions are in place."[126] Natural resources, through the revenue they generate, have the potential to lead to large and sustained improvements for the Congolese standards of living if properly managed. In order to support sustainable and inclusive growth, the government of the Democratic Republic of Congo needs to get the natural resource management policy chain right, including discovering, exploiting, taxing, investing in investments, and all of them need to be adequately developed with strong policies for each. The 'resource curse' as best know is about political dysfunctions. The most important of those dysfunctions is that discovering natural resources often acts as a source of conflict between fractions fighting for a share of the revenue.

The exploitation of the natural resources process is accompanied with large positive and negative externalities that the government should deal with. One of the most

[125]Marcatan Humphreys et al., *Escarping the Resource Curse* (New York: Columbia University Press, 2007), 1-20.

[126] Paul Collier and Caroline Laroche, "Harnessing Natural Resources for Inclusive Growth," *International Growth Center (IGC)* (2015): 1-6, accessed July 23, 2015, http://www.theigc.org/wp-content/uploads/2015/03/IGCGrowthBriefNRMCollier20151.pdf.

beneficial aspects is the infrastructure it generates, such as transport links and healthcare facilities. At the stage of a contract agreement, the government must insist on multi-user infrastructure. The small extra cost to companies achieves a much larger social gain, so that it is mutually beneficial for a government to accept a little less tax revenue in return for open usage of valuable infrastructure[127]. We recommend the Democratic Republic of Congo to analyze the possible positive natural resource externalities effects from the exploitation infrastructure and ensure exploitation contracts allow social benefits to be fully accomplished.

The environmental damages that occur at the stage of exploitation are, on the other side, the most recognizable negative externalities that the government has to predict in advance. On term of contract, the government of the Democratic Republic of Congo must ensure that the contracts clearly stipule the public compensation for environmental damage.

The country such as the Democratic Republic of Congo, which relies on external income sources rather than on domestic revenue, has less of a need to develop a bureaucratic system to raise its revenue. The need to collect taxes is widely thought to have contributed to the emergence of a strong state and even the democratic institutions similar to many Western countries (Ross 2004). The lack of reliance on tax revenue in favor of reliance on external sources of revenue hinders the development of effectiveness. In order to ensure an efficient taxation system against corruption, or any opaque bureaucracy, the government must adopt a transparent negation process, auction

[127]Ibid.

extraction rights, strong transparent arrangement for revenue management in place, set up proper procedures to allocate extraction rights and binding agreements about tax rates.

There is no incentive to invest if the cost of investment is greater than the return on investment. The most important step in the exploitation of natural mineral resources that assures sustainability and benefits the country in the long-term is effectively investing the revenues from natural resources exploitation. The government of the Democratic Republic of Congo should use a large part of this asset from natural mineral resources by investing large shares into infrastructure and other forms of capital that ensure long-term growth. We also recommend to the state to save large amounts of all tax revenue generated by natural resource taxation for the purpose of supporting the next generation.

The volatility of mineral resource prices, which have been considerably higher for years, causes growth to be unstable. Commodity prices being highly volatile, natural resources revenues are volatile too, which leads to uncertainty in the public budgeting process. In order to avoid unstable expenditure, the central government should set up a public expenditure-smoothing rule, which will be funded by savings generated in surplus years.

As the corruption is a common occurrence in Congolese elites, such prevalence makes the population suspicious of politicians' actions. We recommend the government to set up a trustworthy body of citizens, which we call the "critical mass" to monitor whether the revenues from natural resources are properly managed and spent for the benefits of the citizens rather than being captured by the elite. Only with this body of critique will there be enough pressure on the politicians to not break policies and rules.

Another possible effect of the resource curse is the crowding out of human capital. Countries that rely on natural resources exports such as the Democratic Republic of Congo neglect education because they see no immediate revenue involved with it. However, DE Ferranti et al. (2002, p.11) concluded that "the recurrent lesson of the successful natural resource developers, and of contemporary theory, is the necessity of engendering a high level of human capital and developing a capacity for "national "learning and innovation."[128] In particular, most economic historians have actually concluded that American industrial success stemmed in large part from the country's playing to its strength-resource abundance in a large range of minerals- while heavily investing in knowledge accumulation in and around the resource sector[129]. Resource economies like Singapore, Taiwan or South Korea by contrast, spent enormous amounts on education and this contributed in part to their economic success.

In general, interpersonal skill and problem solving seems to be very important in today's workplace because most job positions are offered in education, health care, business and office settings as well as in manufacturing where there are higher levels of human interaction and people spend more time interacting with each other to effectively manage the new technology. The emergence of new and advanced technologies has led to an increase in jobs that require tertiary level qualifications even at the entry level; the rate of increase expected to accelerate. We recommend the government to generously invest

[128] David de Ferranti et al., "From Natura Resources to the Knowledge Economy: Trade and Job Quality," *World Bank* (2002): 1-186, accessed March 10, 2015,https://openknowledge.worldbank.org/handle/10986/14040 License: CC BY 3.0 IGO."

[129]Ibid.

in technology, industry and scientific research and the development for a high level of human capital.

Overall, natural resources can help countries grow out of resource-dependency, but they more often trigger an economy decline in other sectors of the economy. Economy diversification is largely neglected and delayed in the light of the temporary high profitability of the limited natural resources in the Republic Democratic of Congo. The government should adopt the policy of economic diversification by developing the other economic sectors in order to maintain the steady state in case of fluctuation in market price of mineral natural resources. Any negligence to this approach gives birth to a Dutch Disease.

To sum up, we resume that the economic growth is a complex process and the role of natural resources can be also expected to be complex. Whether natural resources are a blessing or a curse is still a debate among economists. When we ran our regression model, we find a significant effect of natural resources and we induce that the resource curse will not always happen and can be avoided. The example of Malaysia with its earnings from resources export, resources to diversify its economy and the diamond of Botswana to become the fastest growing economy in the world illustrates the importance of the political process in ensuring positive productivities in its growth economy. What can be understood for a country like the Democratic Republic of Congo has not been able to transform its abundance resources into a blessing for a prosperous nation? The answer is that the country failed in investing in human capital as well as setting up robust institutions and rules required to assure natural resource wealth support inclusive growth.

Resources, technology, and institutions are factors that are more important and which contribute greatly to economic growth, but the most important are institutions.

The Democratic Republic of Congo to achieve sustainable economic growth and development depends how much it will invest in all sectors of economics by creating a policy and business environment that will attract foreign and local investors. This is a blessing that the state needs to take seriously into consideration by spending time and resources building robust institutions assuring resource revenues support sustainable growth so we cannot only alleviate but also eradicate the poverty.

Bibliography

African Development Bank. "Democratic Republic of Congo, 2013-2017 Country Strategy Paper." *African Development Fund* (June 2013): 6-7. Accessed March 20, 2015.http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Democratic Republic of Congo 2013-2017 Country Strategy Paper.pdf.

AfricanBank. *Natural Resources for Sustainable Development in Africa*. New York: Oxford University Press, 2007. Accessed March 9, 2015. http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/African%20Development%20Report%202007.PDF.

Appiah, Manuella, and Ting Zhang. *Escaping the Resource Curse in Sub-Sahara Africa*. 4th ed. The Hague, Netherlands: The Hague Institute for Global Justice, 2013. Accessed March 19, 2015. http://www.thehagueinstituteforglobaljustice.org/wp-content/uploads/2015/10/PB4-Escaping-Resource-Curse-Sub-Saharan-Africa.pdf.

Auty, Richard. *Sustaining Development in Mineral Economies: The Resource Curse Thesis*. London, NY: Routledge, 1993.

Barro, Robert J. "Economic Growth in a Cross Section of the Countries." *Quarterly Journal of Economics* 106, no. 2 (1991): 407-49. Doi: 10.2307/2957943.

Brewer, Dominic J, and Patrick McEwan. *Economic of Education*. Oxford: Elsevier, 2010.Accessed February 15, 2015. https:books.google.com/books.

Colclough, C. *Structuralism Versus Neo-Liberalism. in C. Colclough,*. Oxford: Oxford University Press, 1995.

Collier, Paul, and Caroline Laroche. "Harnessing Natural Resources for Inclusive Growth." *International Growth Center (IGC)* (2015): 1-6. Accessed July 23, 2015. http://www.theigc.org/wpcontent/uploads/2015/03/IGCGrowthBriefNRMCollier20151.pdf.

Collier, Paul, and David Dollar. *Globalization, Growth, and Poverty: Building and Inclusive World Economy (Policy Research Reports)*. Washington: World Bank Publications, 2001.

Congleton, Roger D., Arye L. Hillman, and Kai A. Konrad. "Forty Years of Reaserch On Rent Seeking: An Overview." *Springer Science and Business Media* (2008): 1-61. Accessed March 24, 2015. http://www.tax.mpg.de/fileadmin/TAX/pdf1/2008-introduction_rent_seeking_june_16_2008.pdf.

David, Grahm A. "Learning to Love Dutch Disease: Evidence from the Mineral Economies." *World Development* 23, no. 10 (1995): 1765-79.

De Ferranti, David, Guillermo E. Perry, Daniel Lederman, and William F Maloney. "From Natura Resources to the Knowledge Economy: Trade and Job Quality." *World Bank* (2002): 1-186. Accessed March 10, 2015. https://openknowledge.worldbank.org/handle/10986/14040 License: CC BY 3.0 IGO.".

Demesetz, Harold. "Toward a Theory of Property Rights." *American Economic Review: Papers and Proceedings* 57, no. 2 (1967): 347-59. www.jstor.org/stable/1821637.

Dholakid, Bakul H. "The Sources of Economic Growth in India." *Borada good Companion* (1974): 246-67. Accessed February 7, 2015. http://www.Jstor.org/stable/27765600.

Doran, C.R. *An Historical Perspective on Mining and Economic, in L.h. Cook and M.g. Porter."The Minerals Sector and the Australian Economy" George Allen and Unwin*. Sydney: Monash University, 1984.

Ferraro, Vincent. *Dependency Theory; An Introduction; in the Development Economics Reader*. London, Routlege: Giorgio Secondi, 2008. Accessed March 27, 2015. https://www.mtholyoke.edu/acad/intrel/depend.htm.

Godo, Yoshihisa, and Yujiro Hayami. "Catching up in Education in the Economic Catch-Up of Japan with the United States, 1890-1990." *Economic Development and Cultural Change*50, no. 4 (2002): 961-78. Accessed March 25, 2015.http://www.jstor.org/stable/10.1086/342762.DOI: 1086/342762.

Gylfason, Thorvaldur. "Natural Resources, Education, and Economic Development." *European Economic Review* 45, no. 6 (May 2001): 847-59.
Sachs, Jeffrey D., and Andrew M. Warner. "Natural Resource Abundance and Economic Growth." *Center for International Development and Harvard Institute for international Development* (1997): 1-50. Accessed January 8, 2016.http://www.cid.harvard.edu/ciddata/warner_files/natresf5.pdf.

Hanushek, Eric A., and Ludger Wobmann. "The Role of Education Quality in Economic Growth." *World bank Policy Research Working paper 4122* (2007): under "2." Accessed March 1, 2015. https://openknowledge.worldbank.org/bitstream/handle/10986/7154/wps4122.txt?sequence=2&isAllowed=y.

Hanushek, Erick Alan. "Economic Growth in Developing Countries: The Role of Human Capital." *Economics of Education Review* 37 (2013): 204-12. Accessed March 29, 2015.

Holmas, Heikki, and Joe Oteng Adjei. *Breaking the Mineral and Fuel Resources Curse in Ghana*. Paris: OECD, 2012. Accessed March 20, 2015. http://dx.doi.org/10.1787/dcr-2012-16-en.

Humphreys, Marcatan, Jeffrey D. Sachs, Joseph E. Stiglitz, and Soros George. *Escarping the Resource Curse*. New York: Columbia University Press, 2007.

Hunt, Diana. *Economic Theories of Development: An Analysis of Competing Paradigms*. UK: Harvester Wheatsheet, 1989. Barnes and Noble Nook.

Japan, Ministry of Education. *Japan's Growth and Education*. Tokyo: Ministry of Education, 1963.

KPMG GLOBAL MINING INSTITUTE. Democratic Republic of Congo Mining Guide. 2014.

Lane, Philipp R., and Aaron Tornell. "Power, Growth and the Voracity Effect." *Journal of Economic* 1, no. 1 (1996): 213-41. www.jstor.org/stable/40215916.

Leite, Carlos, and Jens Weidmann. "Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth." *International Monetary Fund Working Paper 85, no.* 99 (1999): Accessed January 23, 2015.http:ssrn.com/abstract=259928 or htt//dx.doi.org/10.2139/ssrn.259928.

Lewis, Stephen R. *"Development Problems of the Mineral-Rich Countries,"* in Moshe Syrquin, Lance Taylor and Larry E. Westphal (Eds.) *Economic Structure*

and performance: Essays in Honor of Hollis B. Chenery. Orlando, FL: Academic Press, Inc., 1984.

Lucas, Robert Jr. "On the Mechanics of Economics Development." *Journal of Monetary* 22, no. 1 (1988): 3-42.

Mankin, N. Gregory, David Romer, and David N. Weil. "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economic*107, no. 2 (1992): 407-37. Accessed March 5, 2015. http://www.qje.oxfordjournals.org/content/107/2/407.short/2118477. doi.10.2307/2118477.

Mercieca, Pauline. "Aid and Economic Growth in Developing Countries: A Literature Review." *Bank of Valletta Review* no. 41 (Spring 2010): 16-17. Accessed April 26, 2015. https://www.bov.com/documents/bov-review-41-paper-1.

Miller, Riel. "Education and Economic Growth: From the 19th to the 21st Century."*Cisco.Public* (2012): 7-20. Accessed March 20, 2015.https://www.cisco.com/web/strategy/docs/education-and-Economic-Growth.pdf.

Montgomery, Douglas C., Elizabeth A. Peck, and G. Geoffrey Vining. *Introduction to Linear Regression Analysis*. 3rd ed. New York: Jonh Wiley & Sons, INC, 2001.

Oxford Policy Management. "The Impact of Mining in the Democratic Republic of Congo." *Oxford Policy Management*, 2013. Accessed January 24, 2015. http://www.opml.co.uk/sites/default/files/DRC%20mining%20report%20-%20OPM%20-%20Final%20Eng.pdf.

Oxford Policy Management. The Impact of Mining in the Democratic Republic of Congo. October 2013. Accessed January 20, 2015. http://www.opml.co.uk/sites/default/files/DRC mining report OPM Final Eng.pdf.

Patel, Anita P. "Role of Education in Growth and Development of Indian Economy." *International Research Journal* (?): 312-17

Robinson, Sherman. "Theories of Economic Growth and Development: Methodology and Content." *Economic Development and Culture Change*21, no. 1 (Oct. 1972): 54-67. Accessed March 30, 2015. http://www.jstor.org/1152904.

Rudd, David. "An Empirical Analysis of Dutch Disease: Developing and Developed Countries. Honors Projects Paper 62." diss., Illinois Wesleyan University, Spring 1996. Accessed March 12, 2015. http:// digitalcommons.Iwu.edu/econ_honproj/62.

Sachs, Jeffrey D., and Andrew M. Warner. "Natural Resources and Economic Development: The Curse of Davis, Graham A. "Trade in Mineral Resources." *World Trade Organization: Division of Economics. Colorado School of Mines* (2010): 1-42. Accessed May 19, 2015. https://www.wto.org/english/res_e/reser_e/ersd201001_e.pdf.Natural Resources." *Natural Resources and Economic Review* 45 (2001): 827-38.

Saleh, Abdul Majid Mat, Halta Solhee Mohd, and Yusuf Kasim. *Socio-Economic Development in Sarawaki: Policies and Strategies for the 1990s.* Malaysia: Angkatan Zaman Mansang ,1990

Solow, Robert M. "A Contribution to the Theory of Economic Growth." *Quarterly Journal of Economics* 70, no. 1 (1956): 65-94. Accessed March 10, 2015. http://www.econ.nyu.edu/user/debraj/Courses/Readings/Solow.pdf.

Stevens, Philip, and Martin Weal. "Education and Economic Growth." *National Institute of Economic and Social Research* (2003): 6-29. Accessed March 30, 2015.http://cee.lse.ac.uk/conference_papers/28_11_2003/martin_weale.pdf.

Todaro, Michael P, and Stephen C. Smith. *Economic Development*. 8th ed. Boston-MA: Addison -Wesley Higher Education Group, 2003

Yager, Thomas R. "The Mineral Industry of Congo (Kinshasa)." *U.S. Geological Survey Minerals Yearbook- 2010* 1, no. 9 (May 2012): 1. Accessed April 19, 2015. http://minerals.usgs.gov/minerals/pubs/country/2010/myb3-2010-cg.pdf.

Appendices

A. Democratic Republic of Congo Results

The SAS System

The MEANS Procedure

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
lngdpc	lngdpc	9	5.5140572	0.0869936	5.3981627	5.6629605
Llaborc		7	0.4324506	0.0045150	0.4258558	0.4374159
Lcapc		7	3.3760233	0.0875394	3.2004791	3.4645369
Lmine		9	3.4526810	0.1629236	3.2363084	3.6439529

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

Number of Observations Read	9
Number of Observations Used	7
Number of Observations with Missing Values	2

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.02045	0.00682	70.22	0.0028
Error	3	0.00029119	0.00009706		
Corrected Total	6	0.02074			

Root MSE	0.00985	R-Square	0.9860
Dependent Mean	5.47915	Adj R-Sq	0.9719
Coeff Var	0.17981		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent			Variance Inflation
						Standard Error	t Value	Pr > |t|	
Intercept	**1**	2.18335	0.73013	2.99	0.0581	0.33120	6.59	0.0071	0
Lcapc	**1**	0.19662	0.07330	2.68	0.0749	0.04416	4.45	0.0211	2.54492
Llaborc	**1**	4.45438	2.50973	1.77	0.1740	1.31028	3.40	0.0425	7.93709
Lmine	**1**	0.20758	0.06292	3.30	0.0458	0.03938	5.27	0.0133	5.06150

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

Durbin-Watson D	2.558
Number of Observations	7
1st Order Autocorrelation	-0.475

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

The AUTOREG Procedure

Dependent Variable Lgdpc

The AUTOREG Procedure

Ordinary Least Squares Estimates

SSE	0.00029119	**DFE**	3
MSE	0.0000971	**Root MSE**	0.00985
SBC	-42.963355	**AIC**	-42.746996
MAE	0.00549852	**AICC**	-22.746996
MAPE	0.09991973	**HQC**	-45.421157
Durbin-Watson	2.5579	**Regress R-Square**	0.9860
		Total R-Square	0.9860

Parameter Estimates

Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|
Intercept	1	2.1833	0.7301	2.99	0.0581
Lcapc	1	0.1966	0.0733	2.68	0.0749
Llaborc	1	4.4544	2.5097	1.77	0.1740
Lmine	1	0.2076	0.0629	3.30	0.0458

Estimates of Autocorrelations

Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
0	0.000042	1.000000	|********************|
1	-0.00002	-0.474955	| *********| |
2	6.358E-6	0.152842	|*** |

Preliminary MSE 0.000032

Estimates of Autoregressive Parameters

Lag	Coefficient	Standard Error	t Value
1	0.519566	0.995579	0.52
2	0.093928	0.995579	0.09

The AUTOREG Procedure

Yule-Walker Estimates

SSE	0.00017063	**DFE**	1
MSE	0.0001706	**Root MSE**	0.01306
SBC	-42.539697	**AIC**	-42.215158
MAE	0.00462594	**AICC**	.
MAPE	0.08434449	**HQC**	-46.2264
Durbin-Watson	2.5821	**Regress R-Square**	0.9950
		Total R-Square	0.9918

Parameter Estimates

Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|
Intercept	1	2.5423	0.9985	2.55	0.2383
Lcapc	1	0.2101	0.1004	2.09	0.2838
Llaborc	1	3.2912	3.6053	0.91	0.5290
Lmine	1	0.2365	0.0950	2.49	0.2431

B All Country Results

The SAS System

The MEANS Procedure

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
lngdpc	lngdpc	306	8.7001453	2.0690876	4.9698133	11.1432376
Llaborc		238	0.8984633	0.2857465	0.1657686	1.2861148
Lcapc		239	7.1460200	2.1520293	0.8254090	12.5937272
Mine	Mine	296	26.7685604	8.4200820	11.5384615	48.0607448

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

Number of Observations Read	306
Number of Observations Used	235
Number of Observations with Missing Values	71

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	982.60675	245.65169	1602.70	<.0001
Error	230	35.25300	0.15327		
Corrected Total	234	1017.85975			

Root MSE	0.39150	**R-Square**	0.9654
Dependent Mean	8.65985	**Adj R-Sq**	0.9648
Coeff Var	4.52089		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent			Variance Inflation
							Standard Error	t Value	Pr > |t|	
Intercept	Intercept	**1**	3.60317	0.27912	12.91	<.0001	0.27727	13.00	<.0001	0
Lcapc		**1**	0.35470	0.03283	10.80	<.0001	0.10453	3.39	0.0008	7.46171
Llaborc		**1**	2.04817	0.19037	10.76	<.0001	0.38893	5.27	<.0001	4.50134
Lmine		**1**	0.46520	0.10423	4.46	<.0001	0.14409	3.23	0.0014	1.55609
D	D	**1**	-1.58419	0.10765	-14.72	<.0001	0.24616	-6.44	<.0001	4.44148

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

Test of First and Second Moment Specification

DF	Chi-Square	Pr > ChiSq
13	75.49	<.0001

Durbin-Watson D	0.677
Number of Observations	235
1st Order Autocorrelation	0.657

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

Number of Observations Read	306
Number of Observations Used	238
Number of Observations with Missing Values	68

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	990.61680	247.65420	1544.25	<.0001
Error	233	37.36653	0.16037		
Corrected Total	237	1027.98333			

Root MSE	0.40046	**R-Square**	0.9637
Dependent Mean	8.68315	**Adj R-Sq**	0.9630
Coeff Var	4.61197		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent			Variance Inflation
							Standard Error	t Value	Pr > |t|	
Intercept	Intercept	**1**	4.55056	0.20643	22.04	<.0001	0.46659	9.75	<.0001	0
Lcapc		**1**	0.40721	0.03084	13.20	<.0001	0.10313	3.95	0.0001	6.36070

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Heteroscedasticity Consistent			Variance Inflation
							Standard Error	t Value	Pr > |t|	
Llaborc		**1**	2.05195	0.19493	10.53	<.0001	0.45758	4.48	<.0001	4.58500
R	R	**1**	0.15590	0.05502	2.83	0.0050	0.05644	2.76	0.0062	1.11934
D	D	**1**	-1.38836	0.09701	-14.31	<.0001	0.21325	-6.51	<.0001	3.49166

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

Test of First and Second Moment Specification

DF	Chi-Square	Pr > ChiSq
12	74.59	<.0001

Durbin-Watson D	0.776
Number of Observations	238
1st Order Autocorrelation	0.606

The REG Procedure
Model: MODEL1
Dependent Variable: Lgdpc

The AUTOREG Procedure

Dependent Variable Lgdpc

The AUTOREG Procedure

Ordinary Least Squares Estimates

SSE	35.2529995	**DFE**	230
MSE	0.15327	**Root MSE**	0.39150
SBC	248.395838	**AIC**	231.09791
MAE	0.29500415	**AICC**	231.359919
MAPE	3.75689984	**HQC**	238.071639
Durbin-Watson	0.6775	**Regress R-Square**	0.9654
		Total R-Square	0.9654

Parameter Estimates

Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|	Variable Label
Intercept	1	3.6032	0.2791	12.91	<.0001	
Lcapc	1	0.3547	0.0328	10.80	<.0001	
Llaborc	1	2.0482	0.1904	10.76	<.0001	
Lmine	1	0.4652	0.1042	4.46	<.0001	
D	1	-1.5842	0.1077	-14.72	<.0001	D

Estimates of Autocorrelations

Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
0	0.1500	1.000000	|**********|
1	0.1127	0.751047	|********** |

Preliminary MSE 0.0654

Estimates of Autoregressive Parameters

Lag	Coefficient	Standard Error	t Value
1	-0.751047	0.043630	-17.21

The SAS System

The AUTOREG Procedure

Yule-Walker Estimates

SSE	7.24243668	**DFE**	229
MSE	0.03163	**Root MSE**	0.17784
SBC	-96.122147	**AIC**	-116.87966
MAE	0.12407849	**AICC**	-116.51124
MAPE	1.62152842	**HQC**	-108.51119
Durbin-Watson	1.7080	**Regress R-Square**	0.9364
		Total R-Square	0.9929

Parameter Estimates

Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|	Variable Label
Intercept	1	4.2467	0.2968	14.31	<.0001	
Lcapc	1	0.0681	0.0165	4.12	<.0001	
Llaborc	1	3.1446	0.2020	15.57	<.0001	
Lmine	1	0.6722	0.1007	6.68	<.0001	
D	1	-2.1199	0.1174	-18.06	<.0001	D

The SAS System

The AUTOREG Procedure

The SAS System

The AUTOREG Procedure

Dependent Variable Lgdpc

The SAS System

The AUTOREG Procedure

Ordinary Least Squares Estimates

SSE	37.3665253	**DFE**	233
MSE	0.16037	**Root MSE**	0.40046
SBC	262.120186	**AIC**	244.758833
MAE	0.30254589	**AICC**	245.017454
MAPE	3.81530646	**HQC**	251.755769
Durbin-Watson	0.7759	**Regress R-Square**	0.9637
		Total R-Square	0.9637

Parameter Estimates

Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|	Variable Label
Intercept	1	4.5506	0.2064	22.04	<.0001	
Lcapc	1	0.4072	0.0308	13.20	<.0001	
Llaborc	1	2.0519	0.1949	10.53	<.0001	
R	1	0.1559	0.0550	2.83	0.0050	R
D	1	-1.3884	0.0970	-14.31	<.0001	D

Estimates of Autocorrelations

Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
0	0.1570	1.000000	|********************|
1	0.1086	0.691744	|********** |

Preliminary MSE 0.0819

Estimates of Autoregressive Parameters

Lag	Coefficient	Standard Error	t Value
1	-0.691744	0.047411	-14.59

The AUTOREG Procedure

Yule-Walker Estimates

SSE	10.1587975	**DFE**	232
MSE	0.04379	**Root MSE**	0.20926
SBC	-24.080424	**AIC**	-44.914048
MAE	0.15257326	**AICC**	-44.550412
MAPE	1.97846071	**HQC**	-36.517724
Durbin-Watson	1.5076	**Regress R-Square**	0.9328
		Total R-Square	0.9901

Parameter Estimates

Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|	Variable Label
Intercept	1	5.7671	0.2248	25.66	<.0001	
Lcapc	1	0.1040	0.0194	5.35	<.0001	
Llaborc	1	3.3626	0.2063	16.30	<.0001	
R	1	0.1879	0.0636	2.95	0.0035	R
D	1	-1.9041	0.1163	-16.38	<.0001	D