Master's Thesis of International Studies

Empirical Effects of Natural Resource Endowment Dependence and Institutional Quality on External Debt in Sub-Saharan Africa

사하라이남 아프리카의 천연자원 의존도와 제도의 차이가 대외부채에 미치는 실증효과

August 2022

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Submitting a master's thesis of
International Studies

August 2022

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August 2022

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Abstract

In recent years, the level of debt distress is increasing again in sub-Saharan Africa where many low-income and lower middle-income countries are located. This is particularly alarming because most of these countries have low diversity in economic activities along with low level of institutional quality and per capita GDP to service debt. And yet, they are in need of large-scale infrastructure development projects and investments.

The debt crisis of the region in 1980's and 1990's was alleviated after thirty-one sub-Saharan countries received extensive debt cancellation and reduction under Heavily Indebted Poor Country (HIPC) debt relief initiative and Multilateral Debt Relief Initiative (MDRI) in 2000's. Only after a decade since the implementation of substantial debt relief package, the external and public debt burden started to increase at a rapid pace and currently twenty-one countries are either at high risk of external debt distress or already in distress. This evidence supports that although debt relief programs prevented further economic deterioration temporarily, it did not lead to long-lasting economic growth in the region.

This study surmises natural resource endowment dependence and institutional quality as the determinants of external indebtedness and investigates the empirical effects of natural resource dependence and institutional quality on external debt in sub-Saharan Africa using panel data of 44 sub-Saharan African countries over the period of 1996-2019.

The results show that natural resource endowment dependence strongly and

robustly reduces external debt in sub-Saharan Africa and the negative relationship between growth and external debt supports that natural resource rents are often used as payments for debt servicing. This result is alignment with "natural resource curse" since reliance on commodity exports for the revenues to service debt or finance public investments are not sustainable and it signals lack of economic diversification, which could also mean that less investment will go to productive sectors such as manufacturing.

The correlation between institutional quality and external indebtedness shows that political institution reduces external indebtedness, but economic institution has ambiguous effect on external debt. This is more apparent pre- and during HIPC initiative period (1996-2010) and this explains that with structural reforms before HIPC initiative and MDRI, countries with better macroeconomic stability were granted more debts while political instability hindered them to access loans.

Keyword : External Debt, Natural Resource, Institutional Quality, Sub-Saharan Africa, Debt Relief
Student Number : 2018-24389

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List of Abbreviations

AfDB	African Development bank
GDP	Gross Domestic Product
DSA	Debt Sustainability Analysis
DSF	Debt Sustainability Framework
DSSI	Debt Service Suspension Initiative
FCS	Fragile and Conflict-Affected Situations
FCV	Fragility, Conflict and Violence
GDPPC	Gross Domestic Product Per Capita
HIPC	Heavily Indebted Poor Countries
IDA	International Development Association
IMF	International Monetary Fund
LICs	Low-Income Countries
LIC-DSF	Debt Sustainability Framework for Low Income Countries
LMICs	Lower Middle-Income Countries
MDRI	Multilateral Debt Relief Initiative
ODA	Official Development Assistance
PNG	Private Non-Guaranteed
PPG	Public and Publicly Guaranteed
PRGT	Poverty Reduction and Growth Trust
PRSP	Poverty Reduction Strategy Paper
PV	Present Value
SSA	Sub-Saharan Africa
UN	United Nations
WDIs	World Development Indicators
WGIs	Worldwide Governance Indicators

I. Introduction

1.1. Research Background

1.1.1 External Debt Outlook in Sub-Saharan Africa

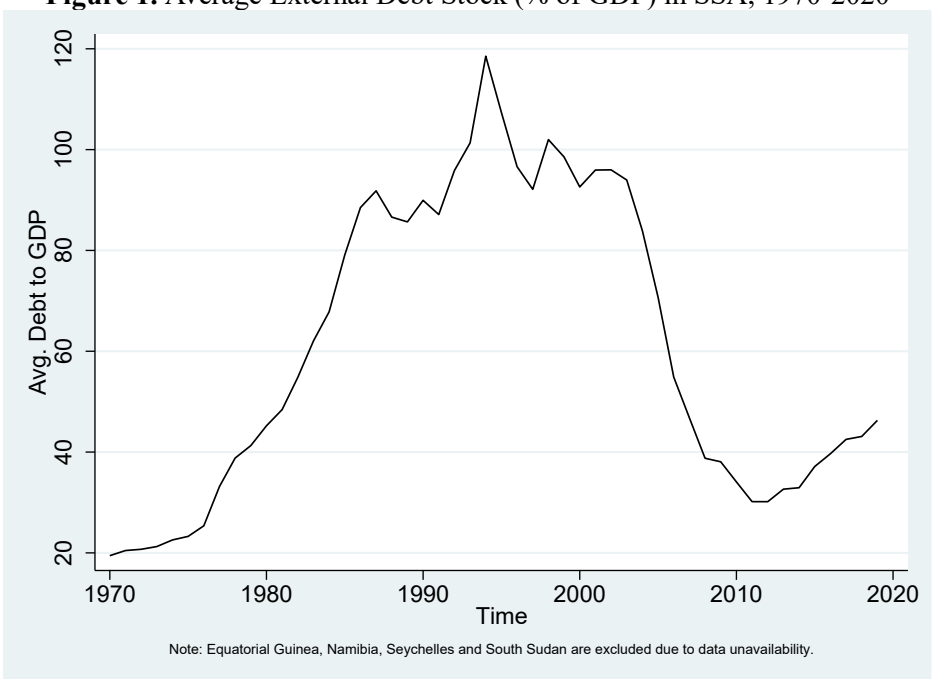
In recent years, increasing debt burden in Sub-Saharan Africa (SSA) has raised concerns. Although the level of debt distress in the region at present is lower than that of pre-debt relief period in 1980's and 1990's, the risk profile of both external and public debt has drastically increased.

Figure 1 depicts the average external debt stocks in relation to gross domestic product (GDP) in SSA from 1970 to 2020. The external indebtedness trend in the region can be divided into 4 periods: rapid debt surge in 1980's, prolonged high indebtedness in 1990's, sudden drop in debt due to debt forgiveness programs in 2000's and recent debt accumulation since 2010.

The period from late 1970's to late 1980's saw a substantial increase in external debt stocks in relation to GDP mainly due to commodity boom followed by two oil price shocks and rise of interest rates (Greene, 1989). The commodity boom in the 1970's led many resource-rich developing countries to borrow using their abundant natural resources as collateral. The 1980's saw a significant decline in commodity prices which led to the debt crisis in many vulnerable economies with low foreign investment level to repay (Manzano and Rigobon, 2001). Consistently high external debt level in 1990's with another surge in mid-1990's left many countries in the region at high risk of debt distress. Consequently, these countries received a

substantial amount of debt relief through the implementation of Heavily Indebted Poor Countries (HIPC) debt relief initiative and Multilateral Debt Relief Initiative (MDRI). As a result, the external debt in relation to GDP ratio dropped from around 90% in mid-1990's through early 2000's, to below 40% in 2010. Moreover, the region showed improved growth rates and achieved relatively stable macroeconomic indicators during this period, which allowed them to be provided with new loans (IMF, 2014).

Figure 1. Average External Debt Stock (% of GDP) in SSA, 1970-2020



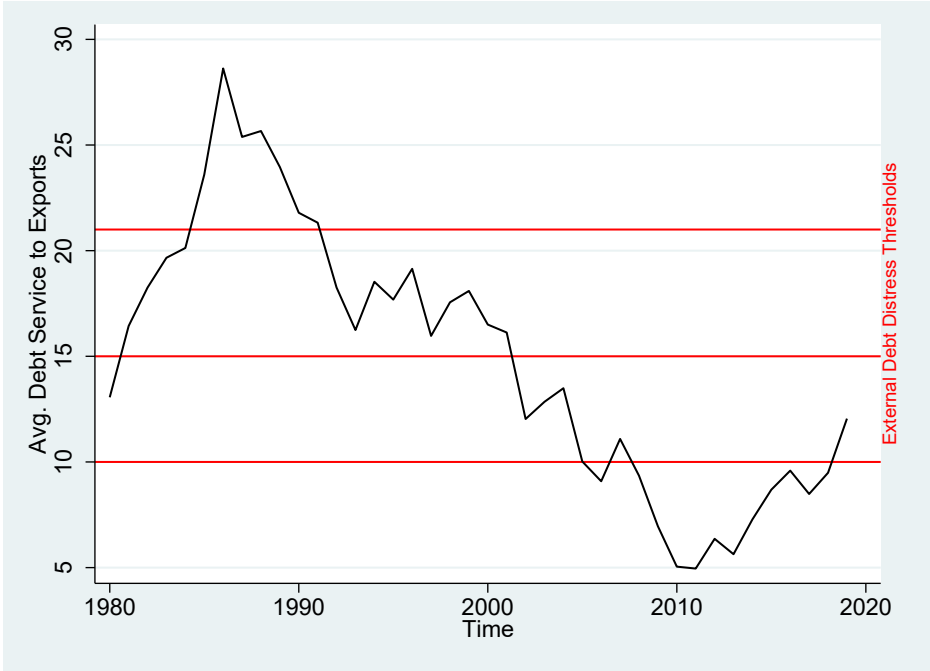
Source: International Debt Statistics, World Bank

In spite of this effort, the debt stocks to GDP ratio in SSA started to increase again in 2010 and the average debt stock in the region is now almost at 50% of its

GDP. Currently fifteen SSA countries are at high risk of external debt distress and six countries are in debt distress according to "Debt Sustainability Analysis (DSA) under the Joint Bank-Fund Debt Sustainability Framework (DSF) for Low Income Countries (LIC)" (IMF, 2022a; see Table A1). That is, a half of the countries in the region is carrying unsustainable level of debt burden and since most countries in the region are low-income countries (LICs) or lower middle-income countries (LMICs), another debt crisis is looming in the region with the multiple of external shocks such as commodity price shocks, the issue of exchange rate volatility, existing debt service payments, and food crisis exacerbated by export and production restrictions brought forward by the recent pandemic and energy price shock. This will further deteriorate the development distress in some countries and severely limit the ability to finance development projects.

In addition to this, the average external debt service payments in relation to exports has consistently dropped until 2010 and started to rapidly increase since then (Figure 2). The average of debt service has surpassed medium level of external debt distress thresholds suggested by "Debt Burden Thresholds and Benchmarks Under the DSF" (see Table A2). Figure 1 and Figure 2 together suggest that current external debt risk in SSA possess severe insolvency and illiquidity problems.

Figure 2. Average Debt Service (% of Exports) in SSA, 1980-2020



Source: International Debt Statistics, World Bank
Note: See Table A2 for external debt distress thresholds guideline.

High external indebtedness poses significant challenges especially for LICs and LMICs. Historically, they have been vulnerable to external shocks. Also, external debt service requires sufficient domestic income and/or export earnings. Most SSA countries lack fiscal space to service the exorbitant debt and the investment declines as most of the government revenues are directed to repayment of the debt which further exacerbates the debt burden due to fall in primary balance and low economic growth in the long term.

After the debt crisis in 1980's and 1990's and subsequent debt relief in 2000's, many of these African countries turned from multilateral or Paris Club lenders to private or non-Paris Club creditors due to their limited market access. For instance,

the share of the external debt in SSA in arrears to multilateral creditors and bilateral creditors has decreased from about 80 percent in the 1990s to 59 percent of the total external debt over the period from 2013 to 2017 (Calderon and Zeufack, 2020). This change in composition of debt portfolio causes heavier debt service burdens to the debtors because these non-traditional sources of financing often come at shorter maturities and higher interest rates.

1.1.2 HIPC Debt Relief Initiative and MDRI

In 1990's, multilateral organizations and some developed countries agreed to an extensive scale of external debt cancellation and reduction of highly indebted countries and these countries implemented structural reforms as a prerequisite to the debt relief programs. Two initiatives were introduced during late 1990's and early 2000's: i) In 1996, HIPC debt relief initiative was launched to provide partial debt forgiveness and debt service reduction for eligible countries; and ii) In 2005, MDRI was launched additionally to provide full debt relief for eligible countries which complete the HIPC debt relief initiative process (IMF, 2022b).

As of February 2020, 31 SSA countries out of 37 eligible countries, were offered $99 billion in debt relief via a substantial cut in both debt stocks and debt service payments, addressing about 40% of Africa's total public debt (IMF, 2022b). In order to address the recent accumulation of external debt in emerging economies, the Debt Service Suspension Initiative (DSSI) was introduced and has been

implemented by bilateral and multilateral creditors which suspended debt service payments up to US$14 billion from 73 LICs and LMICs – most of them in Africa – due from May to December 2020 (IMF, 2020a). This will temporarily allow the financing capacity for these countries to mitigate the socioeconomic impact of the COVID-19 pandemic.

Table 1. HIPC Decision and Completion Point Dates for SSA Countries

	Country	Decision Point	Completion Point		Country	Decision Point	Completion Point
Countries that passed the completion point							
1	Benin	Jul-2000	Mar-2003	16	Liberia	Mar-2008	Jun-2010
2	Burkina Faso	Jul-2000	Apr-2002	17	Madagascar	Dec-2000	Oct-2004
3	Burundi	Aug-2005	Jan-2009	18	Malawi	Dec-2000	Aug-2006
4	Cameroon	Oct-2000	Apr-2006	19	Mali	Sep-2000	Mar-2003
5	C. African Rep.	Sep-2007	Jun-2009	20	Mauritania	Feb-2000	Jun-2002
6	Chad	May-2001	Apr-2015	21	Mozambique	Apr-2000	Sep-2001
7	Comoros	Jun-2010	Dec-2012	22	Niger	Dec-2000	Apr-2004
8	Congo, Dem. Rep.	Jul-2003	Jul-2010	23	Rwanda	Dec-2000	Apr-2005
9	Congo, Rep.	Mar-2006	Jan-2010	24	Sao Tome Prin.	Dec-2000	Mar-2007
10	Cote d'Ivoire	Mar-2009	Jun-2012	25	Senegal	Jun-2000	Apr-2004
11	Ethiopia	Nov-2001	Apr-2004	26	Sierra Leone	Mar-2002	Dec-2006
12	Gambia, The	Dec-2000	Dec-2007	27	Tanzania	Apr-2000	Nov-2002
13	Ghana	Feb-2002	Jul-2004	28	Togo	Nov-2008	Dec-2010
14	Guinea	Dec-2000	Sep-2012	29	Uganda	Feb-2000	May-2000
15	Guinea-Bissau	Dec-2000	Dec-2010	30	Zambia	Dec-2000	Apr-2005
Countries that passed the decision point				**Country that has not passed the decision point**			
1	Somalia	Mar-2020		1	Eritrea		
2	Sudan	Jun-2021					

Source: Debt Relief Under the Heavily Indebted Poor Countries (HIPC) Initiative, IMF.
Note: Eritrea is HIPC-eligible country that has not yet started the debt relief process under HIPC Initiative.

The HIPC initiative debt relief funds are disbursed to countries partially after they enter into the decision point but they are eligible to receive the full debt relief and pass the completion point after satisfying certain criteria such as eligibility to borrow from World Bank's International Development Association (IDA) and

availability of sound policies and a Poverty Reduction Strategy Paper (PRSP) (IMF, 2022b).

Currently 30 SSA countries[1] have reached the completion point. As shown in Table 1, most countries entered the decision point in 2000 and although the interim period (the period between decision point and completion point) varies, most countries passed the completion point by mid- to late-2000's. With the exception of Chad, Comoros, Guinea and Cote d'Ivoire, 26 SSA countries reached their completion point by 2010.

Debt relief programs are also different from the normal official development assistance (ODA) in some respects. First, a large scale of funds is disbursed in relatively short period of time in addition to the ODA. Second, a certain level of indebtedness has to be met along with the debt distress and thus they are struggling with their macroeconomic stability. Third, they must demonstrate that they are carrying out reforms otherwise they do not have access to the full debt relief.

Given the criteria, three characteristics of HIPCs can be explained. First, they are mostly LICs and LMICs with low GDP per capita and low economic diversification (generally dependent on a few primary commodities for their export revenues); second, they carry high risk of external and public debt distress and potentially in danger of defaults due to excruciating amount of debt servicing[2]; and

[1] Of which, 19 low-income countries and 11 lower middle-income countries.
[2] HIPC framework suggests that the debt burden must be above the threshold of the net present value of debt-to-exports ratio of 150% and the net present value of debt-to revenues of 250%. The original framework thresholds were criticized to be too restrictive and thus revised and lowered to provide debt

third, they achieved some degree of macroeconomic stability by implementing policy and structural reforms during pre-HIPC debt relief implementation period (pre-decision point) and kept implementing satisfactorily key reforms throughout the funding process. Thus, HIPC initiative and MDRI are important factor in assessing the external indebtedness and institutional quality of SSA.

Table 2. Total Debt Relief Delivered (In millions of US$; in nominal terms) under HIPC Initiative and MDRI, as of end-2018

	Country	Total Relief (in millions US$)		Country	Total Relief (in millions US$)
1	Benin	1,545	16	Liberia	4,858
2	Burkina Faso	2,080	17	Madagascar	4,205
3	Burundi	1,431	18	Malawi	3,119
4	Cameroon	6,123	19	Mali	2,789
5	Central African Rep.	1,057	20	Mauritania	1,940
6	Chad	1,024	21	Mozambique	6,264
7	Comoros	208	22	Niger	2,194
8	Congo, Dem. Rep.	16,195	23	Rwanda	1,781
9	Congo, Rep.	1,925	24	Sao Tome Principe	321
10	Cote d'Ivoire	5,160	25	Senegal	3,224
11	Ethiopia	6,411	26	Sierra Leone	1,627
12	Gambia, The	476	27	Tanzania	6,683
13	Ghana	7,235	28	Togo	1,043
14	Guinea	1,716	29	Uganda	5,316
15	Guinea-Bissau	904	30	Zambia	6,545

Source: IMF Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI) – Statistical Update 2019

Table 2 shows total debt relief delivered to these 30 SSA countries under HIPC debt relief initiative and MDRI, which amounts to $105.4 billion in nominal terms as of 2018. The debt relief cost under the HIPC initiative provided by bilateral and multilateral creditors is estimated at US$76.2 billion[3] as of 2018, while the debt relief cost under the MDRI provided by the four multilateral lenders (World Bank

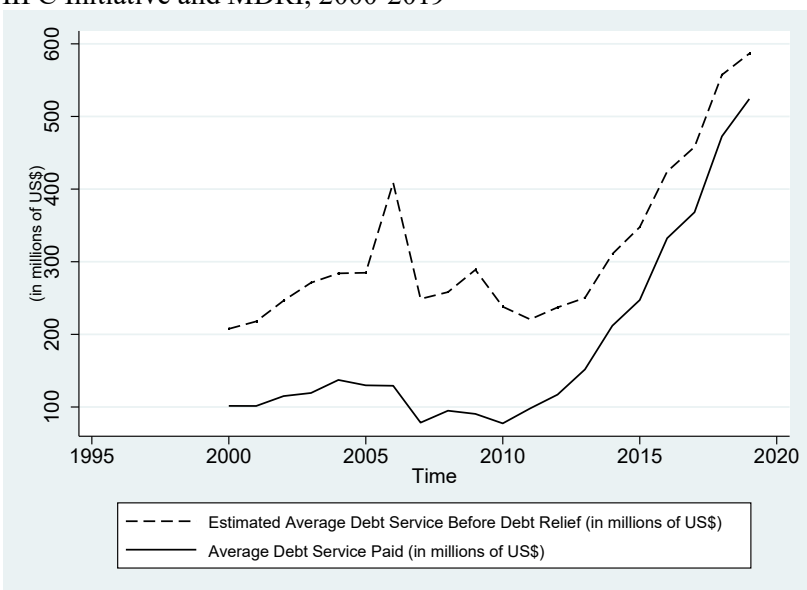
relief to more countries.

[3] in end-2017 present value terms

(IDA), IMF, AfDB and IaDB) is estimated at US$43.3 billion (IMF, 2019)[4]. Among US$76.2 billion, 33.8 billion was by multilateral creditors and 42.4 billion was by bilateral and commercial creditors (IMF, 2019).

For the 30 SSA countries which were targeted for the debt relief programs, the average amount of debt service has decreased by about 2.25 percentage points of GDP on average between 2000 and 2010 and the gap has narrowed both in the amount of debt service and debt service to GDP ratio since 2010 (Figure 3 and 4).

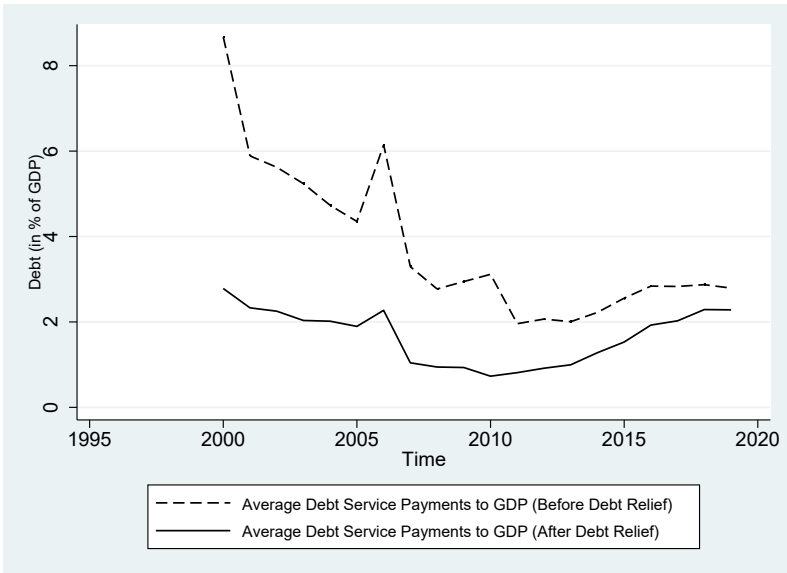
Figure 3. Average Debt Service Payments of HIPCs, Before and After Debt Relief under HIPC Initiative and MDRI, 2000-2019



Source: IMF Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI) – Statistical Update 2019

[4] in end-2017 present value terms

Figure 4. Average Debt Service Payments to GDP of HIPCs, Before and After Debt Relief, 2000-2019



Source: IMF Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI) – Statistical Update 2019

1.1.3 Dependence on Primary Commodities in Sub-Saharan Africa

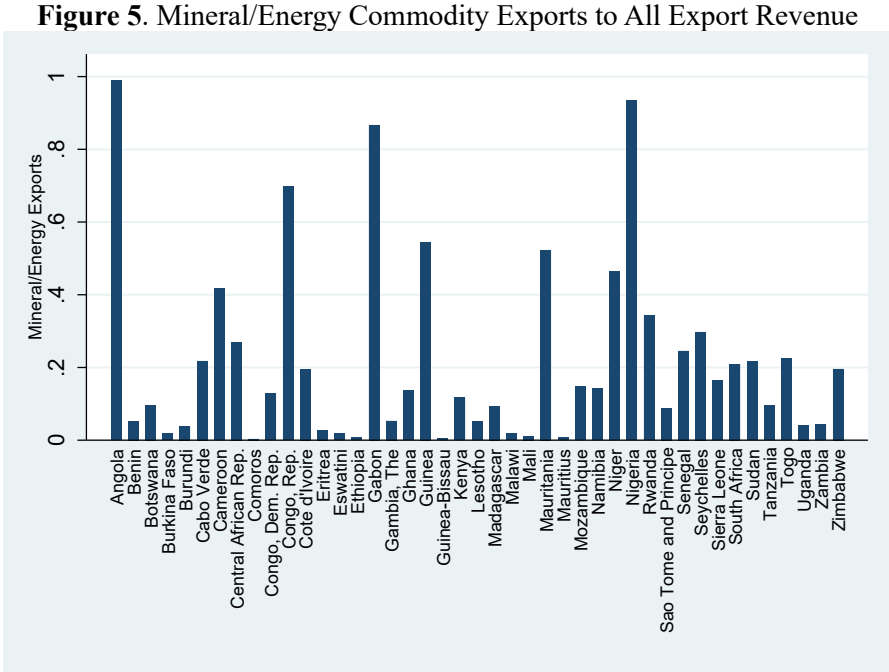
Debt accumulation, among many other reasons, has strong ties to inefficiencies in the investment, which occurs due to governance and corruption issues, or simply because of unexpected cost overruns. Ambitious infrastructure projects indeed often face this problem of cost overruns. However, if the installed infrastructure (public capital) is for the country's productive needs, some degree of debt accumulation is expected and in the long run, is offset with a greater rate of return (Melina et al., 2016).

The problem is debt accumulation of commodity-dependent countries. According to the World Bank Global Economic Prospects (2018b), commodity-

dependent countries are referred to the ones with either (i) i) 30 % of total exports are commodities exports or (ii) 20% of total exports derive from exports of any single commodity.

Another World Bank paper (2018a) on debt vulnerabilities of IDA countries reported that countries classified as commodity-dependent and in Fragile and Conflict-Affected Situations (FCS; see Table A3 for the list of FCS SSA countries) experienced the highest increase in public debt levels in 2013-2017. Commodities are usually subject to volatile price changes which have major impact on debt dynamics for these commodity-dependent countries. Therefore, reliance on mineral and energy resources for their export earnings is particularly fragile for sustainable growth and debt sustainability because of both greater market and price volatility.

Figure 5. Mineral/Energy Commodity Exports to All Export Revenue



Source: UN Comtrade.

Figure 5 shows the ratio of mineral or energy commodities exports in relation to the total export revenues of 45 SSA countries (see Table A4 for the list of 44 sample countries; Seychelles is included in this figure). Angola, Republic of Congo, Gabon, Guinea, Mauritania and Nigeria are heavily dependent on mineral and energy commodity trading since more than 50% of their export earnings come from mineral and energy exports. Cabo Verde, Cameroon, Central African Republic, Senegal, Seychelles, South Africa, Sudan and Togo exceed 20% threshold of reliance on single commodity for their exports. The number of countries and the ratio of commodity dependence increase even more when agricultural commodities are included. Overall, economic activities are not well-diversified in SSA and low institutional quality exacerbate the growth and debt vulnerabilities in the region.

1.2. Literature Review

The “natural resource curse” has been a much-discussed phenomenon since the term was first introduced by Auty (1993). His book documented the underperformance of resource-rich economies in comparison to resource-poor economies. This was further reinforced by Sachs and Warner (1995) and they proved that natural resource intensity has a negative relation with growth.

While economic performance of a country has been the major concern in the discussion of natural resource endowment, some literatures provide explanation for the inevitable linkage between accumulation of external debt and heavy dependence of natural resource rents (Manzano and Rigobon, 2001; Collier and Goderis, 2009; Edo et al., 2019; Muhanji et al., 2019). During the commodity boom in 1970’s, many resource-rich African countries borrowed excessively using their abundant resources as collateral. As a result, “debt overhang” issues occurred as these countries accumulated external debt which also increased debt servicing while the investment that should be allocated to development projects decreased.

Mansoorian (1991), Hann et al. (2018) and Collier and Goderis (2007) found that reliance on resource exports itself may not be the cause of debt overhang but whether the country has quality institutions matters. Resource rents are potentially deployed as means of political support, especially in countries that have inadequate system to contain corruptions. Ross (1999) analyzes the political aspects as to why resource-endowed countries are more likely to have poor institutions. As Mistry (2008) and Arezki and Brückner (2009) also asserted, heavy dependence on natural

resources gives incentives to politicians to abuse their power for their individual gains. Excessive debt level is further exacerbated by the combination of corruption of political elites and irresponsible over-lending by official or commercial creditors especially when the commodity prices are high.

Manzano and Rigobon (2001) suggest that degree of development and the institutional quality are important determinants of a country's growth and debt distress. While Lane (2004) argues that there is an ambiguous effect of natural resource endowment on the debt accumulation level. Dependence on natural resource endowment may increase the credit ceiling of a country since it guarantees the future yield to the country's economy. On the other hand, it may reduce the economic performance of a country by shifting production factors away from more dynamic and productive sectors. It may also induce rent-seeking activities, which, lowers the country's credit ceiling.

Muhanji et al. (2019) investigates the impact of natural resource endowment and institutional quality on external indebtedness, and how this tripartite relationship affects the welfare of Africa. They analyze the natural resource endowment by income level and natural resource types of a country and prove that governance serves as an important indicator for better management of natural resources especially in middle-income and resource-rich countries.

Fonchamnyo (2009) and Hall et al. (2018) emphasized the institutional quality in HIPC-eligible countries and argued that institutional reforms should be preceded before HIPC Initiative. They found that there was an improvement in welfare and

macroeconomic indicators for countries which reached the completion point under the HIPC debt relief Initiative by 2005. The ability of a country to quickly shift from interim period is closely related to its institutional quality as lower institutional quality and higher corruption level resulted in longer interim periods.

1.3. Research Question

Based on fiscal sustainability model by Ley (2009), the government budget constraint implies that:

$$D_t = (1 + i_t)D_{t-1} - B_t - \Delta M_t \qquad \text{Eq. (1)}$$

where D_t is the stock of public debt in the fiscal year t, i_t denotes the average nominal interest rate, B_t is the primary government balance and the change in M_t is the change in the end-of-period stock of monetary base.

External sustainability takes similar approach to the analysis of fiscal sustainability:

$$D_t = (1 + i_t^f)\, D_{t-1} - CA_t \qquad \text{Eq. (2)}$$

where D_t denotes the stock of public and private external debt and CA_t is the non-interest current account balance. F-superscript is used to denote foreign-denominated interest rate. The government accumulates public debt because its revenue falls short of its expenditure and a country accumulates external debt when the country has a current account deficit (Ley, 2009). Current account balance is a key variable for external sustainability just as the government primary balance plays a significant role in equation (1). If $CA_t < 0$ (current account runs a deficit), then the country should be financed by new debt, leading the country into higher debt burden. If $CA_t > 0$ (current account runs a surplus), then the country can reduce the outstanding debt stock.

If there is a small open economy which depends on its natural resource as main export goods and does not have net imports on the commodity, Equation (2) can

derive the negative relationship between external debt and natural resource because natural resource rent is used for debt repayment. On the other hand, the positive relationship between natural resource and external debt can be established if natural resource rents are deployed in investment projects and thus the country is unable to repay and might even need to apply for additional loans in the short-term.

If the country is economically diversified and is not heavily dependent on commodity revenues, then natural resource rent has ambiguous effect on external indebtedness. Also, economic growth and inflation (commodity price) even further obscures the relationship between natural resource and debt. It is possible that external debt has positive impact on economic growth if the revenue goes to the productive sectors. However, it is also possible that funds are inefficiently allocated such as over-ambitious projects or that funds are not enough to completely finance the projects. In this case, external debt might generate negative effect on economic growth.

The purpose of this paper is examining the correlation between the external debt distress and natural resource endowment in SSA countries and investigates whether high level of resource endowment dependence leads to high level of external indebtedness. I will also delve into one other potential determinant of external debt in SSA, which is institutional quality.

1.4. Definitions

1.4.1. External Debt

External debt consists of public and publicly guaranteed (PPG) external debt and private non-guaranteed external debt (PNG) (IMF, 2022a). PPG external debt has been the largest component of debt for many LICs (Calderon and Zeufack, 2020). What matters in practice is not the level of debt stocks itself, but the ratio of debt relative to a measure of capacity to repay (debt-to-GDP ratio) and therefore I will use external debt-to-GDP ratio as the indicator of external indebtedness in this paper. Debt service was used to indicate the effect of HIPC initiative and MDRI on the external debt stock and the debt service is measured as the sum of interest payments and principal repayment.

1.4.2. Natural Resources

Natural resources are often the primary source of income in resource-rich economies. According to United Nations Glossary of Environment Statistics (UN, 1997), natural resources are divided into two categories based on exhaustibility: renewable natural resources and non-renewable natural resources. This paper will focus on exhaustible and extractive commodities which are mineral resources (precious metals such as gold, silver, platinum and diamonds, and industrial metals such as copper, zinc and nickel) and energy resources (oil, coal and natural gas). Also, as mentioned in 1.1.3 of this paper, these commodities are particularly subject to price volatility. Therefore, the reliance on these natural resources could result in

macroeconomic instability of the country. Hereafter, the term *natural resources* in this paper refers to mineral resources and energy resources.

Natural resource endowment is measured either as a share of mineral or energy commodities in relation to total exports of goods and services, or as a share of mineral or energy rents in relation to GDP. The datasets to measure mineral resource endowment and energy resource endowment were retrieved from World Bank World Development Indicators (WDIs) and they are the differences between the value of production for a stock of the resources (mineral or energy) at world prices and their total costs of production. In this study, mineral rents to GDP ratio and energy rents to GDP ratio are used to assess natural resource endowment.

1.3.3. Institutional Quality

To measure the institutional quality, the indicators from World Bank Worldwide Governance Indicators (WGIs) are used and categorized into two: political institution and economic institution. Economic institution is measured as the average of the indicators from "control of corruption", "government effectiveness", "regulatory quality" and "rule of law". WGIs are available from 1996 and the data ranges from 0 to 100 (percentile rank), with higher values corresponding to better institutions (Kauffman et al., 2010). Detailed description of each indicator is explained in Table A5.

II. Methodology

2.1. Model and Variables

A debt crisis can occur when a country is unable to export competitive goods and earn profits. Therefore, external debt is closely related to and affected by trade and institutional quality that support industries to produce and make a profitable return. Thus, this study will deploy following equation:

$$Debt_{it} = \alpha_i + \beta_1 GDPPC_{it} + \beta_2 Growth_{it} + \beta_3 Openness_{it} + \beta_4 ToT_{it} + \beta_5 Inflation_{it} + \beta_5 NR_{it} + \sum_{i=1}^{2} \beta_6 Political_{it} + + \sum_{i=1}^{4} \beta_7 Economic_{it} + \mu_{it} \quad \text{Eq. (3)}$$

where *i* is an index for countries and *t* corresponds to the years. α_i is country-fixed effects that capture unobservable time-invariant country characteristics. *Debt* is the external debt to GDP ratio, *GDPPC* is the indicator for income level of the country and is measured by logarithm of real GDP per capita. *Growth* is the real GDP per capita growth rate, which is the indicator for overall economic performance. *Openness* is trade openness which is measured by the sum of exports and imports of goods and services to GDP ratio. *Terms of Trade (ToT)* is calculated by dividing exports prices by imports prices. GDP deflator is used to measure *Inflation. NR* is the natural resources rents in relation to GDP, which is an index for natural resource endowment, and it is measured by the sum of mineral rents and energy rents.

There are two variables to measure the institutional quality. *Political* variable is the average of political stability and absence of violence/terrorism and voice and

accountability. *Economic* variable is the average of regulatory quality, rule of law, control of corruption and government effectiveness. Variables for the institutional quality are drawn from the World Bank WGIs (Kaufmann et al., 2011).

2.2. Data

44 Sub-Saharan African countries[5] that have available data (see Table A4) are studied in this paper and they are categorized by: 1) Income level (upper- and lower middle-income, and low-income); 2) Degree of resource endowment (Resource-Endowed and less resource-endowed); 3) Type of resource endowment (Energy-endowed and mineral-endowed); and 4) HIPC debt relief initiative implementation (HIPCs, non-HIPCs and HIPCs without debt relief assistance).

By income level categorization, 22 low-income countries, 18 middle-income countries, 3 upper middle-income countries and 1 high-income countries are included in this study. Due to the sample size, the countries are divided into two income level groups – low-income countries and upper-and lower middle-income countries[6].

IMF DSA LIC framework (2022b) identifies that a country is considered resource-rich if the share of natural resources in its exports exceeds 20 percent. In my study, the country is considered natural resource-endowed countries if the average mineral rents to GDP ratio is over 0.571 which is the median value of the average mineral rents-to-GDP for 44 countries from 1996-2019, or the average energy rents-to-GDP ratio is over 1.450 which is the median value of the average energy rents-to-GDP for 44 countries from 1996-2019. Some countries were

[5] Equatorial Guinea, Namibia, Seychelles, and South Sudan are excluded due to data unavailability.

[6] Mauritius has been classified as upper-middle income until 2019 and only recently reclassified as high-income country and therefore included in the latter group in this study

endowed with both types of natural resource, but they were categorized with higher mean-median value. There are 25 natural resource-endowed countries combined by 10 energy-endowed countries and 15 mineral-endowed countries, and 19 less resource-endowed countries.

Out of 44 sample countries, 30 countries are HIPC-eligible[7] (19 low-income countries and 11 lower middle-income countries). In Section 1.1.2 of this paper, three characteristics of HIPCs were identified. They have low GDP per capita, high debt-to-GDP ratio, positive governance indicators. Their political and economic institutions are expected to a positive relationship with external debt.

The data of debt service and debt stocks before debt relief programs is from the "Statistical Update for Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI)" 2019 report. From the report, the amount of assistance committed and delivered under the debt relief initiatives is revealed by each multilateral organization – IDA, IMF and AfDB – in both nominal and 2017 present-value (PV) terms. Since the breakdown of assistance costs to Paris Club creditors[8] and Non-Paris Club[9] members were not available on the report, the total

[7] Somalia, Sudan and Eritrea were not included in HIPC group in this study as they were added to HIPC list after 2019 and have not yet reached the completion point.
[8] Australia, Austria, Belgium, Canada, Denmark, France, Finland, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Russia, Spain, Sweden, Switzerland, United Kingdom, and United States
[9] Algeria, Argentina, Brazil, Bulgaria, Burundi, China, Colombia, Congo, Dem. Rep., Croatia, Cuba, Czech Republic, Ecuador, Egypt, Former Serbia and Montenegro, Guatemala, Hungary, India, Iraq, Israel, Jamaica, Kuwait, Libya, Mexico, Morocco, Oman, People's Democratic Republic of Korea, Pakistan, Poland, Portugal, Republic of Korea, Romania, Rwanda, Saudi Arabia, Slovak Republic, South Africa, Taiwan, Tanzania, Trinidad and Tobago, United Arab Emirates, Uruguay, and Venezuela. Angola, Cameroon, Cabo Verde, Costa Rica, Cote d'Ivoire, Honduras, Iran, Namibia,

debt relief assistance costs to each HIPC by multilateral and bilateral were divided into the number of periods from the decision point of each country to 2019 and applied each year equally for the country.

This paper covers the period 1996-2019 (the governance data covers the years from 1996 to 2019) and datasets are collected from World Bank's WDIs, International Debt Statistics and WGIs database. (See Table A5 and A6 in Appendix A for detailed descriptions of variables).

Niger, Nigeria, Peru, Zambia and Zimbabwe are the Non-Paris Club creditors but did not deliver HIPC debt relief assistance.

III. Results and Analysis

3.1. Descriptive Statistics

Table 3 shows the summary of the variables that I will investigate further in Section 3.2. The descriptive statistics show that the external indebtedness in relation to GDP is the highest for low-income countries among three income groups. The overall debt-to-GDP ratio in the region is excruciatingly high at 61%. Both resource-endowed and less resource-endowed countries have extremely high debt-to-GDP ratio which are at 61.8% and 59.5%, respectively. Resource-endowed countries, especially mineral-endowed countries have higher external indebtedness than less resource-endowed countries. This could be because most mineral-endowed countries are in low-income group whereas most energy-endowed countries are in higher income groups. HIPCs[10] have higher indebtedness than non-HIPCs. Given that this study covers all three periods including pre-debt relief period, debt relief period and post-debt relief period, either (i) HIPCs are undergoing re-occurring debt distress issues or (ii) debt level was extremely high during pre-debt relief period and debt relief period that it obscures the mean debt-to-GDP ratio.

Natural resource rents show that higher income group has heavier reliance on natural resource, especially energy rents. It is also observed that energy rents to GDP ratio of energy-endowed countries is higher than mineral rents to GDP ratio of

[10] Countries that received debt relief package under the HIPC debt relief initiative and MDRI

mineral-endowed countries. There could be two reasons to explain this. First, energy price is higher than mineral price per unit of production. Second, energy-endowed countries depend on their natural resources as their source of national income more intensely than mineral-endowed countries do. This also explains higher natural resource rents of non-HIPCs in comparison to HIPCs, because HIPCs rely more on mineral rents whereas non-HIPCs rely more on energy rents. This goes against the common belief that many countries accumulated external debt with their high natural resource endowment as collaterals.

In terms of institutional quality, low-income countries report worse political and economic governance indicators than lower-middle and upper-middle income countries. Natural resource endowment has mixed effects on institutional quality. Resource-endowed countries have better political institution but worse economic institution than less resource-endowed countries. Energy-endowed countries have weak governance/institutional quality relative to mineral-endowed countries. Non-HIPCs have better institutional quality than HIPCs which could imply that even if HIPCs have undergone structural reforms to receive debt relief, it is not sufficient to catch up with its peers with higher per capita GDP.

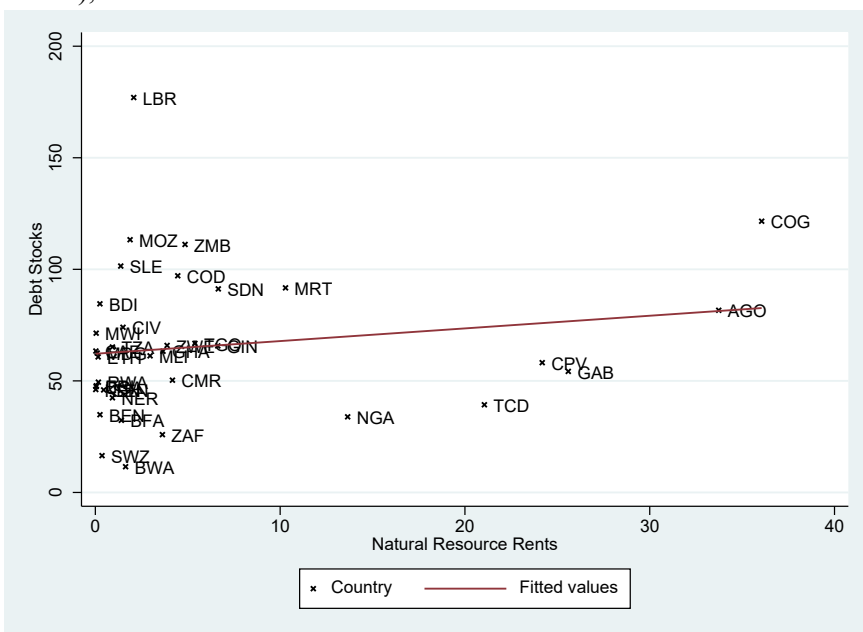
Table 3. Descriptive Statistics

Variable	Group	N	Mean	SD	Min	Max
Debt	All	1022	60.951	59.014	3.598	485.668
	Low Income	499	68.354	67.495	6.386	485.668
	Lower middle Income	427	57.415	51.265	4.713	405.992
	Upper middle to high Income	96	38.197	29.939	3.598	129.309
	Less resource-endowed	426	59.658	60.658	6.386	471.477
	Resource-endowed	596	61.874	57.844	3.598	485.668
	Energy-endowed	240	59.543	44.871	4.713	261.623
	Mineral-endowed	356	63.446	65.164	3.598	485.668
	Non-HIPC	311	46.417	32.535	3.598	188.196
	HIPC	711	67.308	66.431	9.386	485.668
Natural Resource Rents	All	831	6.237	10.753	0	55.634
	Low Income	399	2.908	5.408	0	35.015
	Lower middle Income	360	9.089	13.446	0	55.634
	Upper middle to high Income	72	10.419	12.34	0.296	40.285
	Less resource-endowed	261	0.219	0.607	0	6.023
	Resource-endowed	570	8.992	12.012	0.001	55.634
	Energy-endowed	233	16.596	14.908	0.003	55.634
	Mineral-endowed	337	3.734	4.801	0.001	37.153
	Non-HIPC	253	10.333	12.883	0.002	55.472
	HIPC	578	4.444	9.125	0	55.634
Energy Rents	All	550	7.54	12.474	0	55.627
	Low Income	153	4.269	7.611	0	35.011
	Lower middle Income	325	8.629	13.903	0	55.627
	Upper middle to high Income	72	9.577	12.818	0.099	40.269
	Less resource-endowed	103	0.32	0.855	0	5.679
	Resource-endowed	447	9.204	13.287	0	55.627
	Energy-endowed	233	16.491	14.975	0.002	55.627
	Mineral-endowed	214	1.27	2.016	0	15.808
	Non-HIPC	218	11.396	13.516	0.005	55.472
	HIPC	332	5.009	11.049	0	55.627
Mineral Rents	All	700	1.479	3.007	0	24.834
	Low Income	368	1.378	2.484	0	13.713
	Lower middle Income	264	1.772	3.856	0	24.834
	Upper middle to high Income	68	0.892	1.2	0.001	6.494
	Less resource-endowed	207	0.117	0.213	0	1.65
	Resource-endowed	493	2.051	3.424	0	24.834
	Energy-endowed	162	0.151	0.442	0	2.683
	Mineral-endowed	331	2.981	3.84	0.001	24.834
	Non-HIPC	179	0.726	1.129	0	6.494
	HIPC	521	1.738	3.385	0	24.834
Political Institution	All	924	31.614	19.57	0.704	81.308
	Low Income	462	23.037	14.836	0.704	59.559
	Lower middle Income	378	35.579	17.849	4.862	81.308
	Upper middle to high Income	84	60.947	15.417	29.737	79.835
	Less resource-endowed	399	30.867	19.399	0.704	79.835
	Resource-endowed	525	32.182	19.699	1.493	81.308
	Energy-endowed	210	26.824	20.342	1.773	81.308
	Mineral-endowed	315	35.753	18.444	1.493	76.894
	Non-HIPC	294	34.592	25.675	0.704	81.308
	HIPC	630	30.225	15.775	1.493	74.682
Economic Institution	All	924	28.255	18.866	0	77.524
	Low Income	462	21.098	14.047	0	64.063
	Lower middle Income	378	29.963	16.3	2.272	67.476
	Upper middle to high Income	84	59.931	18.475	18.269	77.524
	Less resource-endowed	399	28.905	17.583	0	77.524
	Resource-endowed	525	27.761	19.788	0.902	77.153
	Energy-endowed	210	21.373	16.836	2.799	67.476
	Mineral-endowed	315	32.019	20.476	0.902	77.153

Non-HIPC	294	33.57	25.505	0	77.524
HIPC	630	25.774	14.139	0.902	64.063

Figure 6 illustrates the relationship between natural resource endowment dependence and external debt. It seems that natural resource endowment increases external indebtedness however, this is more meaningful in rationalizing the fact that energy rents of energy-endowed countries is higher than mineral rents to GDP ratio of mineral-endowed countries in Table 3. Countries that depend heavily on natural resource as their source of income are energy-endowed countries. Republic of Congo, Angola, Gabon, Cabo Verde, Chad, and Nigeria have extremely high energy rents.

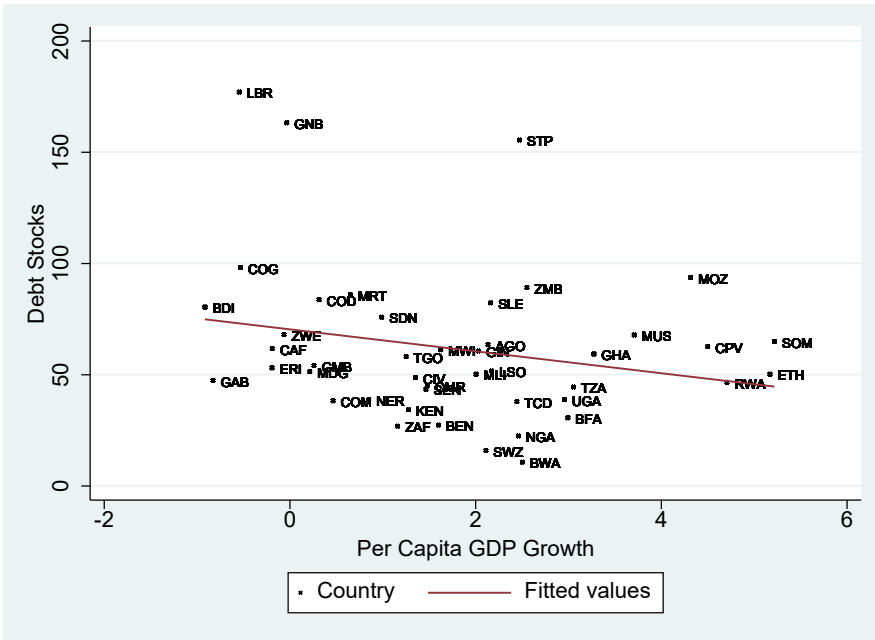
Figure 6. Average Debt Stocks (% of GDP) and Average Natural Resource Rents (% of GDP), 1996-2019



Source: International Debt Statistics and World Development Indicators, World Bank

Figure 7 shows that there is a clear negative relationship between economic growth and external indebtedness. This could indicate that either most government revenues are allocated to debt servicing and thus leave no space for investment, or the loans were invested in unproductive sector/projects.

Figure 7. Average Debt Stocks (% of GDP) and Average Growth of Real GDP Per Capita (Annual %), 1996-2019

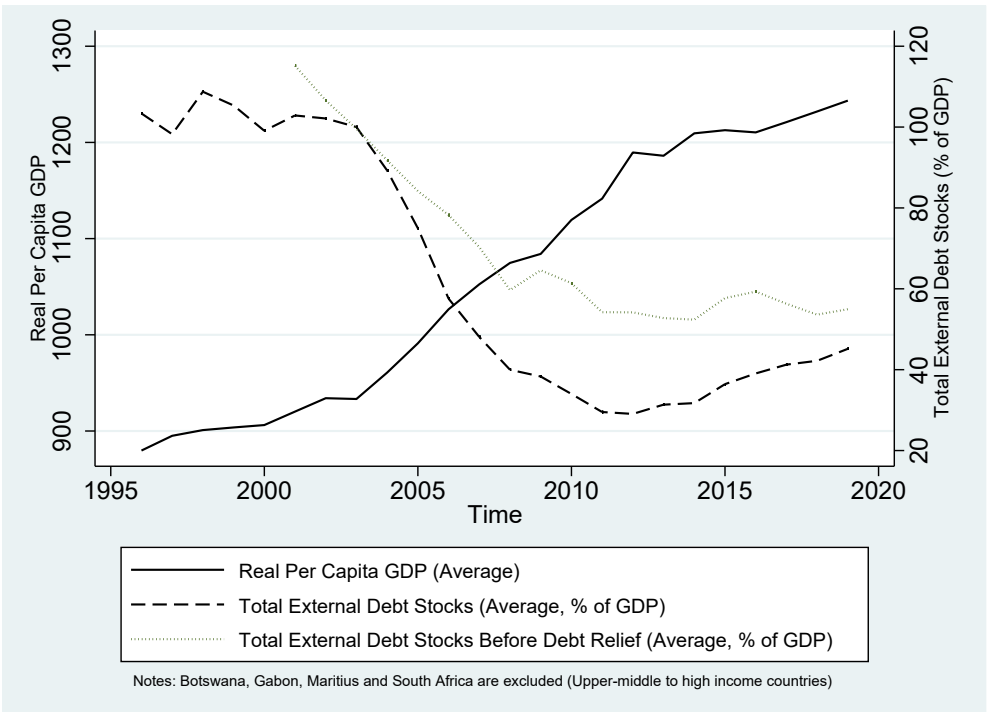


Source: International Debt Statistics and World Development Indicators, World Bank

3.2. Regression Results and Analysis

As stated in the research background, there are dramatic changes in the external debt trend in SSA due to debt reduction/cancellation programs. Pre-HIPC initiative period in 1990's saw rapid debt accumulations in most countries, HIPC debt relief initiative and MDRI Period in 2000's saw drastic drop in external debt stocks and post-HIPC initiative and MDRI period since 2011 which is showing rise in debt stocks again.

Figure 8. Average Per Capita GDP and Average External Debt Stocks in SSA, 1996-2019

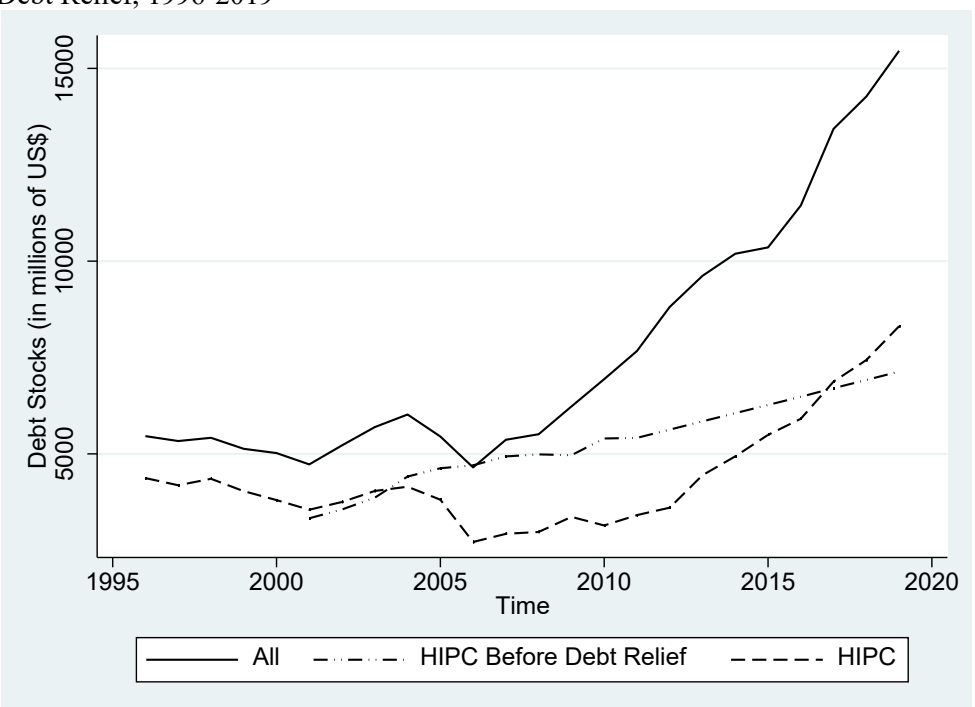


Source: International Debt Statistics and World Development Indicators, World Bank

Figure 8 shows that debt-to-GDP dropped significantly on account of HIPC

debt relief initiative and MDRI in 2000's. Real GDP per capita also grew at consistent pace but there was an improvement in overall growth from mid-2000's to 2010 which coincide with the implementation of debt relief packages. For this reason, the average total external debt stocks to GDP ratio before debt relief also decreased because even without the decrease in debt stocks, the reduction in debt service and stocks have helped the growth rate in the region which alleviated the debt burden.

Figure 9. Average Debt Stocks (in millions of US$) of SSA, HIPC and HIPC Before Debt Relief, 1996-2019

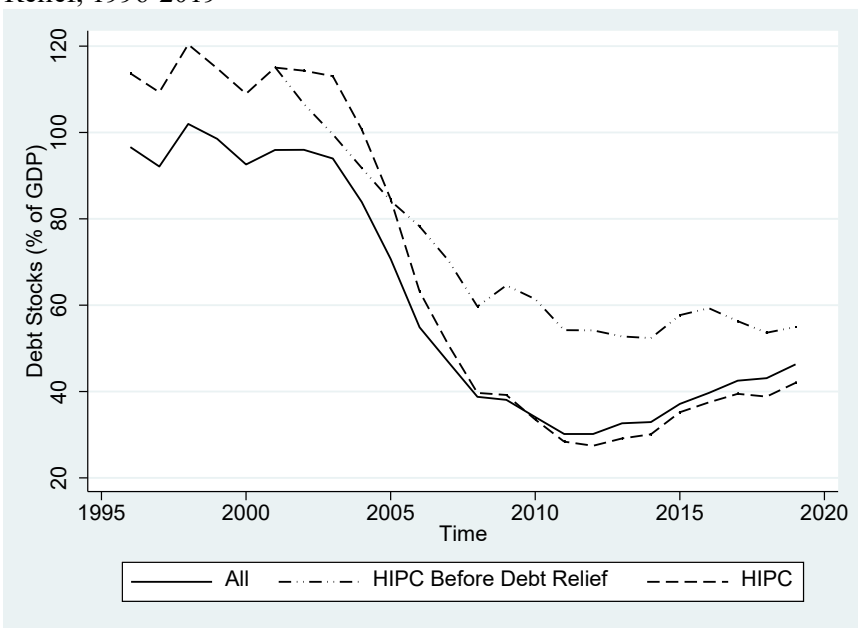


Source: International Debt Statistics, World Bank and IMF Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI) – Statistical Update 2019

As shown in the above graph, the average debt stocks in millions of US$ has substancially decreased for HIPCs. Although the debt accumulation has surpassed

the effect of debt relief assistance since 2015, the two initiatives laid the foundation for sustainable growth in the region for more than 10 years since 2005. Figure 10 also depicts how the debt relief initiatives alleviated debt burden of the region since 2005 when a lot of countries passed the completion point.

Figure 10. Average Debt Stocks (in % of GDP) of SSA, HIPC and HIPC Before Debt Relief, 1996-2019

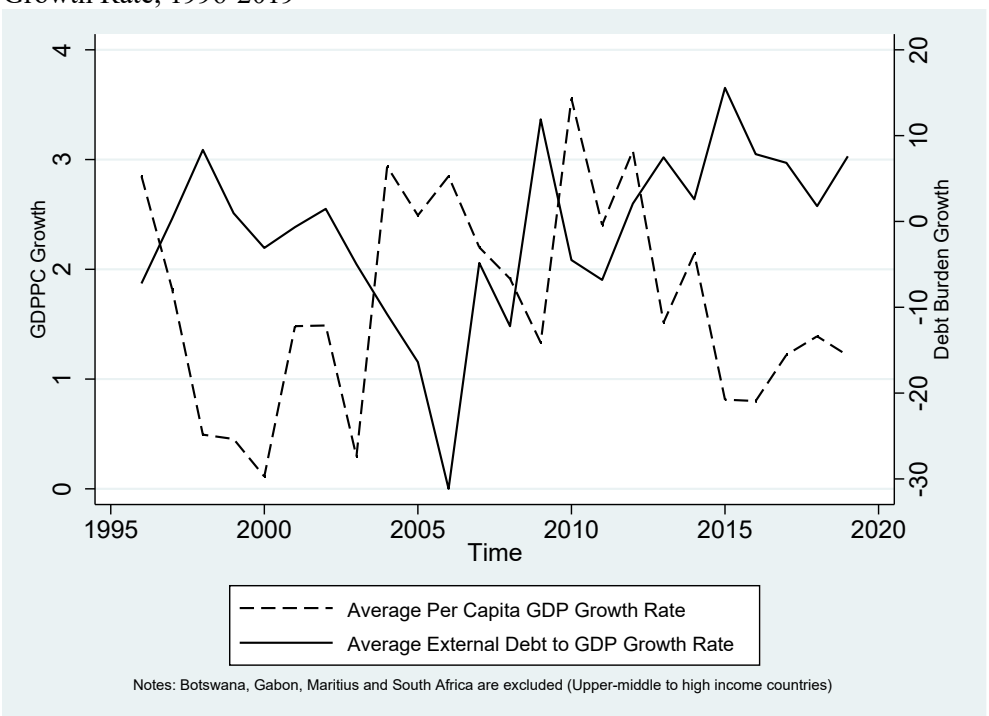


Source: International Debt Statistics, World Bank and IMF Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI) – Statistical Update 2019

Figure 11 shows the growth rate of average per capita GDP and average external debt-to-GDP. There is a clear negative relationship between GDP per capita growth and debt burden (debt-to-GDP ratio) growth. As the debt burden increases in mid-1990s and early-2000's, average per capita GDP decreases. As the growth increases in mid-2000's, the average debt burden drops. This opposite pattern of movement lasts until recent. This could be interpreted that the revenue which used to be alloted

to debt service payment was spent in investment which resulted in good economic performance. However, it also signals that the region has overal debt vulnerabilities since revenues are not sufficient to both service the existing debt and direct to the investment. The debt relief will only temporarily halt the deterioration of macroeconomic stability and will not sustain the growth. Indeed, the recent debt dynamics since 2010 shows the increasing debt burden and drop in GDP per capita growth in the region.

Figure 11. Average Per Capita GDP Growth Rate and Average External Debt Stocks Growth Rate, 1996-2019



Source: International Debt Statistics and World Development Indicators, World Bank

3.2.1. Regression Results by Period

In order to address the empirical effects of natural resource endowment dependence and institutional quality on the external debt in Sub-Saharan Africa, Equation 3 was estimated into i) by period; ii) by degree of natural resource endowment; iii) by type of natural resource endowment; and iv) before and after the debt relief programs.

Table 4. Regression Results by Period

	All	1996-2000	2001-2010	2011-2019
Log.GDPPC	-92.39***	-48.44	-142.2***	20.91*
	(9.008)	(52.12)	(23.99)	(8.276)
Growth	-0.952**	0.618	-1.387**	-0.454**
	(0.330)	(0.854)	(0.446)	(0.162)
Openness	0.426***	0.882**	-0.0922	0.127*
	(0.0963)	(0.328)	(0.200)	(0.0567)
TOT	0.370***	0.0145	0.350**	0.0545
	(0.0817)	(0.152)	(0.131)	(0.0435)
Inflation	0.0115	-0.00864	-0.162	0.0259
	(0.00686)	(0.00596)	(0.123)	(0.0238)
NR	-2.508***	-1.936**	-1.759**	-0.795***
	(0.296)	(0.699)	(0.553)	(0.141)
Political	-1.306***	-0.178	-1.773***	-0.620***
	(0.258)	(0.681)	(0.480)	(0.167)
Economic	0.629*	0.958	0.0652	-0.767**
	(0.300)	(0.857)	(0.535)	(0.238)
_cons	679.6***	353.7	1091.9***	-80.84
	(61.48)	(350.3)	(164.8)	(59.06)
Observations	711	94	305	312
R-squared	0.273	0.351	0.322	0.298

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In Table 4, the sample was divided into three periods: 1996-2000, 2001-2010 and 2011-2019. Regression results in Table 4 indicate that there is a negative relationship between natural resource rents and external indebtedness. In other words, natural resource abundance and the country's dependence on commodity revenue

reduce external debt of the country. This is consistent throughout each period of the sample periods. There is a negative relationship between growth and external debt. Growth and external debt should have positive relation with appropriate resource management because when the country invests on productive infrastructure projects, they borrow expecting returns in the future and growth in GDP. Conversely, the results show that growth decreases as debt burden increases, and this could imply that the government revenue is concentrated in repayment of the existing debt stock. Also, HIPC debt relief initiative and MDRI expanded fiscal space and thus repayment and investment could happen simultaneously.

The impact of institutional quality on external debt is rather mixed. In terms of political institution, strong political infrastructure reduces external indebtedness. However, strong economic institution grants debt. This could be interpreted that strong economic institutional quality (government effectiveness, control of corruption, regulatory quality, and rule of law) attracts foreign investment and might lead to greater indebtedness. However, in recent periods, weak economic institution also leads to greater external indebtedness.

Further regressions have two time-periods: 1996-2010 and 2011-2019 given the small sample size during 1996-2000 period.

3.2.2. Regression Results by Income Group

In Table 5, this was further analyzed by dividing the sample countries into two

income levels: Column (I) is low-income group and column (II) is lower middle-income and upper middle-income countries due to small sample size of upper middle-income countries.

The result shows that the natural resource rents are strongly correlated to the indebtedness in both income groups and both periods. Natural resource reduces external debt, and this implies that regardless of income, SSA countries rely on commodity exports for their national income to service their external debt or finance public investments, which signal lack of economic diversification.

Table 5. Regression Results by Income Group

	All		1996-2010		2011-2019	
	(I)	(II)	(I)	(II)	(I)	(II)
Log.GDPPC	-138.9***	-75.18***	-165.4***	-102.2***	21.37*	15.95
	(17.66)	(9.242)	(32.51)	(15.93)	(10.07)	(16.06)
Growth	-0.773	-0.640	-1.475*	-1.194*	-0.398*	-0.618
	(0.538)	(0.380)	(0.728)	(0.496)	(0.179)	(0.384)
Openness	0.710***	0.362***	-0.347	0.604***	0.212**	-0.0677
	(0.166)	(0.109)	(0.296)	(0.179)	(0.0690)	(0.118)
TOT	1.070***	0.257***	1.037***	0.298**	0.105	0.0676
	(0.196)	(0.0760)	(0.269)	(0.105)	(0.0972)	(0.0607)
Inflation	0.00419	0.0120*	-0.0214	0.0114	0.233*	0.00686
	(0.0169)	(0.00579)	(0.0165)	(0.00608)	(0.100)	(0.0295)
NR	-5.631***	-1.913***	-4.283**	-2.611***	-0.894**	-0.789***
	(0.858)	(0.250)	(1.284)	(0.386)	(0.319)	(0.195)
Political	-1.581***	-1.549***	-2.016***	-1.486**	-0.462*	-0.833**
	(0.380)	(0.337)	(0.564)	(0.476)	(0.203)	(0.312)
Economic	0.333	1.418***	-0.322	1.524**	-1.252***	-0.423
	(0.484)	(0.355)	(0.715)	(0.471)	(0.324)	(0.406)
_cons	877.4***	581.9***	1139.4***	761.8***	-84.43	-35.04
	(105.6)	(68.49)	(191.9)	(113.1)	(64.79)	(121.9)
Observations	333	315	183	180	150	135
R-squared	0.340	0.399	0.399	0.539	0.350	0.301

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;
(I) is low-income group and (II) is lower middle- and upper middle-income group.

3.2.3. Regression Results by Degree of Natural Resource Endowment

In this analysis, NR Dummy was deployed in order to see if there is a difference between natural resource-endowed countries and less resource-endowed countries. Resource-endowed countries are those whose average mineral rents to GDP is over 0.571 (the median value of the average mineral rents to GDP for 44 countries from 1996-2019) or average energy rents to GDP is over 1.450 (the median value of the average energy rents to GDP for 44 countries from 1996-2019). Some countries were endowed with both types of natural resource, but they were categorized with higher mean-median value.

Natural Resource-endowed countries have significant and robust negative relationship between growth and external debt level while less resource-endowed countries did not show any correlation between the two. This further affirms that mineral/energy commodity-dependent countries use their revenues for servicing debt instead of investing for long-term and productive projects. Also, natural resource-endowed countries have clear negative relationship between political institution and external debt. The economic institutional quality has ambiguous effect on external debt level for both natural resource-endowed and less endowed countries.

Openness to trade also significantly increases external debt level for natural resource-endowed countries, whereas it decreases the external indebtedness for less endowed countries. One potential explanation could be derived that price volatility of commodity market leads high degree of openness to trade for resource-endowed countries and leave them vulnerable to external shocks during the economic

downturn, which results in high indebtedness for these countries. .

Table 6. Regression Results by Degree of Natural Resource Endowment

	All		1996-2010		2011-2019	
	NR Endowed	Less Endowed	NR Endowed	Less Endowed	NR Endowed	Less Endowed
Log.GDPPC	-108.3***	-83.78***	-106.7***	-134.1***	13.85	17.00
	(10.82)	(13.19)	(19.26)	(24.38)	(11.68)	(9.447)
Growth	-1.068**	0.0421	-1.161*	-1.042	-0.541*	-0.174
	(0.398)	(0.431)	(0.525)	(0.644)	(0.232)	(0.170)
Openness	0.814***	-0.537***	0.399	-0.482**	0.0727	0.118
	(0.127)	(0.109)	(0.237)	(0.166)	(0.0750)	(0.0756)
TOT	0.335***	0.601***	0.295*	0.656**	0.0424	0.0697
	(0.0913)	(0.167)	(0.125)	(0.220)	(0.0505)	(0.0979)
Inflation	0.00766	-0.192	0.00403	-0.120	0.0240	-0.0751
	(0.00727)	(0.180)	(0.00750)	(0.189)	(0.0269)	(0.110)
NR	-2.682***	-2.602	-2.864***	-12.28	-0.735***	-1.876
	(0.321)	(2.840)	(0.511)	(13.95)	(0.161)	(1.144)
Political	-1.860***	0.551	-2.762***	0.281	-0.866***	0.209
	(0.337)	(0.316)	(0.539)	(0.379)	(0.235)	(0.199)
Economic	0.993*	0.558	1.387*	0.176	-0.834*	0.0599
	(0.454)	(0.296)	(0.607)	(0.432)	(0.346)	(0.281)
_cons	804.2***	552.4***	852.6***	901.7***	-14.47	-102.3
	(75.87)	(83.26)	(130.3)	(152.6)	(86.15)	(59.91)
Observations	504	207	284	115	220	92
R-squared	0.359	0.294	0.383	0.450	0.361	0.179

Note: Standard errors in parentheses; * p<0.05 ** p<0.01 *** p<0.001

3.2.4. Regression Results by Type of Natural Resource Endowment

Both mineral-endowed countries and energy-endowed countries have strong correlation between the natural resource rents and external indebtedness, but mineral-endowed countries have stronger correlation with the external indebtedness. However, in terms of institutional quality, energy-endowed countries have stronger correlation with both political institutions and economic institutions. Political institutions have negative impacts on external indebtedness but economic

institutions have positive impacts on external indebtedness for energy-endowed countries.

Table 7. Regression Results by Natural Resource Endowment Type

	All		1996-2010		2011-2019	
	Energy-Endowed	Mineral-Endowed	Energy-Endowed	Mineral-Endowed	Energy-Endowed	Mineral-Endowed
Log.GDPPC	-83.10***	-118.8***	-106.0***	-87.51**	37.65*	22.23
	(12.46)	(15.87)	(21.44)	(30.78)	(15.34)	(18.87)
Growth	0.0125	-1.675**	0.300	-1.725*	-0.741	-0.168
	(0.482)	(0.560)	(0.695)	(0.721)	(0.379)	(0.287)
Openness	0.728***	0.886***	0.574	0.486	0.256*	-0.0271
	(0.163)	(0.175)	(0.331)	(0.335)	(0.0990)	(0.105)
TOT	0.200*	0.630***	0.133	0.563*	0.0298	-0.123
	(0.0835)	(0.176)	(0.126)	(0.225)	(0.0476)	(0.138)
Inflation	0.00304	-0.000111	0.00408	-0.0174	0.875***	0.0333
	(0.00654)	(0.0160)	(0.00743)	(0.0167)	(0.152)	(0.0296)
NR	-1.919***	-5.043***	-1.987***	-5.234***	-0.967***	-0.602
	(0.292)	(0.659)	(0.494)	(1.027)	(0.162)	(0.374)
Political	-2.790***	-1.314**	-2.723***	-3.009***	-1.538***	-0.606
	(0.532)	(0.423)	(0.785)	(0.687)	(0.338)	(0.306)
Economic	3.273***	-0.846	3.802***	-0.532	0.0230	-0.987
	(0.620)	(0.615)	(0.863)	(0.814)	(0.429)	(0.502)
_cons	637.7***	873.0***	819.3***	749.4***	-215.7	-55.41
	(90.89)	(107.6)	(147.6)	(202.6)	(118.5)	(131.4)
Observations	206	298	116	168	90	130
R-squared	0.417	0.427	0.505	0.436	0.708	0.200

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

3.2.5. Regression Results Before and After Debt Relief

One important factor that needs to be considered in this analysis is that during the period studied, large-scale debt relief initiatives were implemented, and the decreased debt stocks could obscure the observations. Also, the economic growth and external indebtedness might have a negative relationship in the previous analyses due to the decrease in debt stocks and debt service from debt relief programs.

Therefore, a counterfactual condition should be added in this analysis as to

reflect the results had there not been debt relief assistance. The results are shown in the Table 8. Column (1) is the external debt level of HIPCs, Column (2) is the external debt level of non-HIPCs, and Column (3) is the external debt level of HIPCs before the implementation of HIPC debt relief initiative and MDRI.

Table 8. Regression Results of External Debt Before and After Debt Relief

	All			1996-2010			2011-2019		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Log_GDPPC	-128.5***	-38.02***	-90.97***	-184.4***	-55.03***	-165.9***	34.06***	-53.43**	-39.12***
	(12.41)	(8.631)	(4.844)	(24.78)	(13.74)	(12.47)	(9.543)	(18.11)	(5.860)
Growth	-0.622	-1.081***	0.0843	-1.714**	-1.033*	-0.194	-0.415*	-0.368	-0.133
	(0.448)	(0.296)	(0.156)	(0.617)	(0.410)	(0.264)	(0.183)	(0.318)	(0.113)
Openness	0.730***	0.275***	0.0100	0.0751	0.0849	0.400**	0.191**	0.00472	0.0704
	(0.140)	(0.0818)	(0.0508)	(0.251)	(0.145)	(0.125)	(0.0682)	(0.0938)	(0.0419)
TOT	1.061***	-0.0213	0.0585	0.861***	-0.0975	0.292**	0.0402	0.113**	0.00666
	(0.144)	(0.0546)	(0.0550)	(0.182)	(0.0884)	(0.0880)	(0.0845)	(0.0423)	(0.0519)
Inflation	0.0104	0.0175***	0.0457	-0.0159	0.0170**	0.0461	0.116	0.00940	0.0110
	(0.0154)	(0.00439)	(0.0658)	(0.0153)	(0.00515)	(0.0747)	(0.103)	(0.0211)	(0.0631)
NR	-4.074***	-1.229***	-0.810***	-3.969***	-1.245**	-1.571***	-0.785**	-0.980***	-0.678***
	(0.477)	(0.212)	(0.171)	(0.641)	(0.415)	(0.324)	(0.251)	(0.153)	(0.154)
Political	-1.470***	-0.532	-0.0622	-1.349**	-0.349	0.513*	-0.713***	0.445	-0.0166
	(0.303)	(0.402)	(0.116)	(0.440)	(0.635)	(0.215)	(0.184)	(0.370)	(0.113)
Economic	0.799*	0.0860	0.422**	0.0934	0.0206	0.332	-1.038***	0.391	-0.365*
	(0.376)	(0.328)	(0.140)	(0.532)	(0.477)	(0.228)	(0.271)	(0.429)	(0.166)
_cons	824.1***	352.1***	645.1***	1271.6***	501.1***	1085.3***	-158.9*	435.5**	316.3***
	(77.78)	(67.02)	(31.16)	(153.0)	(102.6)	(77.83)	(63.80)	(146.1)	(39.18)
Observations	491	220	392	269	130	170	222	90	222
R-squared	0.346	0.361	0.550	0.432	0.425	0.690	0.341	0.490	0.366

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Results show that there is no fundamental difference between the external indebtedness of HIPCs and the external indebtedness of HIPCS before debt relief. As Figure 9 suggests, the external debt stock has decreased due to the initiatives however, the difference in debt burden before and after the debt relief packages is not drastic because GDP per capita in the region has grown rapidly, which resulted in decrease in debt burden.

IV. Conclusion

4.1. Summary

In summary, the following findings were concluded with the external debt model estimation in the previous sections: (1) there is a strong and robust negative relationship between natural resource rents and external debt level, in other words, natural resource abundance and the country's dependence on commodity revenue reduce external debt of the country; (2) growth decreases as external indebtedness increases; 3) institutional quality has an ambiguous effect on external debt – generally, political institutions have negative relations and economic institutions have positive relations to the external debt burden; 4) resource-endowed countries, especially mineral-endowed countries have higher external indebtedness; 5) natural resource-endowed countries have significant and robust negative relationship between growth and external debt level while less resource-endowed countries did not show any correlation between the two. This further affirms that mineral/energy commodity-dependent countries use their revenues for servicing debt instead of investing for long-term and productive projects. Also, natural resource-endowed countries have clear negative relationship between political institution and external debt; and 6) resource-endowed countries have better political institution but worse economic institution and particularly, energy-endowed countries have weak governance/institutional quality relative to mineral-endowed countries.

4.2. Implications

This paper investigates the natural resource endowment of sub-Saharan African countries on external debt level using panel data. The result consistently indicates that natural resource dependence reduces external debt, as mineral rents and energy rents (especially oil rents) are often used as payments for debt servicing. These natural resources traditionally are also bought at higher prices compared to other commodities, which contribute to further reduction in external debt. However, reliance on commodity exports for the revenues to service debt or finance public investments poses risk because it signals lack of economic diversification, and less investment will go to productive sectors such as manufacturing.

Growth has negative effect on external indebtedness. Although as debt decreases, growth increases during HIPC initiative period, after the debt cancellation program, growth has ambiguous effect on external debt. This implies that growth was not driven by the macroeconomic stability but was rather brought by temporary fiscal capacity from the debt relief programs. Another potential reason for decrease in growth while external indebtedness increases is corruption. Politicians and elites in resource-rich countries are likely to pursue rent-seeking activities and control of the natural resources and thus less likely to invest in more productive projects, such as job-creating manufacturing industries. This affirms that the revenues driven from natural resource rents are not well-redistributed to the society.

The quality of institutions shows that political institution reduces external indebtedness, but economic institution has ambiguous effect on external debt. This

is more apparent pre- and during HIPC initiative period (1996-2010) and this explains that with structural reforms before HIPC initiative and MDRI, countries with better macroeconomic stability were granted more debts while political instability hindered them to access loans. Economic institution has a strong positive effect on external indebtedness while political institution reduces external indebtedness. This contradictive outcome on governance might be due to the fact that most LICs and LMICs in SSA are HIPCs that were required to fulfil the "conditionality" suggested by the World Bank and the International Monetary Fund (IMF) before the disbursement of external debt relief packages.

Natural resource and institutional quality both negatively affect indebtedness, while economic institution shows mixed results. Economic institution was enhanced in pre-HIPC initiative period and during HIPC initiative period and thus many countries which successfully carried out structural reforms were able to receive debt reduction. However, economic institutional quality does not contribute to accessing loans post-HIPC period.

Although a provisional increase in debt level could happen especially when a country is investing in large scale infrastructure projects which could improve great rate of return and extend to promote economic growth. However, steep increase in debt level could mean weak policy frameworks or institutional quality.

Africa's current debt distress does not seem to possess the same magnitude of risk experienced in 1970's and 1980's. However, repeated official and private debt reductions and rescheduling which only provides temporary cash-flow relief will not

help the region in the long-term.

Appendix A.

Table A1. Debt Sustainability Analyses (DSA) Under the Joint Bank-Fund Debt Sustainability Framework for Low Income Countries (LIC-DSF)

Country	Risk of external debt distress	Risk of overall debt distress
Benin	Moderate	Moderate
Burkina Faso	Moderate	Moderate
Burundi	High	…
Cabo Verde	High	High
Cameroon	High	High
Central African Republic	High	High
Chad	High	High
Comoros	High	High
Congo, Dem. Rep.	Moderate	Moderate
Congo, Rep.	In distress	In distress
Cote d'Ivoire	Moderate	Moderate
Eritrea	…	…
Ethiopia	High	High
Gambia, The	High	High
Ghana	High	High
Guinea	Moderate	Moderate
Guinea-Bissau	High	High
Kenya	High	High
Lesotho	Moderate	Moderate
Liberia	Moderate	High
Madagascar	Moderate	Moderate
Malawi	Moderate	High
Mali	Moderate	Moderate
Mauritania	High	High
Mozambique	In distress	In distress
Niger	Moderate	Moderate
Rwanda	Moderate	Moderate
Sao Tome and Principe	In distress	In distress
Senegal	Moderate	Moderate
Sierra Leone	High	High
Somalia	In distress	In distress
South Sudan	High	High
Sudan	In distress	In distress
Tanzania	Moderate	Moderate
Togo	Moderate	High
Uganda	Moderate	Moderate
Zambia	High	High
Zimbabwe	In distress	In distress

Source: World Bank, Debt Sustainability Analysis (DSA); it reflects DSA ratings as of end-December 2021.

Table A2. Debt Burden Thresholds and Benchmarks Under the DSF

	PV of external debt in percent of		External Debt service in percent of		PV of total public debt in percent of
	GDP	Exports	Exports	Revenue	GDP
Weak	30	140	10	14	35
Medium	40	180	15	18	55
Strong	55	240	21	23	70

Source: Joint World Bank-IMF Debt Sustainability Framework for Low-Income Countries

Table A3. List of Fragile and Conflict-affected Situations (SSA Countries only, FY22)

High-Intensity Conflict	Medium-Intensity Conflict	High Institutional Social Fragility
Somalia	Burkina Faso	Non-Small States
	Burundi	Congo, Rep.
	Cameroon	Eritrea
	Central African Republic	Guinea-Bissau
	Chad	Sudan
	Congo, Dem. Rep.	Zimbabwe
	Ethiopia	
	Mali	Small States
	Mozambique	Comoros
	Myanmar	
	Niger	
	Nigeria	
	South Sudan	

Table A4. Sample Countries with Income, Resource and HIPC Status

Countries	*Country Code*	*Income group*	*Lending category*	*HIPC*	*Resource-Endowed*	*Resource Type*
Angola	AGO	Lower middle	IBRD		Yes	Energy
Benin	BEN	Lower middle	IDA	HIPC	No	--
Botswana	BWA	Upper middle	IBRD		Yes	Mineral
Burkina Faso	BFA	Low income	IDA	HIPC	Yes	Mineral
Burundi	BDI	Low income	IDA	HIPC	No	--
Cabo Verde	CPV	Lower middle	Blend		Yes	Energy
Cameroon	CMR	Lower middle	Blend	HIPC	Yes	Energy
Central African Rep.	CAF	Low income	IDA	HIPC	No	--
Chad	TCD	Low income	IDA	HIPC	Yes	Energy
Comoros	COM	Lower middle	IDA	HIPC	No	--
Congo, Dem. Rep.	COD	Low income	IDA	HIPC	Yes	Mineral
Congo, Rep.	COG	Lower middle	Blend	HIPC	Yes	Energy
Côte d'Ivoire	CIV	Lower middle	IDA	HIPC	Yes	Energy
Eritrea	ERI	Low income	IDA	**HIPC**	No	--
Eswatini	SWZ	Lower middle	IBRD		No	--
Ethiopia	ETH	Low income	IDA	HIPC	No	--
Gabon	GAB	Upper middle	IBRD		Yes	Energy
Gambia, The	GMB	Low income	IDA	HIPC	No	--
Ghana	GHA	Lower middle	IDA	HIPC	Yes	Mineral
Guinea	GIN	Low income	IDA	HIPC	Yes	Mineral
Guinea-Bissau	GNB	Low income	IDA	HIPC	No	--
Kenya	KEN	Lower middle	Blend		No	--
Lesotho	LSO	Lower middle	IDA		No	--
Liberia	LBR	Low income	IDA	HIPC	Yes	Mineral
Madagascar	MDG	Low income	IDA	HIPC	No	--
Malawi	MWI	Low income	IDA	HIPC	No	--
Mali	MLI	Low income	IDA	HIPC	Yes	Mineral
Mauritania	MRT	Lower middle	IDA	HIPC	Yes	Mineral
Mauritius	MUS	High income	IBRD		No	--
Mozambique	MOZ	Low income	IDA	HIPC	Yes	Energy
Niger	NER	Low income	IDA	HIPC	No	--
Nigeria	NGA	Lower middle	Blend		Yes	Energy
Rwanda	RWA	Low income	IDA	HIPC	No	--
Sao Tome Principe	STP	Lower middle	IDA	HIPC	No	--
Senegal	SEN	Lower middle	IDA	HIPC	Yes	Mineral
Sierra Leone	SLE	Low income	IDA	HIPC	Yes	Mineral
Somalia	SOM	Low income	IDA	**HIPC**	No	--
South Africa	ZAF	Upper middle	IBRD		Yes	Mineral
Sudan	SDN	Low income	IDA	**HIPC**	Yes	Energy
Tanzania	TZA	Lower middle	IDA	HIPC	Yes	Mineral
Togo	TGO	Low income	IDA	HIPC	Yes	Mineral
Uganda	UGA	Low income	IDA	HIPC	No	--
Zambia	ZMB	Lower middle	IDA	HIPC	Yes	Mineral
Zimbabwe	ZWE	Lower middle	Blend		Yes	Mineral

Source: Modified from World Bank list of sub-Saharan African economies (June 2020)
Notes:
1) Equatorial Guinea, Namibia, Seychelles, and South Sudan are excluded due to data unavailability.
2) Bold letters indicate countries which were added to HIPC list after 2019 and have not reached the completion point yet, and thus were not included in HIPC group in this study.
3) Resource-Endowed Countries are those whose average mineral rents to GDP is over 0.571 (the median value of the average mineral rents to GDP for 44 countries from 1996-2019) or average energy

rents to GDP is over 1.450. Some countries were endowed with both types of natural resource, but they were categorized with higher mean-median value.

Table A5. Description of Institutional Quality Variables

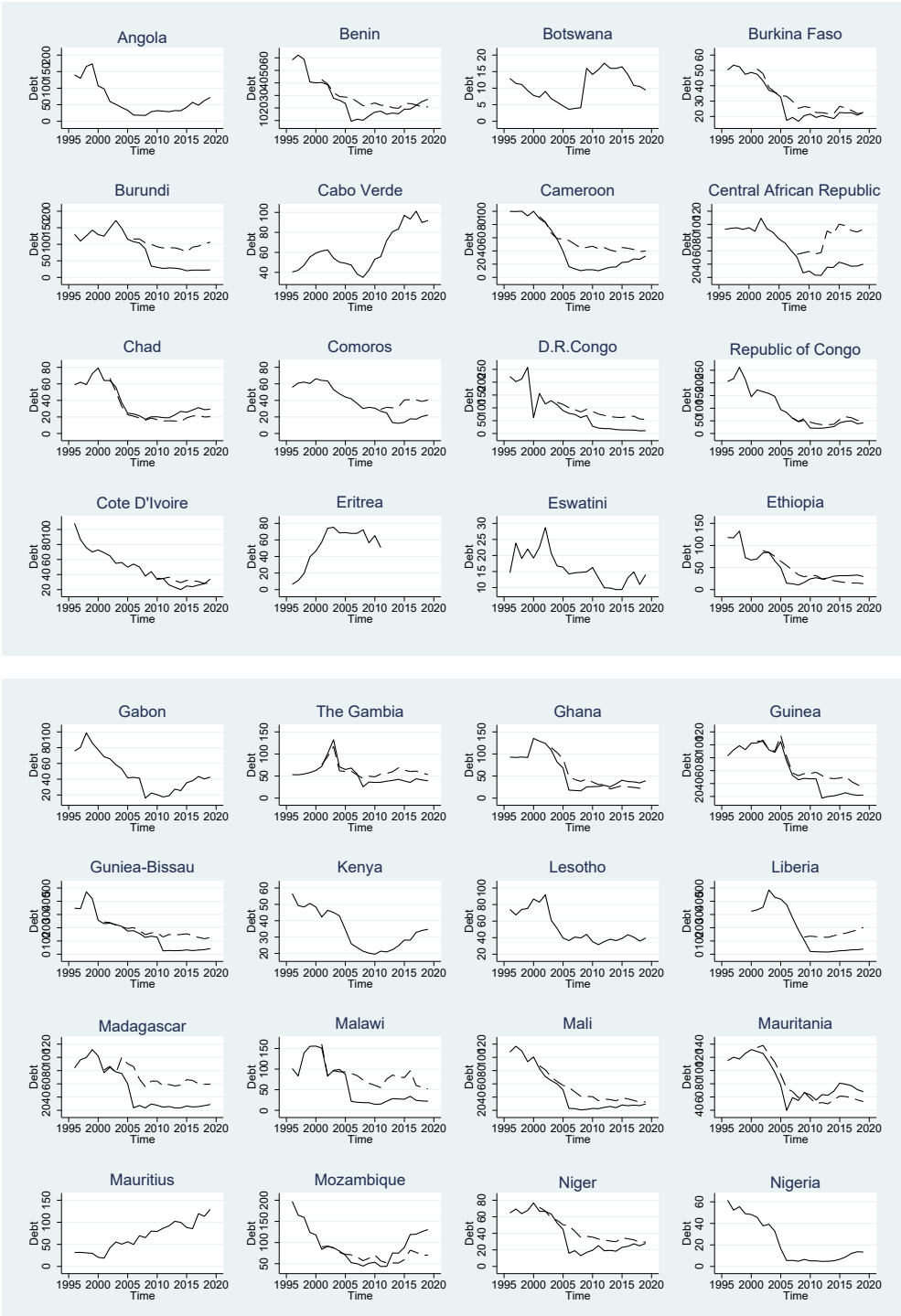
Control of Corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.
Government Effectiveness	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Political Stability and Absence of Violence/Terrorism	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.
Regulatory Quality	Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
Rule of Law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Voice and Accountability	Voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

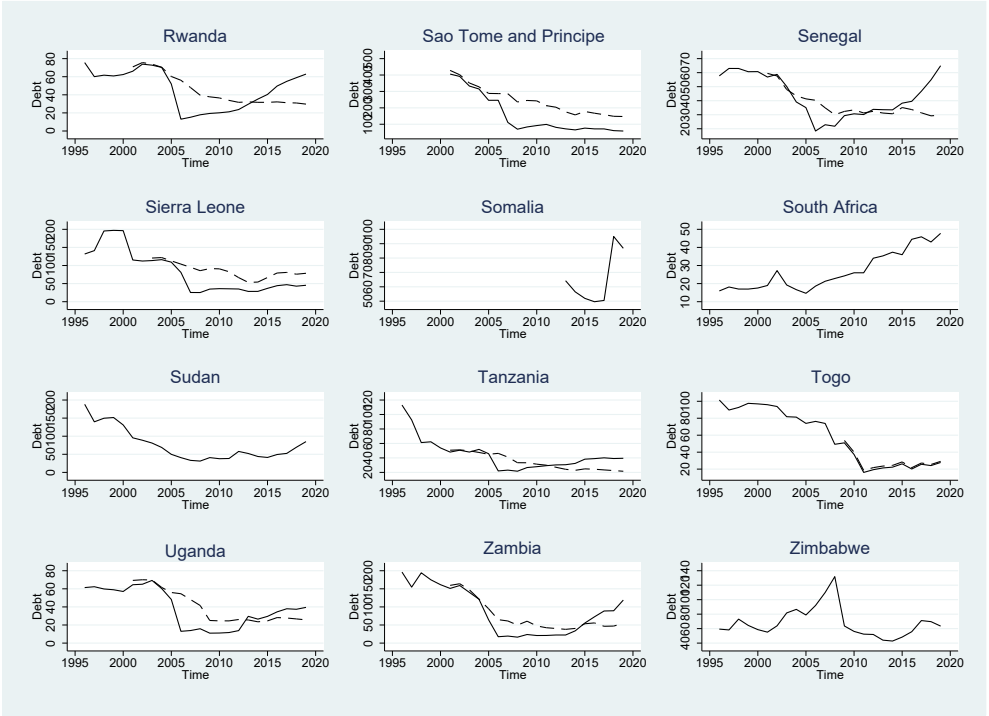
Source: Kaufmann et al. (2010)

Table A6. Description of Variables

Variable	Description	Source
Debt	External debt stocks to GDP ratio; Total external debt stocks divided by GDP (in %)	World Bank, International Debt Statistics.
GDPPC	Logarithm of real GDP per capita (constant 2015 US$)	World Bank, World Development Indicators
Growth	Per capita GDP growth (in annual %)	World Bank, World Development Indicators
Openness	Trade openness; Sum of exports and imports of goods and services divided by GDP (in %)	World Bank, World Development Indicators
TOT	Terms of Trade; Exports of goods and services divided by imports of goods and services *100	World Bank, World Development Indicators
Inflation	Inflation, GDP deflator. Inflation as measured by the annual growth rate of the GDP implicit deflator; the GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.	World Bank, World Development Indicators
Political	Political institutional quality; The average percentile ranks of 1) Political Stability and Absence of Violence/Terrorism and 2) Voice and Accountability	Kaufmann et al. (2010)
Economic	Economic institutional quality; The average percentile ranks of 1) Control of Corruption; 2) Government Effectiveness; 3) Regulatory Quality and 4) Rule of law	Kaufmann et al. (2010)
NR	Natural resources rents are the sum of energy rents and mineral rents; Natural Resource endowment: 1 if country is either mineral-endowed or energy-endowed, 0 otherwise	World Bank, World Development Indicators
Mineral	Mineral rents (% of GDP); the difference between the value of production for a stock of minerals at world prices and their total costs of production. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate. Mineral-Endowed: 1 if average mineral rents to GDP of the country is over 0.571, 0 otherwise	World Bank, World Development Indicators
Energy	Sum of coal rents (% of GDP), natural gas rents (% of GDP) and oil rents (% of GDP); the difference between the value of production at regional prices and total costs of production. Energy-Endowed: 1 if average energy rents to GDP of the country is over 1.450.	World Bank, World Development Indicators

Figure A1. Debt Burden (Debt stocks in relation to GDP) by Country





Note: For HIPCs, the debt stock to GDP before debt relief was shown in dash line.

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국문초록

최근 저소득 및 중하위 소득 국가가 대거 위치한 사하라이남 아프리카 지역의 부채 문제가 다시 증가하고 있다. 이는 대부분의 국가가 낮은 1인당 국내총생산지수 및 제도수준 함께 경제 활동의 다양성이 낮기 때문에 특히 우려된다. 또한 이들 대부분 국가는 대규모 인프라 개발 프로젝트와 투자가 지속적으로 필요하다.

사하라이남 아프리카 중 31개국은 2000년대에 고채무빈곤국 채무구제 제도 (Heavily Indebted Poor Countries, HIPC) 및 다자간부채탕감제도 (Multilateral Debt Relief Initiative, MDRI)를 통하여 대규모 부채 탕감 및 감면을 받았다. 그러나 이로부터 10년도 지나지 않아 2010년부터 대외 및 국가 부채 위기가 빠른 속도로 증가하기 시작했으며 현재 21개국이 대외부채 위기에 높은 위험수준이거나(high risk) 이미 위기에 처해 있다 (in distress). 이것으로 보아 부채 탕감 프로그램이 일시적으로 경제 악화를 방지했지만 이 지역의 경제 성장으로 이어지지는 않았다는 것을 알 수 있다.

본 연구는 1996년부터 2019년까지 41개 사하라 사막 이남 아프리카 국가의 데이터를 사용하여 천연자원 보유량과 제도수준을 대외부채를 결정하는 요인으로 추정하고 사하라 사막 이남 아프리카의 천연자원 의존도와 제도수준이 대외부채에 미치는 영향을 조사한다.

결과적으로 천연자원 의존도가 사하라이남 아프리카의 대외 부채 감소 간의 강한 연관성 발견할 수 있었고, 성장과 대외 부채 사이의 부정적인 관계가 천연자원의 이익이 대부분 부채 상환에 대한 지불로 이어진다는 것을 뒷받침하고 있다. 이 결과는 “자원의 저주”와 동일한 선상의 증거를 제시하고 있고, 부채 상환 또는 공공 투자 자금 조달을 위하여 자원수출에 의존하는 것은 지속가능하지 않고 경제적 다각화의 부족을 의미한다.

제도의 차이와 대외 부채의 상관관계에서 보여지는 결과로는 정치제도

가 대외채무를 감소시키는 반면, 경제제도는 대외채무에 미치는 영향이 모호함을 보여준다. 이는 HIPC 이니셔티브(1996-2010년) 기간동안 더욱 분명하게 나타나며, HIPC 이니셔티브 및 MDRI 이전의 구조 개혁으로 거시경제적 안정성이 더 좋은 국가에 더 많은 부채를 부여한 반면 정치적 불안정한 국가들은 상대적으로 대외부채에 대한 접근성이 부족했음을 설명하고 있다.

키워드 : 대외부채, 천연자원, 사하라이남 아프리카, 제도수준, 채무구제
학번: 2018-24389