INTEGRATING HUMAN CAPITAL, INVESTMENT, INSTITUTION, AND NATURAL

RESOURCE: EMPIRICAL EVIDENCE FOR THEIR RELATIONSHIPS WITH

ECONOMIC GROWTH AND DEVELOPMENT

A Thesis

By

RINA MIHASHI 47-126847

in Partial Fulfilment

of the Requirements for the Degree

Master of Sustainability Science

Advisor: Associate Professor Masaru Yarime

Co-Advisor: Associate Professor Hirotaka Matsuda

Graduate Program in Sustainability Science

Graduate School of Frontier Sciences

THE UNIVERSITY OF TOKYO

January 2014

INTEGRATING HUMAN CAPITAL, INVESTMENT, INSTITUTION, AND NATURAL

RESOURCE: EMPIRICAL EVIDENCE FOR THEIR RELATIONSHIPS WITH

ECONOMIC GROWTH AND DEVELOPMENT

ABSTRACT

  Human capital, investment, institution, and natural resource are among the determinants of

economic growth and of development. Davis (1995) compares the magnitudes of the changes

in the levels of development during period 1970-1989 between mineral exporters and

non-mineral exporters, using wide range of development indicator. This master's thesis

examines more recent time period (1990-2010), and the association between resource

abundance and the long-run development. Resource export (a flow) is considered as the

measure of resource dependence (Davis, 1995; Sachs and Warner, 1997; Bulte et al., 2005;

Brunnschweiler and Bulte, 2008; Mihashi and Yarime, 2013; Mihashi et al., 2013), whereas

resource abundance is measured as a stock (e.g. asset value of natural capital). The natural

capital considered in this thesis includes cropland, pastureland, timber and non-timber forest

resources, protected areas, and subsoil assets. Subsoil assets include energy resources (oil,

natural gas, hard coal, lignite) and other mineral resources (bauxite, copper, gold, iron, lead,

nickel, phosphate, silver, tin, zinc).

  The relationships between the total of human capital, institutional quality, investment rate,

and resource abundance and (1) economic growth, and (2) long-run development, are not well

understood as previous literature has treated these four factors independently. Relatively

resource-rich countries (e.g. Ireland, Trinidad and Tobago, and United Kingdom) seem to

have experienced relatively small change in the level of development, vice versa (e.g.

Morocco and Mozambique). However, there are some relatively resource-rich countries that

have experienced relatively large increase in the level of development (e.g. Cameroon and

Niger). Similarly, some relatively resource-poor countries have experienced relatively small increase in the level of development (e.g. Portugal and Jamaica). Other factors that seem to have been associated with the magnitude of the change in the level of development are human capital, investment rate, and institutional qualities; Cameroon and Niger have relatively low scores on these three factors, Jamaica has relatively high scores, and Portugal has relatively low score on human capital but high scores on investment rate and institutional qualities. What seem to be related to the magnitude of change in the level of development are not only these four independent factors but also the total of these four factors. Thus, this master's thesis examines the association between the total of human capital (H), investment rate (I), institutional quality (I), and natural resource abundance (R), measured by the HIIR index, and the level of development.

  The contributions of this master's thesis are the following. The work by (1) Brunnschweiler and Bulte (2008) is extended by examining the relationship between the natural resource abundance and the level of development, and (2) Bulte *et al.* (2005) is extended by examining the long-run development, and additional indicators of human welfare and development. This master's thesis also extends previous works by (1) examining the differences in long-run growth and development across and within regions and the underlying factors that explain such differences, and (2) introducing the HIIR index that measures the total of human capital, investment rate, institutional quality, and natural resource abundance. The objectives of this master's thesis are to examine the relationships between natural resource abundance and (1) economic growth, and (2) long-run development, and the relationships between the HIIR index and (1) and (2). Cross-country statistical analysis of the data for period 1990-2010 is conducted to examine these relationships. The aim is to find initial conditions that are associated with subsequent long-run growth and development.

The following were the main findings. First, when regional differences were not accounted for, there was no evidence for the relatively resource-rich countries experiencing relatively fast economic growth in the past two decades. After accounting for regional differences, European countries and OECD members that experienced relatively fast growths were found to have relatively high natural resource abundance. This was not the case for African countries. African countries that experienced relatively fast growths had relatively high human capital accumulation. European countries and OECD members had relatively high GDP per economically active population (aged 15-64) and experienced relatively rapid economic growth compared to African countries during the past two decades. Second, relatively rapid economic growth was associated with relatively high score on the HIIR index in Europe but not in Africa and among OECD members. Third, when regional differences were not accounted for, countries that experienced relatively fast economic growths experienced relatively small changes in the level of development. When regional differences were accounted for, the changes in the levels of development did not vary by growth rates among European countries. The OECD members that grew relatively fast experienced relatively large increases in the levels of development. In contrast, the African countries that grew relatively fast experienced relatively small increase in the level of development. European countries and the OECD members had relatively high levels of development and experienced relatively small changes in the magnitudes of the levels of development compared to African countries. Finally, regardless of regional differences, countries that experienced relatively large increase in the levels of development had relatively low scores on natural resource abundance and on the HIIR index.

Depending on the values of GDP per economically active population and region-specific factor, the associations between growth rate and (1) natural resource abundance, (2) the HIIR index, and (3) human capital might vary. Similarly, depending on the levels of development

and region-specific factors, the association between the magnitude of the change in the level of development and growth rate might vary.

Since the aim of this paper is to find some initial conditions associated with subsequent long-run growth and development, the discussion focuses on Africa that has relatively low levels of development. For African countries that already have relatively high levels of development to increase their levels of development marginally, some initial/past conditions that may be important are to (1) have large total of human capital, investment rate, institutional quality, and natural resource abundance, and fast economic growth, and (2) invest in education and infrastructure, and manufacturing and services (i.e. diversifying the economy), driving the economic growth. For African countries that still have relatively low levels of development to increase their levels of development dramatically (they tend to have small total of human capital, investment rate, institutional quality, and natural resource abundance, and experience slow economic growth), receiving and spending the foreign aids to improve their levels of development may be one of the important points.

ACKNOWLEDGEMENTS

DEDICATION

This master's thesis was built upon my graduate thesis written for my B.A. obtained at Waseda University. After spending almost three years researching the same topic, I realised how my thoughts and values changed through various experiences at the Graduate Program in Sustainability Science. Such experiences include presenting at conferences and a workshop, attending a lecture given by Professor Sir Partha Dasgupta of Cambridge University during the GSFS symposium in January, 2013, conducting field works for Great Pearl River Delta (GPRD) Unit of Asian Program for Incubation of Environmental Leaders in February and March, 2013, etc. I used to strongly believe in numerical data and relied on it to understand the socio-economic phenomena. However, over time, I realised that rather than using and interpreting the data for my research, I might have been navigated by the data to interpret socio-economic phenomena in limited ways. Towards the end of my two years as master's student, I grew sceptical of using the data and started to wish to explore more the concepts/theories. After all, the construction and selection of data, index, indicator, etc. should stem in concepts/theories. I am happy that I realised this now so that I can reflect this to my future studies.

I thank all the people who have inspired me, especially my supervisors and my mentor, and those I have interacted with at the student room on the seventh floor and during the conferences and a workshop. I thank all the people who have contributed to change my worldview, especially those I met during the GPRD unit. Finally, I am grateful to my parents who have always supported me in many ways.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.   INTRODUCTION

At the past World Bank conference on mining and economic development held in 1994, the historically poor per capita economic growth of the mineral-exporting nation was noted by several invited experts. The fate of mineral-based developing countries was the concern of delegates from those countries. The fears that were prevalent were of the Dutch disease and of the "resource curse", and the question was appropriate policy response.

Certain mineral based economies had unhappy economic experiences in the 1970s and early 1980s, which were to some extent the basis of these concerns. The dangers awaiting mineral economies outlined by books and papers might have also been the causes of these concerns. The tentative conclusion drawn by Alan Gelb in *Oil windfall: Blessing or Curse?* through a case study analysis was that the oil exporters were certainly made worse off in the long run due to the oil price rise of the 1970s compared to when the real oil price was constant. "Volatility plus poor [price] prediction translates, on average, into a poorer use of resource during the cycle, which may more than offset the increment to resource from the windfall" (1988 , p.   141). Similarly, the oil price shocks of the 1970s induced terms of trade shocks, to which the selected hard-rock mineral exporters did not respond well, according to Auty (1993) in *Sustaining Development in Mineral economy: The Resource Curse Thesis.* Auty noted, "This study confirms the scepticism of Gelb (1988) concerning the   advantages   of   a   bountiful   natural   resource   endowment   and   it   also reinforces   the   resource   curse   thesis,   [a   thesis   suggesting   that]   not   only

1

may resource-rich country fail to benefit from a favourable endowment, they may actually perform worse than less well-endowed country (1993, pp. 1, 124)."

The resource curse thesis is rather a strong recurrent tendency than an iron law, as has been advised by Auty (1994, P.12). Careful mineral windfall management may help avoid it. Nevertheless, mineral economies mostly seem to have succumbed. This has led to Auty's finding that "The mineral economy have underperformed compared with country of a similar size and level of economic development which lack the mineral bonus (1994, p. 12)." Being a mineral based economy tends to be a development "curse" given uncertain mineral price and imperfectly meddling government in a global environment (see also Auty and Evans, 1994; Lewis, 1989; Roemer, 1985).

Developing economy government has evidently taken up this resource curse pessimism. These negative development effects have been incorrectly categorized by them as the Dutch disease. The incorrect use of the Dutch disease terminology, as the word "disease" implies unfortunate connotations, is of little concern. That the resource curse thesis seems to be creating the widespread and overtly negative policy bias towards developing countries' resource endowments is of more concern, at least for the developing countries that derive income directly or indirectly from the mineral industries. The natural wish of each country may be an optimal exploitation of its resource endowments even if this means postponing or stifling mineral production until ensuring an adequate domestic environment through creating policy that reduces the effective mineral endowment. According to the resource curse thesis, less well-endowed country should do better than a country destined to become a victim of the resource curse thesis, so the resource-rich country may try to temporarily or permanently transform itself into

one of the less well-endowed countries. This has led to Davis' (1995) noting that "I see the roughly 2% of developing nations that can be termed minerals-based economies responding by downplaying or even ignoring their mineral endowments and proceeding to an apparently higher growth path via the production of other, non-mineral related goods." Why has developing economy government taken up this resource curse pessimism? This question leads to a summary of previous literature.

1.1. The Dutch disease versus the resource curse thesis

The role of mining in developing economy has been among a series of concerns for development economists. The pariahs of development economics have long been the primary resource industries and the mining industries. Mineral-rich countries are said to have rather development problems than development advantages (Lewis, 1984, 1989). This has perhaps led to Gelb's (1985) posing a question to which he has devoted considerable research effort: "are the difficulties of economic management through uncertain windfall gains so severe as to erode their large ex-ante value, perhaps turning them into a net liability?" This question has raised the resource curse issue.

Although the Dutch disease and the resource curse thesis are frequently thought to be synonymous, they are two separate issues. The temporary or sustained increase in export earnings leading to the coexistence of booming and lagging sector in an economy is denoted by the Dutch disease. The ideal environment for the disease seems to be generated by the mineral exporting economies with their booming mineral sector. The core idea of the theory is that while manufacturing and agriculture sectors shrink the mining sector booms, resulting in a medium-term deindustrialisation of the economy. The

name reflects the experience in the Netherlands in the 1970s, when the increase in natural gas production from the Groningen fields has led to shrinking tradable sector (see Kremers, 1986).

The resource curse thesis is a separate issue. According to the thesis, the present value of negative effect of the mineral boom more than offset the present value of the positive effect, leading to a net economic loss. One mechanism consistent with the anti-mining bias in early development economics is the growth-inhibiting nature of the deindustrialization implicit in the core Dutch disease model (see Chenery *et al.,* 1986). The temporary drop in output in the manufacturing sector, where industry-specific learning-by-doing effect external to the firm (i.e. positive externality) occurs, results in permanent loss in comparative advantage (van Wijnbergen, 1984; Krugman, 1987). Mineral exploitation may lead to growth and not be offset by any negative deindustrialization effect, i.e. net positive effect may occur. The assumption is that the mineral windfall is not used to subsidise these sectors through the appropriate policy response (van Wijnbergen, 1984). In response to the Dutch disease effect, manufacturing sectors were subsidised in most cases. In fact, some manufacturing sector instead expanded (Fardmanesh, 1991), and most mineral economies did not experience deindustrialisation (Auty and Evans, 1994). The original model omitted certain aspects of developing economy, which were taken into account when modifying the core Dutch disease theory (Bandara, 1991; Benjamin, Devarajan and Weiner, 1989; Struthers, 1990). The most notable modified Dutch disease result seems to be deagriculturalisation and a booming government sector.

1.2. The indirect effect of natural resource on economic growth through institutions

To explain the poor growth performance of resource-rich country, several other

theories have been advanced by economists and political scientists. These theories appear to be converging: rent-seeking models; and institutional explanation.

In resource-rich country, the role of rent-seeking may be potentially destructive. The underlying assumption of rent-seeking models is that resource rents are easily appropriable, leading to bribes, public policies being distorted, and labour being diverted away from productive activities to seeking public favours (Torvik, 2002). However, the basic rent-seeking explanation may be too blunt because resources are a curse to development only for some countries but not for others as suggested by the available evidence. The attempts have been made to enrich rent-seeking models with multiple equilibria, where comparative statics are conditional on the specific prevailing equilibrium. In such systems, "initial conditions" essentially determine the context-specific effect of resource abundance on growth (e.g. Acemoglu, 1995; Baland and Francois, 2000). Mehlum *et al.*, (2002) point out that a country's governance institutions may influence the effect of resource abundance on growth. An institution-specific analysis of the resource curse, while regarding institution as pre-determined or fixed, has been carried out by the authors.

Although resource and institution may be connected, what matters may be the type of resource and, in terms of institutional features, the form of government and its policies. For example, lower or negative rate of "genuine saving", which is saving adjusted for resource depletion, due to the inability of host country to manage resource revenues sustainably may lead to the curse as argued by Atkinson and Hamilton (2003). That is, (macroeconomic) policies are important. Auty (2001a, 2001b) examines transition economy. He argues that factional and predatory oligarchic polities, what are governments promoting narrow sectional interests (see Karl, 1997, and Ross, 2001), tend to dominate resource-rich countries, especially those with "point resources" (e.g. oil

5

fields) that are concentrated in space. "Bad policies", and the so-called rentier effect, repression effect, or policies postponing the transition to competitive industrialization and economic diversification are expected to be seen in countries well-endowed with point resource. Infant industries may make up the burgeoning non-tradable sector, and public sector may become inflated and unproductive. These sectors may be supported by the resource sector as a possible outcome.

Political and institutional variables may play key role in economic growth as supported by ample empirical evidence. One of the major factors shaping institutional context is resource abundance, as shown by Leite and Weidmann (LW) (2002). They demonstrated that growth is determined by the level of corruption, which in turn is affected by resource, so there is an important indirect effect, but no direct effect, of resource wealth on economic performance. That is, the "social infrastructure" could be shaped by resource abundance. Its importance has been demonstrated by Hall and Jones (1999).

Two recent papers by Isham *et al.,* (IWPB) (2005) and Sala-I-Martin and Subramanian (SS) (2003) have confirmed and placed this important result in a more general context. Instead of examining only corruption, which is just one aspect of institutional quality, alternative and broader governance indicator has been explored by IWPB and SS. Their findings are that resource abundance is inversely proportional to economic growth when failing to control for institutional quality. Natural resources, however, do not appear to have separate adverse effect on growth at a given level of institutional quality and price volatility. Growth is affected by institutional quality, which in turn is inversely proportional to "point resources", such as oil fields, i.e. resource has indirect effect on growth through institutional quality. Institutional quality is not significantly correlated with diffuse natural resources, such as food and agricultural products.

6

Overall picture is that although the direct effect of resource wealth on economic performance becomes insignificant when controlling for institutional quality, an indirect effect remains significant. Institutional quality is among the important determinants of economic growth, and is negatively affected by certain types of resource wealth.

1.3. Natural resource <u>abundance</u> versus <u>dependence</u>

Sections 2.1. and 2.2. have summarised popular explanations for the curse: the Dutch disease; rent-seeking models; and institutional explanations. One explanation for the curse that seems to be supported by growing evidence is the adverse impact of resource on institutions. Institutions, such as governance and the legal system, can be damaged by natural resource exports indirectly or directly. The former occurs as the incentives to reform, to improve infrastructure, or to even establish a well-functioning tax bureaucracy are removed. The latter occurs as the fight to control resource rents is provoked. This effect is the most problematic based on growing evidence (Harford and Klein, 2005).

Various authors (e.g. Bulte *et al.,* 2005; Isham *et al.,* 2005; Ross, 2001) have provided empirical support for this view. For countries with good institutions, resource abundance can be rather a blessing than a curse, *vice versa* (Mehlum *et al.,* 2006)*.* However, the new consensus view argues that the institutional context *per se* is endogenous and varies with respect to resource endowments (Robinson *et al.,* 2006; Jensen and Wantchekon, 2004; Sokoloff and Engerman, 2000). "Institutional quality", the exact definition of which is debateable, refers to the rules of the game as agreed by most economists, and is a significant driver of economic development and of growth (Rodrik *et al.,* 2004).

The limitations that emerge through literature review is summarised as follows. One is thatthe associations between the natural resource abundance, measured as a stock, and the indicators of human welfare and development are not well understood. Brunnschweiler

and Bulte (BB) (2008) distinguish between resource dependence (measured as the share of primary exports in GDP) and resource abundance (stock-based measure), and examine their associations with economic growth. Development indicators are different from the growth in GDP per capita. Development indicators are commonly expressed as "levels," which capture varying economic performance across long period of time and are directly relevant to welfare measured by consumption of goods and services (Hall & Jones, 1999). The change in levels over time is the measure of economic growth. According to the empirical study by Easterly *et al.* (1993), the correlation of growth rates across decades is weak, so varying growth rates by countries may be transitory and "levels" may be a more appropriate measure for development and welfare. Moreover, aggregate growth statistics do not capture distributional considerations, but development and welfare indicators do. For instance, the percentages of population meeting the basic human needs are captured by some indicators, such as the percentage of population having access to safe water supply, sanitation, etc. This paper will examine the associations among the resource abundance, economic growth, and the indicators of human welfare and development.

Another limitation is that the relationship between resource abundance and long-run development is not well understood. Bulte *et al.* (2005) examine the association between the resource dependence at the start of observation period and the indicators of human welfare and development at the end of observation period. Davis (1995) compares the changes in the levels of development during period 1970-1989 between mineral exporters and non-mineral exporters, using wider range of development indicator. This paper will examine more recent time period (1990-2010), and the association between resource abundance and the long-run development.

The other limitation is that the relationships between the total of human capital, institutional quality, investment rate, and resource abundance and (1) economic growth,

and (2) long-run development, are not well understood as previous literature has treated these four factors independently. Relatively resource-rich countries (e.g. Ireland, Trinidad and Tobago, and United Kingdom) seem to have experienced relatively small change in the level of development, *vice versa* (e.g. Morocco and Mozambique). However, there are some relatively resource-rich countries that have experienced relatively large increase in the level of development (e.g. Cameroon and Niger). Similarly, some relatively resource-poor countries have experienced relatively small increase in the level of development (e.g. Portugal and Jamaica). In both cases, other factors that seem to have been associated with the magnitude of the change in the level of development are human capital, investment rate, and institutional qualities; Cameroon and Niger have relatively low scores on these three factors, Jamaica has relatively high scores, and Portugal has relatively low score on human capital but high scores on investment rate and institutional qualities. What seem to be related to the magnitude of change in the level of development are not only these four <u>independent</u> factors but also the <u>total</u> of these four factors. Thus, this paper will examine the association between the total of human capital (H), investment rate (I), institutional quality (I), and natural resource abundance (R), measured by the HIIR index, and the level of development.

The contributions of this paper are the following. The work by (1) BB (2008) is extended by examining the relationship between the natural resource abundance and the level of development, and (2) Bulte *et al*. (2005) is extended by examining the long-run development, and additional indicators of human welfare and development. This paper also extends previous works by (1) examining the regional differences in long-run growth and development and the underlying factors that explain such differences, and (2) introducing the HIIR index that measures the total of human capital, investment rate, institutional quality, and natural resource abundance. The objectives of this paper are to

9

examine the relationships between natural resource abundance and (1) economic growth, and (2) long-run development, and the relationships between the HIIR index and (1) and (2). Data for period 1990-2010 is examined. The aim is to find initial/past conditions that are associated with subsequent long-run growth and development that contributes to achieving the sustainability.

The remainder of this paper is organised as follows. Section 2 summarises the data collected and methodology used. Section 3 summarises the empirical evidence for period 1990-2010. Section 4 discusses the evidence presented in Section 3. Section 5 concludes.

2.   METHODOLOGY

The following selection of data is based on the works by BB (2008), Bulte *et al.,* (2005), SW (1997), and Davis (1995). Based on bivariate correlations of all the data used by these authors, the key variables that seem to explain the magnitude of the change in the level of development and growth rate are chosen. The samples are categorised according to the growth rates and the magnitudes of the changes in the levels of development (top third, mid-range, bottom third). Then, the means and medians of chosen variables are compared.

Average annual growth rate: The calculation of average annual growth rate is as follows: (ln(GDPEA2009)-ln(GDPEA1990))/19, where ln(GDPEA2009) and ln(GDPEA1990) are the natural log of real GDP divided by economically active population in 2009 and 1990 respectively (source: World Development Indicator).

Natural resource abundance: the total natural capital in US$ per capita in 1994 (source: World Bank, 1997). It includes cropland, pastureland, timber and non-timber forest resources, protected areas, and subsoil assets. Subsoil assets include energy

resources (oil, natural gas, hard coal, lignite) and other mineral resources (bauxite, copper, gold, iron, lead, nickel, phosphate, silver, tin, zinc).

Investment rate: the ratio of real gross domestic investment (public plus private) to real GDP in 1990 (source: World development indicator).

Resource dependence: the share of primary product exports in GNP (or GNI) in 1990. Primary products refer to "fuels" and "non-fuel primary products" in World development indicator published by World Bank. They include the followings: SITC sections 0 (food and live animals); 1 (beverages and tobacco); 2 (crude materials except fuels); 3 (mineral fuels); 4 (animal and vegetable oils and fats); 22 (oil seeds, oil nuts, and oil kernels); 27 (crude fertilizer, minerals); 28 (metalliferous ores, scrap); and 68 (non-ferrous metals).

Human capital: secondary school enrolment rate in 1970 (source: SW, 1997).

*Fraction of the population speaking a major European language as first language (English, German, French, Spanish, or Portuguese).*Source: Hall and Jones, 1999.

Development indicator: Development indicator measures the level of satisfaction of basic human needs. The basic human needs considered here are life expectancy at birth (years), infant mortality rate (per 1,000 live births), population using improved drinking-water sources (%), population using improved sanitation facilities (%), and primary school enrolment rate (% gross), following previous literature (Bulte *et al.,* 2005; Davis, 1995). The sources for these indicators are World development indicator, Human Development Report, and Global Health Observatory. The values of these five indicators are normalised to take values on a scale of 0 (worst) - 10 (best). They are summed to create an original index that measures the level of development. This index takes values on a scale of 0 (worst) - 50 (best). Note that the five indicators are given the same weight. That is, they are assumed to be equally important in determining the level of development.

HIIR index: How is the HIIR index created? The values of four constituents (human capital, investment rate, institutional quality, and natural resource abundance) are normalised and then summed. Following Bulte *et al.*(2005), institutional quality variables include 1996 values of the World Bank's rule of law indicator and government effectiveness indicator (source: World Governance Indicators). The values are recalibrated to assume scores 0 (worst) - 5 (best). Bulte *et al.* (2005) note that the effect of institutional quality on development performance varies by the institutional quality indicator. Following their work, above-mentioned two indicators are included in this paper. H, I, I, and R are combined to form the HIIR index for the year 1990. The values of two institutional quality indicators are summed to create a single index of institutional quality, which takes the values on a scale of 0 (worst) – 10 (best). An assumption is that two constituents, which are given equal weights, are assumed to be equally important in forming the institutional quality index. The values of measurements for human capital, investment rate, and natural resource abundance are adjusted to take the values on a scale of 0 (worst) – 10 (best). The values of H, I, I, and R are then summed to create the values for the HIIR index, which takes values on a scale of 0 (worst) – 40 (best). An assumption is that the four constituents, which are given same weights, are assumed to be equally important in forming the HIIR index.

3. EMPIRICAL RESULTS

3.1. Natural resource abundance

Have the relatively resource-rich countries experienced relatively fast economic growth in the past two decades (i.e. period 1990-2009)? Table 1 provides a simple

comparison of countries that have experienced high (top third), moderate (mid-range), and low average annual growth rates (bottom third). The mean and median of natural resource abundance and other relevant variables chosen based on previous literature are compared. Table 1 shows that the countries with high average annual growth rate has relatively (1) high investment rate, and (2) low share of primary exports in GNP. However, there is no evidence for the relatively resource-rich countries experiencing relatively fast economic growth in the past two decades.

Do the average annual growth rates differ across regions? According to Figure 1, the countries in the 4th quartile are mostly European countries, 3rd African countries, 2nd OECD members, and 1st African countries (the categorisations of countries are based on World Bank and CIA World Factbook). The evidence shows that some African countries have experienced faster economic growth than the others.

What factors explain such difference seen within the African region? Table 2 provides the same comparison done in Table 1 for European countries, OECD members, and African countries. European countries and OECD members that have experienced relatively fast growth have had relatively high natural resource abundance, *vice versa*. The examples are Norway and Belgium (see Figures 1 and 2). There is no evidence to suggest that this has also been the case for African countries. The evidence shows that African countries that have experienced relatively fast growths have had high scores on human capital, *vice versa*. The examples are Guinea-Bissau and Mauritius. Why are relatively high growth rates associated with relatively high natural resource abundance among European countries and OECD members but not among African countries? Similarly, why are relatively high human capital accumulation associated with relatively high growth rate in Africa but not in Europe and among OECD members? What explains these differences across regions? This point will be further discussed in Section 4.

13

Table 1. Natural resource abundance and annual growth rates during the period 1990-2009

Average annual growth rate	Samples	Share of primary product exports in GNP		The ratio of sum of imports and exports to GDP		Point resource exports (fuels and minerals) as a share of total exports		Secondary school enrolment rate		Fraction of the population speaking a major European language as first language (English, German, French, Spanish, or Portuguese)		Rule of Law (max. = 5.00)	
1990-2009		1990		1970-1989		1990		1970				2009	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
High	52	0.11	0.08	0.71	0.60	0.08	0.03	0.13	0.13	0.23	0.00	2.44	2.39
Moderate	52	0.13	0.09	0.70	0.59	0.05	0.02	0.16	0.12	0.31	0.00	2.83	2.72
Low	51	0.18	0.15	0.70	0.60	0.09	0.02	0.09	0.04	0.23	0.00	1.99	1.77

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

Table 1. Continued

Average annual growth rate	Samples	Government Effectiveness (max. = 5.00)		Investment rate as a share of GDP (%)		GDP per economically active population (PPP US$ per capita)		Subsoil assets (US$ per capita)		Total natural capital (US$ per capita)	
1990-2009		2009		1990		1990		1994		1994	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
High	52	2.51	2.43	23.85	25.15	12229.46	8784.15	2217.37	330.00	7523.60	5550.00
Moderate	52	2.91	2.86	23.85	23.09	17865.88	12490.80	1242.42	320.00	8156.49	4200.00
Low	51	2.00	1.75	20.89	20.17	13626.39	6607.53	4502.50	120.00	8426.00	5490.00

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.
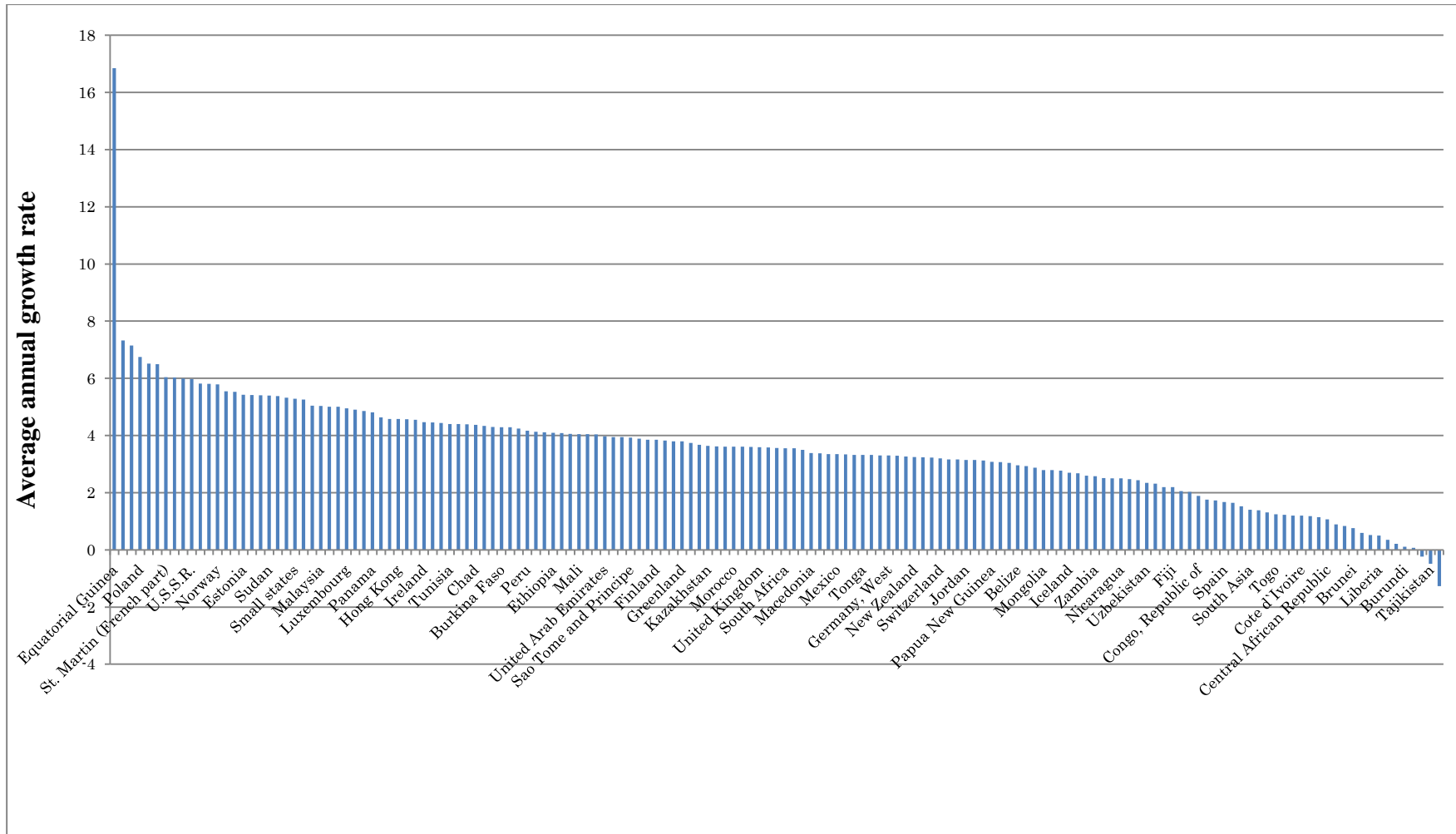
Figure 1. Average annual growth rate during the period 1990-2009. Source: World Bank, World Development Indicators online. Note: Total sample size is 155.

Table 2. Natural resource abundance and annual growth rates during the period 1990-2009: Europe, OECD members, and Africa

Region	Average annual growth rate	Samples	Share of primary product exports in GNP		The ratio of sum of imports and exports to GDP		Point resource exports (fuels and minerals) as a share of total exports		Secondary school enrolment rate		Fraction of the population speaking a major European language as first language (English, German, French, Spanish, or Portuguese)	
	1990-2009		1990		1970-1989		1990		1970			
			Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Europe	**High**	12	0.08	0.09	0.87	0.78	0.06	0.03	0.22	0.24	0.10	0.00
	Moderate	16	0.05	0.04	0.70	0.64	0.01	0.01	0.23	0.22	0.40	0.01
	Low	6	0.12	0.11	0.63	0.53	0.02	0.02	0.15	0.13	0.27	0.17
OECD members	**High**	10	0.07	0.07	0.79	0.75	0.07	0.03	0.20	0.22	0.21	0.00
	Moderate	17	0.07	0.04	0.57	0.54	0.02	0.01	0.29	0.29	0.55	0.86
	Low	4	0.09	0.08	0.61	0.53	0.01	0.01	0.23	0.26	0.27	0.17
Africa	**High**	11	0.19	0.12	0.57	0.56	0.14	0.04	0.06	0.05	0.13	0.00
	Moderate	12	0.15	0.15	0.69	0.51	0.01	0.00	0.03	0.01	0.01	0.00
	Low	22	0.14	0.15	0.74	0.60	0.08	0.07	0.02	0.02	0.01	0.00

Table 2. Continued

Region	Average annual growth rate	Samples	Rule of Law (max. = 5.00)		Government Effectiveness (max. = 5.00)		Investment rate as a share of GDP (%)		GDP per economically active population (PPP US$ per capita)		Subsoil assets (US$ per capita)	
	1990-2009		2009		2009		1990		1990		1994	
			Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Europe	**High**	12	2.92	3.25	2.89	3.19	25.05	25.49	22863.92	16772.40	10310.00	10310.00
	Moderate	16	3.66	3.93	3.74	3.71	25.07	23.48	30961.30	33001.08	522.73	230.00
	Low	6	3.20	3.51	3.07	3.44	21.14	23.03	27013.55	33259.08	75.00	75.00
OECD members	**High**	10	3.29	3.55	3.15	3.36	23.87	24.85	26124.23	21772.88	6600.00	3055.00
	Moderate	17	3.86	4.24	3.99	4.16	23.72	23.16	35120.87	36336.70	1870.00	570.00
	Low	4	3.88	3.84	3.82	3.87	25.21	24.56	38249.99	36257.70	63.33	40.00
Africa	**High**	11	2.02	1.97	1.94	1.97	18.79	18.15	4335.99	3523.43	346.67	330.00
	Moderate	12	2.25	2.27	2.29	2.32	25.96	23.04	5083.68	1905.97	483.75	45.00
	Low	22	1.63	1.57	1.65	1.60	18.26	17.28	4384.84	2302.67	267.00	90.00

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

Table 2. Continued

Region	Average annual growth rate 1990-2009	Samples	Total natural capital (US$ per capita)	
			1994	
			Mean	**Median**
Europe	**High**	12	24000.00	24000.00
	Moderate	16	7363.64	4940.00
	Low	6	3745.00	3745.00
OECD members	**High**	10	16595.00	16110.00
	Moderate	17	14196.88	7845.00
	Low	4	3263.33	2300.00
Africa	**High**	11	3358.33	2380.00
	Moderate	12	3002.73	2200.00
	Low	22	5090.71	5200.00

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.
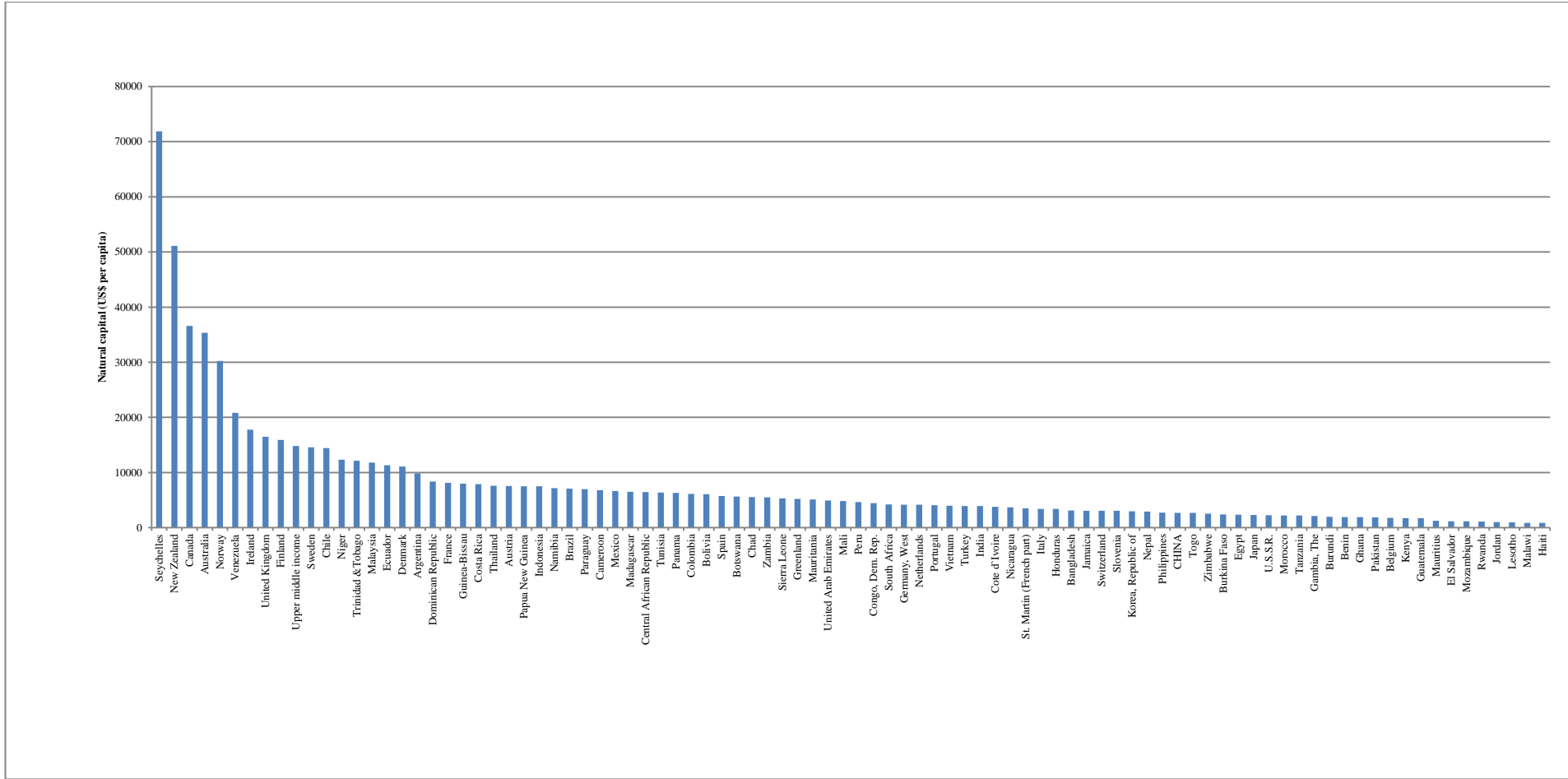
Figure 2. Total natural capital in US$ per capita for the year 1994. Source: World Bank, 1997 (cited in references). Note: Total sample size is 92.

The above findings lead to following question: to what extent do these implications carry over to indicator of human welfare and development (e.g. the level of development), which represent level rather than growth rate? Do the economies that have experienced relatively rapid economic growth experience relatively large increase in the level of development? Does the magnitude of the change in the level of development differ across regions? Is it related to natural resource abundance?

Table 3, again, provides a simple comparison of countries that have experienced high, moderate, and low annual growth rates. The mean and median of the change in the level of development are compared. Table 3 shows that countries that have experienced relatively fast economic growth have experienced relatively small change in the level of development, *vice versa*. The examples are Niger and Trinidad and Tobago (see Figures 1 and 3).

According to Figure 3, the countries in the 4th and 3rd quartiles are mostly African countries, 3rd and 2nd the Middle Eastern and Northern African countries, and 1st the OECD high income members, OECD members, and Europe. The magnitude of the change in the level of development varies widely among the African nations as have been observed with growth rate.

What factors explain such wide variance seen within the African region? Table 4 provides the same comparison as Table 3 but this time the samples are divided into following regions as done previously: Europe, OECD members, and Africa. The evidence shows that the magnitude of the change in the level of development does not vary by growth rate among European countries. However, the samples are limited to Ireland and Portugal. The OECD members that have grown relatively fast have experienced relatively large increase in the level of development, *vice versa*. The examples are Spain and

22

Table 3. The level of development and annual growth rates

Average annual growth rate 1990-2009	Samples	Change in the level of development 1990-2010	
		Mean	Median
High	52	0.16	0.17
Moderate	52	0.12	0.05
Low	51	0.61	0.31

Sources: World Bank, World Development Indicators online; World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; and World Health Organization, Global Health Observatory online.
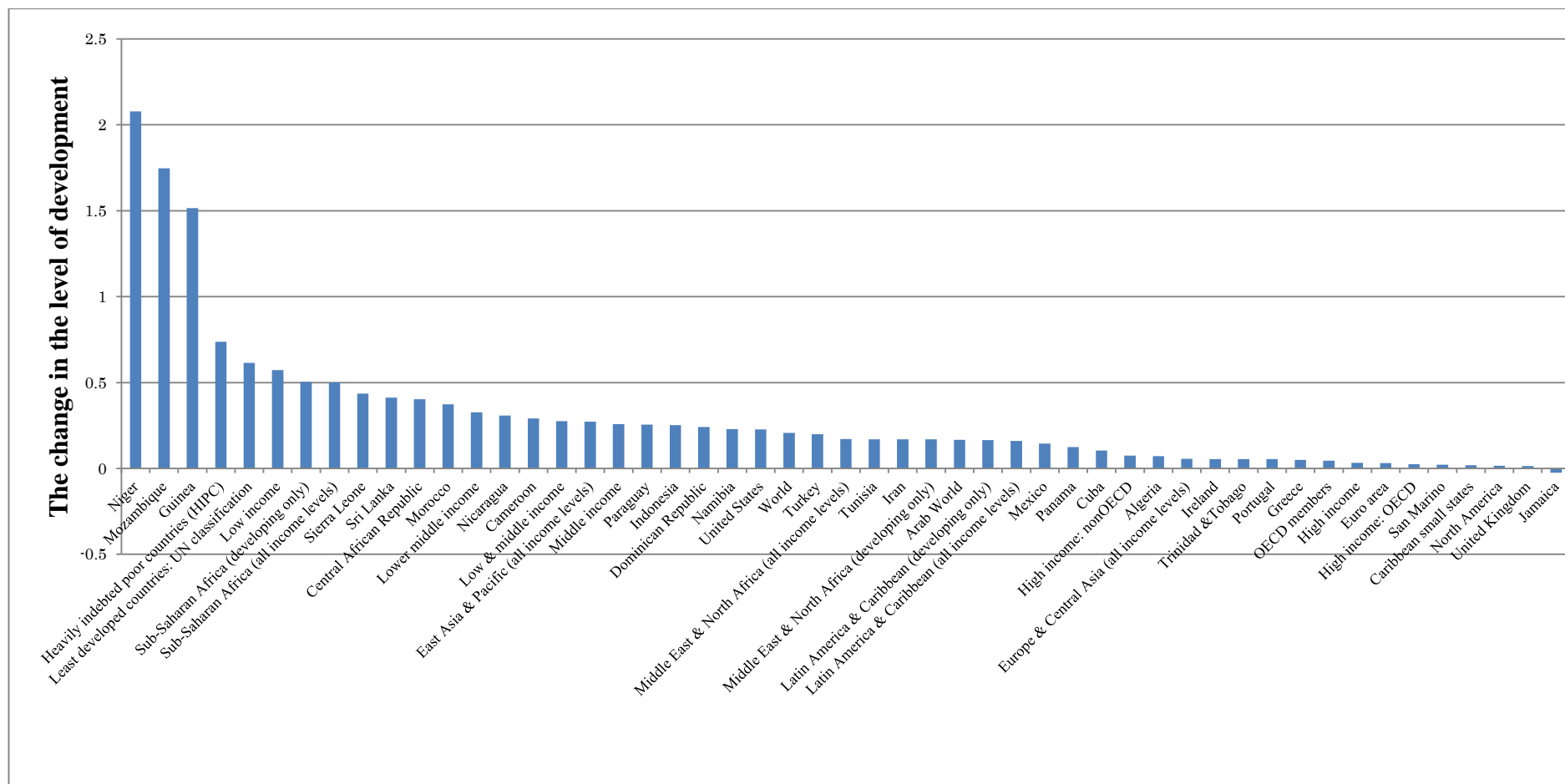
Figure 3. The change in the level of development over the period 1990-2010. Sources: World Bank, World Development Indicators online; UN Development Programme, Human Development Report online; and World Health Organization, Global Health Observatory online. Note: Total sample size is 47.

Table 4. The level of development and annual growth rates: Europe, OECD members, and Africa.

Region	Average annual growth rate 1990-2009	Samples	Change in the level of development	
			1990-2010	
			Mean	Median
Europe	**High**	12	0.05	0.05
	Moderate	16	0.05	0.05
	Low	6		
OECD members	**High**	10	0.13	0.13
	Moderate	17	0.07	0.05
	Low	4		
Africa	**High**	11	0.17	0.17
	Moderate	12	0.30	0.30
	Low	22	0.80	0.42

Sources: World Bank, World Development Indicators online; World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; and World Health Organization, Global Health Observatory online.

Turkey (see Figures 1 and 3). In contrast, the African countries that have grown relatively fast have experienced relatively small increase in the level of development, *vice versa*. The examples are Tunisia and Niger (see Figures 1 and 3). Why are relatively high growth rates associated with relatively small increase in Africa but not in Europe and among OECD members? What explains such difference across regions? This point will be discussed further in Section 4 .

Table 5 provides a simple comparison of countries that have experienced high, moderate, and low change in the level of development. The mean and median of natural resource abundance and other relevant variables chosen based on previous literature are compared. The evidence shows that countries that have experienced relatively large changes in the level of development have had relatively low natural resource abundance, *vice versa*. The examples are Ireland and Mozambique (see Figures 2 and 3). The evidence presented in Table 6, where the same comparison as Table 5 is done for African countries, shows that the same applies for African countries.

24

Table 5. Natural resource abundance and change in the level of development during the period 1990-2010

Change in the level of development	Samples	Share of primary product exports in GNP		The ratio of sum of imports and exports to GDP		Point resource exports (fuels and minerals) as a share of total exports		Secondary school enrolment rate		Fraction of the population speaking a major European language as first language (English, German, French, Spanish, or Portuguese)		Rule of Law (max. = 5.00)	
1990-2010		1990		1970-1989		1990		1970				2009	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
High	17	0.17	0.14	0.46	0.49	0.03	0.03	0.08	0.03	0.08	0.00	1.69	1.67
Moderate	17	0.08	0.09	0.53	0.42	0.04	0.04	0.13	0.08	0.37	0.06	2.41	2.27
Low	17	0.13	0.09	0.68	0.52	0.06	0.01	0.14	0.11	0.68	0.89	2.93	3.14

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

Table 5. Continued

Change in the level of development	Samples	Government Effectiveness (max. = 5.00)		Investment rate as a share of GDP (%)		GDP per economically active population (PPP US$ per capita)		Subsoil assets (US$ per capita)		Total natural capital (US$ per capita)	
1990-2010		**2009**		**1990**		**1990**		**1994**		**1994**	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
High	17	1.71	1.69	19.36	17.86	3071.09	2663.51	80.00	30.00	5420.00	5300.00
Moderate	17	2.58	2.69	24.70	23.63	10316.20	9738.46	1233.33	690.00	6658.75	6810.00
Low	17	3.06	3.11	22.80	22.99	24163.79	22040.50	3168.00	2630.00	10702.00	12110.00

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

Table 6. Natural resource abundance and change in the level of development during the period 1990-2010: Africa

Change in the level of development	Samples	Share of primary product exports in GNP		The ratio of sum of imports and exports to GDP		Point resource exports (fuels and minerals) as a share of total exports		Secondary school enrolment rate		Fraction of the population speaking a major European language as first language (English, German, French, Spanish, or Portuguese)	
1990-2010		1990		1970-1989		1990		1970			
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
High	9	0.13	0.13	0.50	0.50	0.07	0.07	0.02	0.01	0.00	0.00
Moderate	2	0.09	0.09	1.00	1.00	0.06	0.06	0.02	0.02	0.05	0.05
Low	1	0.21	0.21	0.56	0.56	0.21	0.21	0.02	0.02	0.01	0.01

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

Table 6. Continued

Change in the level of development	Samples	Rule of Law (max. = 5.00)		Government Effectiveness (max. = 5.00)		Investment rate as a share of GDP (%)		GDP per economically active population (PPP US$ per capita)		Subsoil assets (US$ per capita)	
1990-2010		2009		2009		1990		1990		1994	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
High	9	1.59	1.53	1.66	1.69	17.32	17.86	2902.74	2183.52	96.00	60.00
Moderate	2	2.74	2.74	2.80	2.80	30.37	30.37	9436.91	9436.91	1285.00	1285.00
Low	1	1.77	1.77	1.91	1.91	28.59	28.59	16147.86	16147.86		

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

Table 6. Continued

Change in the level of development 1990-2010	Samples	Total natural capital (US$ per capita) 1994	
		Mean	Median
High	9	5708.33	5885.00
Moderate	2	6775.00	6775.00
Low	1		

Sources: World Bank, World Development Indicators online; Sachs, J. D., & Warner, A. M., 1997 (cited in references); World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

3.2.　　　Integrating human capital (H), investment rate (I), institutional quality (I), and natural resource abundance (R): The HIIR index

Section 1.1. has treated human capital (H), investment rate (I), institutional quality (I), and natural resource abundance (R) as four <u>independent</u> factors. This section will examine the association between the <u>total</u> of these four factors, measured by the HIIR index, and long-run growth and development.

Is relatively rapid economic growth associated with relatively high score on the HIIR index? Table 7 provides a comparison of countries with high, moderate, and low average annual growth rates. The mean and median of the values of the HIIR index are compared. The evidence shows that relatively rapid economic growth is associated with relatively high score on the HIIR index in Europe but not in Africa and among OECD members, *vice versa*. The examples are Norway and Spain (see Figures 1 and 4). What explains this difference across regions? This point will be discussed further in Section 4.

The above finding leads to the following question: to what extent does this implication carry over to the indicator of human welfare and development? Is relatively large change in the level of development associated with relatively high score on the HIIR index? Table 8 provides a comparison of countries with high, moderate, and low change in the level of development. The mean and median of the values of HIIR index are compared. There is evidence that relatively large increase in the level of development have been associated with relatively small score on the HIIR index, *vice versa*. The examples are Niger and Namibia (see Figures 3 and 4).

Does the relationship between the HIIR index and the level of development differ across regions? Table 8 shows the evidence that there is no regional difference (the data

Table 7. The HIIR index and average annual growth rates during period 1990-2009

Region	Average annual growth rate 1990-2009	Samples	HIIR90 1990	
			Mean	Median
All regions	**High**	52	13.13	12.48
	Moderate	52	16.53	17.58
	Low	51	10.77	10.42
OECD members	**High**	12	18.93	20.73
	Moderate	16	20.54	20.12
	Low	6	17.77	19.75
Europe	**High**	10	22.42	22.42
	Moderate	17	19.91	19.79
	Low	4	16.41	16.41
Africa	**High**	11	9.48	9.20
	Moderate	12	9.92	9.66
	Low	22	5.34	5.92

Sources: World Bank, World Development Indicators online; World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

for Middle East and North Africa was unavailable) between African countries and OECD high income members.

Do four components of the HIIR index substitute each other? Table 9 provides a comparison of countries with high, moderate, and low natural resource abundance. The means and medians of the scores (on the scale of 0 (worst) – 10 (best)) of human capital, institutional quality, and investment rate are compared. The evidence shows that human capital, institutional quality, and natural resource abundance are complementary. However, the evidence shows that natural resource abundance and investment rate are neither complementary nor substitutes.

4.   DISCUSSION

Section 4 is organised as follows. Sections 4.1 and 4.2 explain the how the associations among the magnitude of the change in the level of development, growth rate,
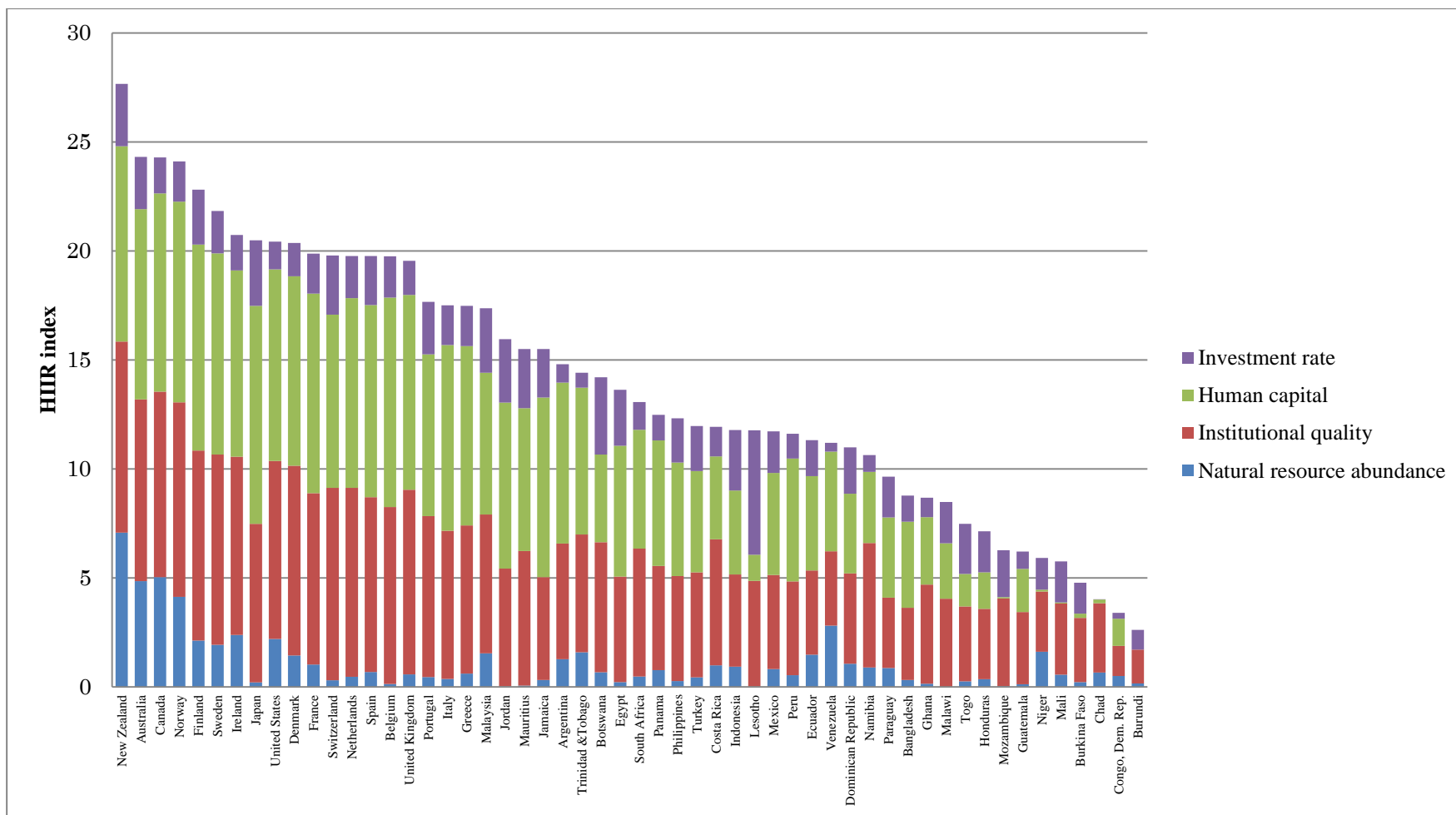
Figure 4. The HIIR index for year 1990. The values are on the scale of 0 – 40. Sources: World Bank, World Development Indicators online; World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online. Note: Total sample size is 54.

Table 8. The HIIR index and the level of development during period 1990-2010

Region	Change in the level of development 1990-2010	Sample	HIIR90 1990	
			Mean	Median
All regions	**High**	17	6.10	6.10
	Moderate	17	11.32	11.72
	Low	17	18.00	17.66
Africa	**High**	9	6.10	6.10
	Moderate	2	10.63	10.63
	Low	1		
OECD high income	**High**	5	11.97	11.97
	Moderate	1	19.07	19.05
	Low	0		

Sources: World Bank, World Development Indicators online; World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; World Health Organization, Global Health Observatory online; and World Bank, World Governance Indicators online.

Table 9. Natural resource abundance and human capital, institutional quality, and investment rate

Total natural capital (US$ per capita) 1994	Samples	Institutional quality (max. = 5.00) 1996		Secondary school enrolment rate 1990		Investment rate as a share of GDP (%) 1990	
		Mean	Median	Mean	Median	Mean	Median
High	18	6.77	8.01	7.05	8.62	1.72	1.65
Moderate	18	5.40	5.27	5.17	5.07	1.69	1.86
Low	18	4.75	4.63	4.30	3.52	2.18	2.09

Sources: World Bank, World Development Indicators online; World Bank, 1997 (cited in references); UN Development Programme, Human Development Report online; and World Bank, World Governance Indicators online.

natural resource abundance, and the HIIR index varies across regions, thus the need to examine the conditions associated with long-run growth and development for individual region rather than for all regions and countries. Sections 4.3 and 4.4 focus on Africa. Why Africa? African countries have relatively low values of GDP per economically active population and of the levels of development compared to other regions (see Figures 5 and
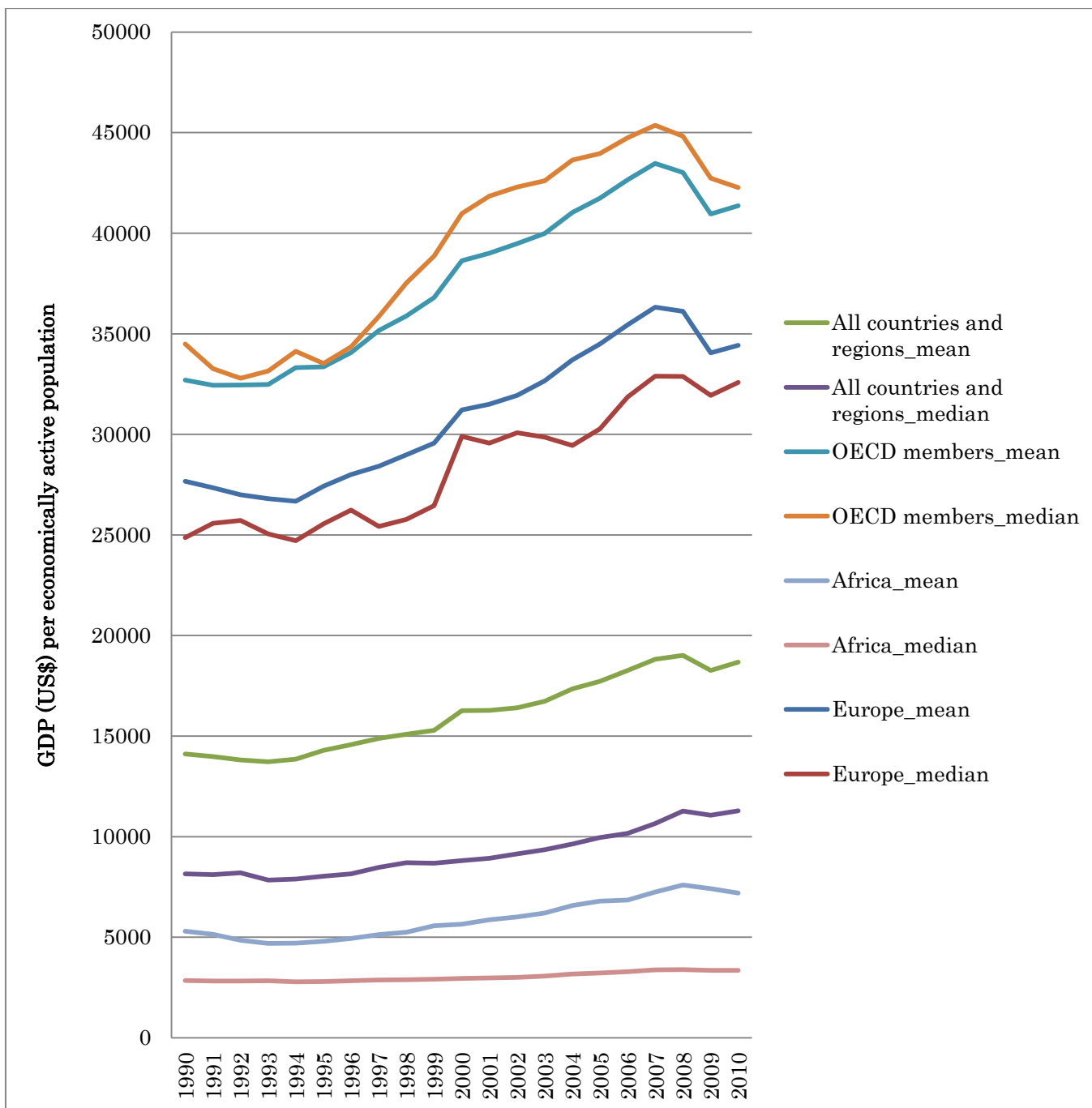
Figure 5. GDP per economically active population (aged 15-64) during the period 1990-2010. Source: World Bank, World Development Indicators online. Note: Total sample size ranges between 193-209. The samples vary each year, partly causing the rise and fall in the values of means and medians.

Figure 6. The level of development during period 1990-2010. The values are on the scale of 0 (worst) – 50 (best). Sources: World Bank, World Development Indicators online; UN Development Programme, Human Development Report online; and World Health Organization, Global Health Observatory online. Note: Total sample size ranges between 83-155. The samples vary each year, partly causing the rise and fall in the values of means and medians.
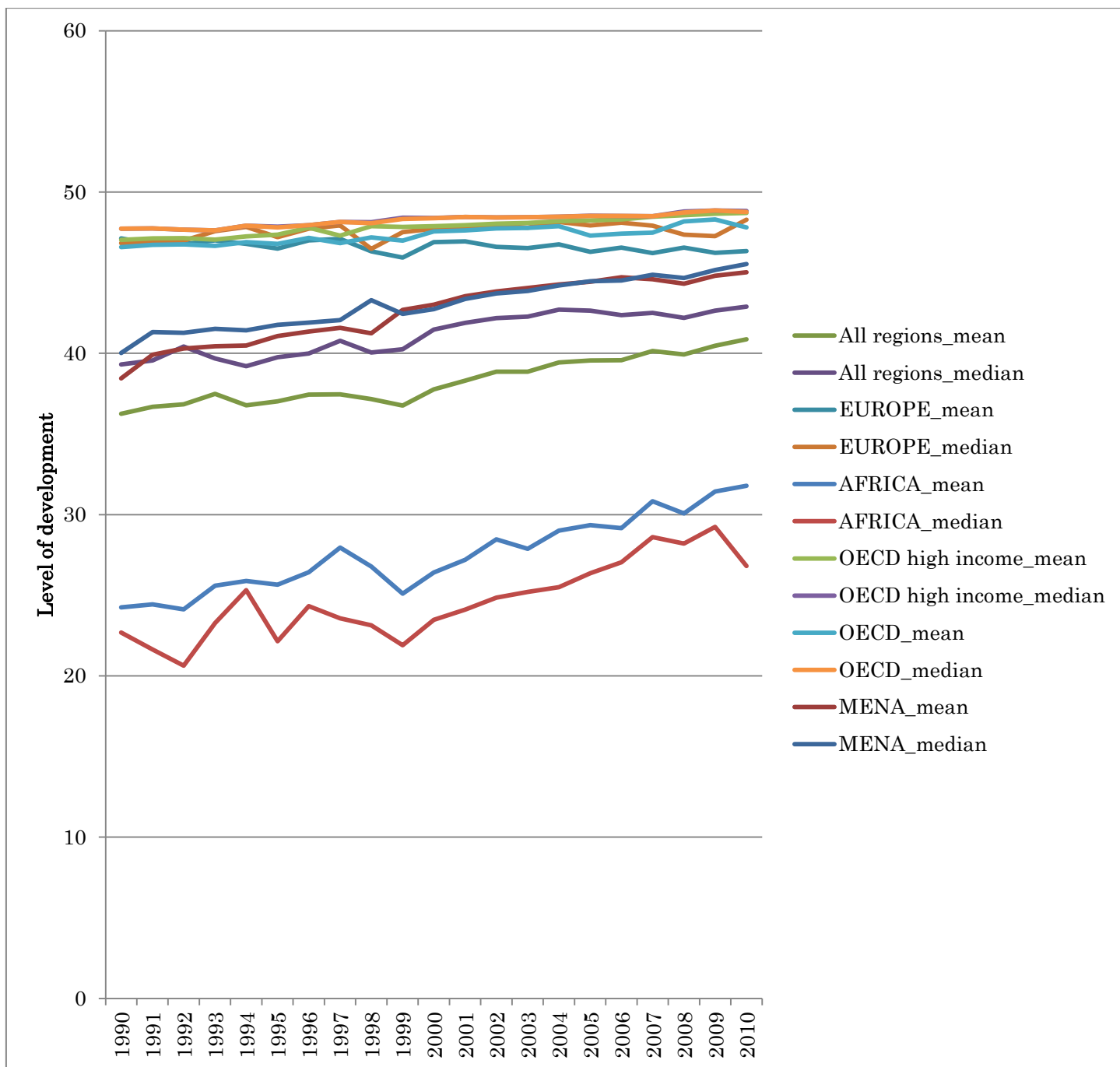
6). Given that the aim of this paper is to find some initial/past conditions associated with subsequent long-run growth and development, this research may have more significant implication for countries currently with relatively low levels of development and income per capita,, and those that have experienced relatively large increase in their levels of development. Note that the generalisations made in this section apply to only the countries (for which the data is available) included in the samples (Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Cote d`Ivoire, Egypt, Dem. Rep. Congo, Djibouti, Equatorial Guinea, Gabon, Guinea-Bissau, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Republic of Congo, Rwanda, Sierra Leone, Slovenia, South Africa, Sub-Saharan Africa (all income levels), Sub-Saharan Africa (developing only), Sudan, Swaziland, Tanzania, The Gambia, Togo, Tunisia, U.S.S.R., Zambia, Zimbabwe; total of 50 countries), not the entire Africa. Section 4.3 discusses the conditions associated with relatively large/small changes in the levels of development. Section 4.4 attempts to derive conditions that may be important for non-declining levels of development. Section 4.5 discusses the associations among aid, natural resource abundance, institution, economic growth, and human welfare and development. Section 4.6 discusses the implication of the association between the HIIR index and long-run development for all countries (for which the data is available; total of 54 countries).

4.1. The associations among growth rate, human capital, natural resource abundance, and the HIIR index: variation across Africa, Europe, and OECD members

Relatively high growth rates were found to be associated with relatively high scores on

natural resource abundance and on the HIIR index among European countries and OECD members but not among African countries. Similarly, the relatively high scores on human capital accumulation were found to be associated with relatively high growth rate in Africa but not in Europe and among OECD members. What explains these differences across regions? To answer this question, one should examine how the values of GDP per economically active population have changed over period 1990-2010 (see Figure 5). The means and medians of GDP per economically active population for all countries and regions (for which the data is available), Europe, OECD members, and Africa are compared. The evidence shows that European countries have relatively high levels of development, which have changed relatively rapidly during the period 1990-2010. In contrast, African countries have relatively low GDP per economically active population, which have increased relatively slowly. OECD members are in between. Africa, Europe, and OECD members have different values of GDP per economically active population, and experienced different growth rates. Depending on the values of GDP per economically active population and region-specific factors, the associations between growth rate and (1) human capital, and (2) natural resource abundance may vary.

4.2.   Association between growth rate and the magnitude of change in the level of development: variation across Africa, Europe, Middle East and North Africa, and OECD (high income) members

        Relatively high growth rates are associated with relatively small increase in the level of development in Africa but not in Europe and among OECD members. What explains this difference across regions? To answer this question, one should examine how the level of development has changed over period 1990-2010 (see Figure 6). The means and

medians of the levels of development for all countries and regions (for which the data is available), Europe, OECD high income, OECD members, Africa, and Middle East and North Africa are compared. The evidence shows that European countries, OECD high income members, and OECD members have relatively high levels of development, which have changed relatively little during period 1990-2010. In contrast, African countries have relatively low levels of development, which have increased relatively largely. Middle East and North Africa (MENA) are in between. Africa, Europe, MENA, and OECD (high income) members have different levels of development, and experienced different magnitudes of changes in the levels of development. Depending on the levels of development and region-specific factors, the association between growth rate and the magnitude of the change in the level of development may vary.

4.3.   Conditions associated with the magnitude of change in the level of development: Africa

4.3.1. Large increase in the level of development

4.3.1.1. Slow growth and low human capital accumulation: Guinea-Bissau and Niger

African countries that have experienced relatively slow growths have relatively low scores on human capital. Relatively slow growths are associated with relatively large increases in the levels of development. The examples are Guinea-Bissau and Niger.

Guinea-Bissau experienced relatively slow growth (average annual growth rate of 1.15%, which is in the bottom third) during the past two decades. It had relatively low accumulation of human capital (secondary school enrolment rate of 0.00% in the year 1970).

The other example is Niger. During the past two decades, Niger experienced relatively

slow economic growth (average annual growth rate of 1.18%, which is in the bottom third), and largest increase in the level of development (208.00%).

4.3.1.2. Low natural resource abundance: Mozambique

In Africa, relatively large changes in the levels of development are associated with relatively low scores on natural resource abundance. An example is Mozambique.

Mozambique experienced relatively large increase in the level of development (175.00%, which is in the top third) during the past two decades. It had relatively low natural resource abundance; its natural capital was worth US $1,130 per capita in the year 1994 (in the 2nd quartile).

4.3.1.3. Low score on the HIIR index: Niger

Relatively large change in the level of development is associated with relatively high score on the HIIR index. An example is, again, Niger. During the past two decades, Niger experienced the largest increase in the level of development (208.00%). Its 1990 score on the HIIR index was relatively low; 5.92, which was in the bottom quartile.

4.3.2. Small increase in the level of development
4.3.2.1. Fast growth and high human capital accumulation: Mauritius and Tunisia

African countries that have experienced relatively fast growths have relatively high scores on human capital. Relatively high growth rates are associated with relatively small increase in the level of development. The examples are Mauritius and Tunisia.

Mauritius experienced relatively fast economic growth (average annual growth rate of 5.33%, which is in the top third) during the past two decades. It had relatively high human capital accumulation (secondary school enrolment rate of 12.00% in the year 1970, which is in the third quartile).

The other example is Tunisia. During the past two decades, it experienced relatively fast economic growth (average annual growth rate of 4.40%, which is in the top third), and relatively small increase in the level of development (17.02%).

4.3.2.2. High natural resource abundance: Tunisia

In Africa, relatively small change in the level of development is associated with relatively high score on natural resource abundance. An example is, again, Tunisia. Tunisia experienced relatively small increase in the level of development (17%, which is in the mid-range) during the past twenty years. It had relatively high natural resource abundance; its natural capital was worth US$6,370 per capita estimated for the year 1994.

4.3.2.3. High score on the HIIR index: Namibia

Relatively small change in the level of development is associated with relatively high score on the HIIR index. An example is Namibia.

Namibia experienced relatively small increase in the level of development (22.91%, which is in the mid-range) during the past two decades. Its 1990 score on the HIIR index was relatively high; 10.63 on a scale of 0 (worst) – 40 (best), which was in the 2nd quartile.

4.4. Conditions for non-declining levels of development in Africa

As the above discussion has shown, the conditions related to non-declining levels of development depend on the relative magnitudes of the changes in the levels of development. The African countries currently with relatively high levels of development have experienced relatively small increase in the level of development, *vice versa* (see Figure 7). That is, the countries that have had relatively high levels of development two decades ago have increased their levels of development marginally compared to those that have had relatively low levels of development two decades ago. African countries that have increased their levels of development marginally have had high resource abundance, high scores on the HIIR index, large human capital accumulation, and experienced fast economic growth. Such marginal increases in the levels of development may have been due to investments being directed towards rather driving economic growth than improving the levels of development, as opposed to African countries that have increased their levels of development largely. These countries have had low natural resource abundance, low scores on the HIIR index, small human capital accumulation, and experienced slow economic growth. These countries tend to be poor (i.e. may have not had the money to invest in bolstering economic growth) and seem to have relied on some foreign aids (e.g. PRGF, MCC) to improve their levels of development, e.g. Mozambique and Niger. This point will be discussed further in Section 4.5.

Based on the above discussions, some initial/past conditions that may contribute in achieving the long-run, non-declining levels of development in Africa are deduced. For African countries that already have relatively high levels of development to increase their levels of development marginally, some initial/past conditions that may be important are to (1) have large total of human capital, investment rate, institutional quality, and natural
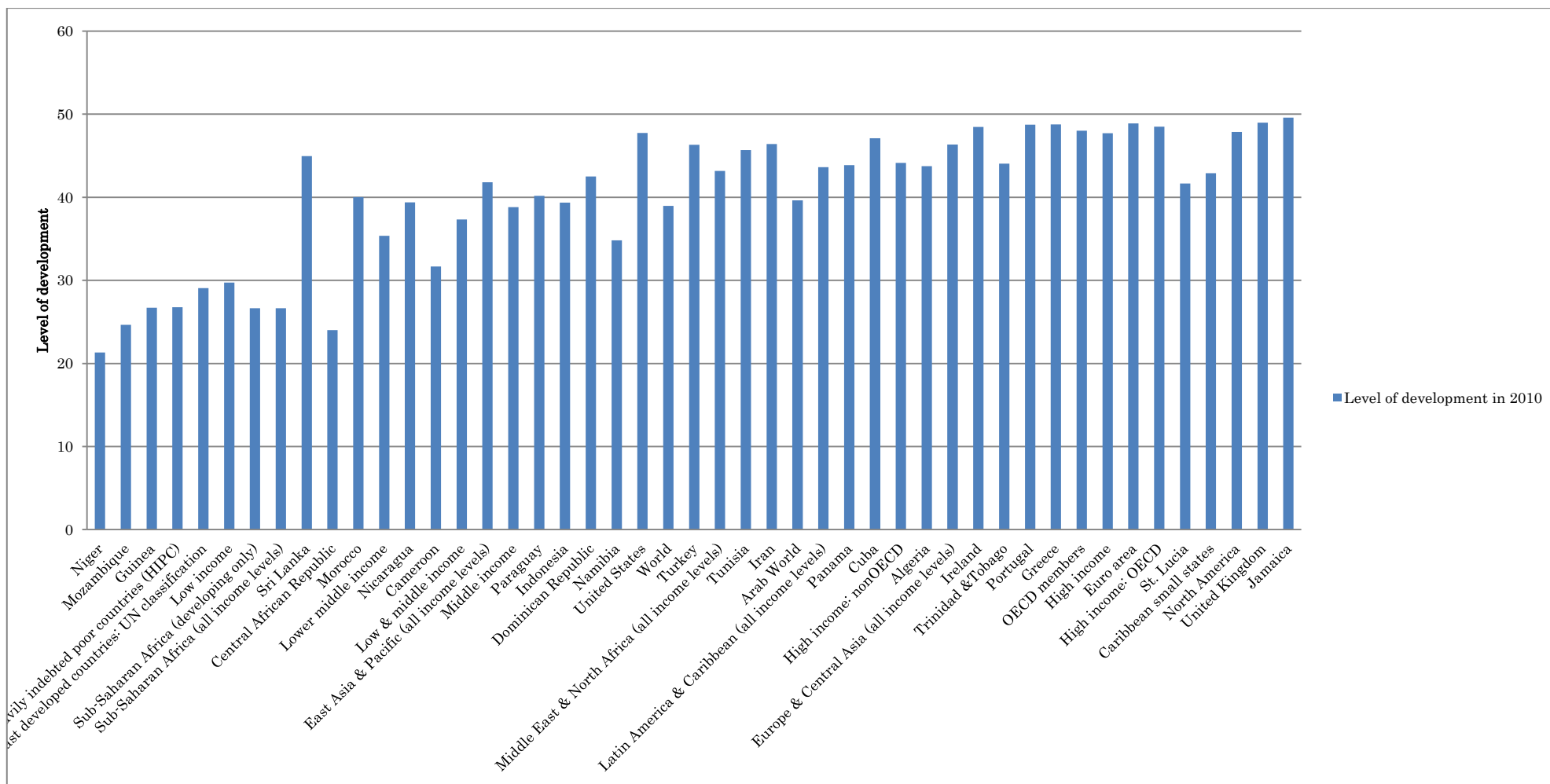
Figure 7. The level of development in 2010. The values are on the scale of 0 (worst) – 50 (best). The countries are in the same order as Figure 3. Sources: World Bank, World Development Indicators online; UN Development Programme, Human Development Report online; and World Health Organization, Global Health Observatory online. Note: Total sample size is 47.

resource abundance, and fast economic growth, and (2) invest in education and

infrastructure, and manufacturing and services (i.e. diversifying the economy), driving

the economic growth. For African countries that still have relatively low levels of

development to increase their levels of development dramatically (they tend to have small

total of human capital, investment rate, institutional quality, and natural resource

abundance, and experience slow economic growth), receiving and spending the foreign

aids to improve their levels of development may be one of the important points.

4.5. Aid and the poor

This thesis did not consider the role of aid in its data analysis. However, the above

discussions led to the realisation that aid seemed to play a role in improving the levels of

development in some cases. This section would discuss how the above discussions might

be extended by incorporating the role of aid through associating the findings of this thesis

with that of previous literature. This would be a necessary step leading to suggestions (i.e.

how to consider the role of aid) for future research to address the limitations of this

research.

Finding the ways to allocate an aid most effectively to reduce poverty has been the

focus following the recent proliferation of cross-country studies examining the effect of

aid on economic growth (Gomanee *et al.*, 2005). That aid cannot be targeted to the poor

is the underlying assumption of one answer. Consequently, countries should have good

policies to receive an aid. What are "good" policies? To answer this question, we must

understand the concept of institution. BB (2008) distinguish between two different

perspectives on institutions. Institutions are interpreted in two ways by analysts: "deep

and durable" characteristics of societies (Glaeser *et al.*, 2004) versus the reflection of

"changeable policy outcomes" (Rodrik *et al.,* 2004). The former perspective means institutions are considered as persistent constitutional variables, e.g. presidential systems versus parliamentary ones, or the specification of electoral rules. Policy-makers, for example, invest in human capital for public servants, uphold the rule of law, and fight corruption by formulating specific short-term "governance" policies within the framework of constitutional design. Wide range of policy outcomes (institutional proxies and otherwise (Persson and Tabellini, 2003, 2004)) are therefore determined by constitutional design. One way to determine whether the policies are "good" or "bad" is to use some indicators. An example is World Governance Indicator published by World Bank. This indicator takes a value on the scale of approximately -2.5 (worst) – 2.5 (best) and measures several dimensions of institutional quality, e.g. rule of law, control of corruption, government effectiveness, etc. Why should aid be allocated to those countries with good policies?

By allocating the aid to those countries with good policies, growth is achieved, which in turn reduces poverty (Collier and Dollar, 2002). Does this mean achieving growth is "good"? According to previous cross-country studies on resource curse, if natural resource abundance leads to rapid economic growth, it is a blessing. The opposite is a curse. However, this thesis goes one step further. It presents the evidence (for period 1990-2010) that in Africa, the countries that have experienced relatively slow economic growth have experienced relatively large increases in the levels of development, vice versa. Therefore, slow economic growth (i.e. the curse) can be "good" for such African countries. They tend to score low on the followings: level of human welfare and development; income per economically active population; human capital (or educational attainment), which is a driver of industrialisation; natural resource abundance (natural resource can be exploited to generate government revenues, which in turn can be invested

in education and infrastructure, driving the economic growth); and the HIIR index. They seem to have overcome such unfavourable conditions by receiving and spending foreign aids to improve their levels of development. What types of aid have they received? Countries with low levels of human welfare are assumed to have high levels of poverty, ceteris paribus. Most of the aids to the poorest countries targeting on addressing poverty or welfare is increasingly in the form of budget support. One example of effective aid is Poverty Action Funds under the HIPC initiative (Gomanee *et al.*, 2005). Niger is an example of a country qualified for enhanced debt relief under this initiative. Niger concluded an agreement with the Fund on a Poverty Reduction and Growth Facility (PRGF) (African Development Bank, 2004). The other example of effective aid is Compact signed by the US government's Millennium Challenge Corporation (MCC). Mozambique Compact worth $506.9 million ended in September 2013 and focused on improving sanitation, roads, agriculture, and the business regulation environment (Millenium Challenge Corporation, 2013).

What are other views on the impact of aid on the poor? I will discuss relevant papers here, but other general papers include Chenery and Ecksteing (1970), Chenery and Syrquin (1975), Griffin (1970), Levy (1987), Levy (1988), Papanek (1973), and Weisskopf (1972). Mosley *et al*. (1987) conclude that, based on cross-country regressions, growth rates are not raised by aid. Early literature on the effect of foreign aid is strongly criticised by Papanek (1972), who describes how simultaneity and measurement error lead to a range of potential problems. What raises/does not raise growth rates? Persson and Tabellini (2003, 2004) find that increased spending for special interests tend to be related to both presidential regime (vs. parliamentarian systems) and majoritarian electoral rule (vs. proportional representation). Such spending is at the expense of public goods that benefit a wider swathe of voters and lead to enhanced economic growth. Thus,

one of the reasons an aid has negative consequence (i.e. does not enhance economic growth) may be presidential regime and majoritarian electoral rule, as they may be associated with more spending of the aid for special interests, at the expense of public goods which benefit a wider swathe of voters. However, this thesis goes one step further. It presents evidence that Niger has experienced relatively large increase in the level of development while receiving an aid and growing relatively slowly (see Section 4.3.1.1.). Thus, the spending of the aid for programs geared at poverty reduction may have increased, benefiting a wider swathe of voters. This has occurred regardless of presidential regime and majoritarian electoral rule. Therefore, in countries that receive an aid, presidential regime and electoral rule may be "bad" for economic growth but "good" for long-run development.

In previous literature (e.g. Boone (1995), Mosley *et al*. (1987)) the measurements of relevant factors mentioned above are used to examine the impact of aid in the aid recipient country. The empirical evidence presented by Boone (1995) implies poverty in aid recipient countries is not primarily caused by capital shortage. He finds that the effect of aid on tax proxies and on measures of distortionary policies is insignificant but he does find that the size of government increases with aid. The increase in government consumption is equivalent to approximately three quarters of total aid receipts. In Boone (1995), and consistent with Mosley *et al*. (1987), he finds that in all countries the correlation between aid and growth is insignificant. What other associations are examined in other literature? BB (2008) argues that high score on an indicator of resource abundance (e.g. the one popularised by Sachs and Warner) dependence is associated with bad institutions. (As mentioned earlier, BB (2008) distinguishes between two interpretations of institutions; "durable constraints" and the "changeable policy outcome.") Bad institutions are in turn associated with slow growth. Boone (1995a)

examines measures of distribution as proxied by human development indicators. Or more accurately he relates the effectiveness of foreign aid programs to the political regime of recipient countries. If high scores on resource dependence indicator are associated with bad institutions, and the bad institutions of recipient countries or certain constitutional designs are related to the ineffectiveness of foreign aid programs, high scores on resource dependence indicator may be associated indirectly (or directly) with the ineffectiveness of foreign aid programs. Whether this gives rise to slow growth is unclear. This thesis goes one step further. It presents evidence that relatively low scores on resource abundance indicator are associated with relatively large increases in the levels of development, e.g. Mozambique. This implies that abundant natural resource may be associated with effective foreign aid programs.

4.6. The HIIR index and long-run development

What would the relationship between the HIIR index and the magnitude of change in the level of development imply? The initial expectation was that four components of the HIIR index would substitute each other, so the amount of the total of these four factors, rather than that of individual factors, mattered for long-run development. This was not the case, i.e. human capital, institutional quality, and natural resource abundance were complementary, not substitutes, and investment rate and other factors were neither complementary or substitutes. What would be the significance of introducing the HIIR index if the four constituents were not substitutes but complementary? The results and implications gained without introducing the HIIR index might have been sufficient to deduce the initial/past conditions associated with subsequent long-run development.

47

5.   CONCLUSION

This paper examined the relationships between natural resource abundance and (1) economic growth and (2) long-run development, and the total of human capital, investment rate, institutional quality, and natural resource abundance (measured by original index called the HIIR index) and (1) and (2). Data for period 1990-2010 was observed to examine these relationships. The work by (1) BB (2008) was extended by examining the relationship between the natural resource abundance and the level of development, and (2) Bulte *et al.* (2005) was extended by examining the long-run development, and additional indicators of human welfare and development. This paper also extended previous works by (1) examining the regional differences in long-run growth and development and the underlying factors that explain such differences, and (2) introducing the HIIR index. The contributions of this paper were the following findings. First, when regional differences were not accounted for, there was no evidence for the relatively resource-rich countries experiencing relatively fast economic growth in the past two decades. After accounting for regional differences, European countries and OECD members that experienced relatively fast growths were found to have relatively high natural resource abundance. This was not the case for African countries. African countries that experienced relatively fast growths had high human capital accumulation. Second, relatively rapid economic growth was associated with relatively high score on the HIIR index in Europe but not in Africa and among OECD members. Third, when regional differences were not accounted for, countries that experienced relatively fast economic growths experienced relatively small changes in the level of development. When regional differences were accounted for, the changes in the levels of development did not vary by growth rates among European countries. The OECD members that grew relatively fast

experienced relatively large increases in the levels of development. In contrast, the African countries that grew relatively fast experienced relatively small increase in the level of development. Finally, regardless of regional differences, countries that experienced relatively large changes in the levels of development had relatively low scores on natural resource abundance and on the HIIR index.

Depending on the values of GDP per economically active population and region-specific factor, the associations between growth rate and (1) natural resource abundance, (2) the HIIR index, and (3) human capital. Similarly, depending on the level of development and region-specific factor, the association between the magnitude of the change in the level of development and growth rate might vary.

For African countries that already have relatively high levels of development to increase their levels of development marginally, some initial/past conditions that may be important are to (1) have large total of human capital, investment rate, institutional quality, and natural resource abundance, and fast economic growth, and (2) invest in education and infrastructure, and manufacturing and services (i.e. diversifying the economy), driving the economic growth. For African countries that still have relatively low levels of development to increase their levels of development dramatically (they tend to have small total of human capital, investment rate, institutional quality, and natural resource abundance, and experience slow economic growth), receiving and spending the foreign aids to improve their levels of development may be one of the important points.

The limitations of this thesis is summarised as follows. First, not only the reflection of "changeable policy outcomes" but also "deep and durable" characteristics of societies may matter, i.e. aid should be allocated to those counties with not only good policies but also constitutional designs that determine a wide range of policy outcomes. The future research should examine the relationships among constitutional design, policy outcome,

aid, and the level of human welfare and development.

Second, achieving growth can be "good" but this does not imply that slow growth is "bad." In Africa, achieving growth can be "good" for countries with relatively high levels of development and income per capita as it is associated with relatively marginal increase in the level of development. These countries tend to have relatively abundant natural resource. Slow growth can also be "good" for those with relatively low levels of development and income per capita as it is associated with relatively large increase in the level of development. These countries tend to have relatively scarce natural resource. Therefore, the "curse" may not exist in the first place, or may be avoided or solved. One of the ways to avoid or solve the "curse" may be to receive and spend the foreign aids that target on addressing poverty or welfare in the form of budget support. The future research should examine the relationships among the amount of aid received and spent to address poverty or welfare, the form of aid, the level of human welfare and development, growth rate, and natural resource abundance.

Third, presidential regime (vs. parliamentarian systems) and majoritarian electoral rule (vs. proportional representation) causes an aid to have negative impact on growth but may have positive effect on long-run development. One of the reasons may be that they are associated with more spending of the aid for programs geared at reducing poverty, which benefit a wider swathe of voters, rather than with increased investment or spending to bolster economic growth. The future research should examine a mechanism through which aid, government investment or spending, and institutional context affect economic growth and long-run development.

Finally, abundant natural resource may be associated with effective foreign aid programs, increasing the levels of development. This association may be direct or indirect through the channels of constitutional design and of policy outcomes. The future research

50

should examine a mechanism through which natural resource abundance, institutional context, and foreign aid programs affect the long-run development.

REFERENCES

Acemoglu, D. (1995). Reward structures and the allocation of talent. *European Economic Review, 39,* 17-33.

African Development Bank. (2004). *Niger: HIPC Approval Document Completion Point Under The Enhanced Framework.* African Development Bank. Retrieved January 25, 2014, from http://www.afdb.org/fileadmin/uploads/afdb/Documents/Financial-Information/ADB-BD-WP-2004-79-EN-NIGER-HIPC-APPROVAL-DOCUMENT-COMPLETION-POINT-UNDER-THE-ENHANCED-FRAMEWORK.PDF

Atkinson, G., & Hamilton, K. (2003). Savings, growth and the resource curse hypothesis. *World Development, 31,* 1793-1807.

Auty, R. M. (2001a). *Resource abundance and economic development.* Oxford: Oxford University Press.

Auty, R. M. (2001b).The political economy of resource-driven growth. *European Economic Review, 45,* 839-846.

Auty, Richard M., Industrial policy reform in six large newly industrialized countries: The resource curse thesis, *World Development*, Vol. 22, No. 1 (1994), pp. 1 I-26.

Auty, Richard M. and David Evans, "Trade and industrial policy for sustainable resource-based development: Policy issues, achievements and prospects," Report GE94-50979 prepared for UNCTAD (Geneva: UNC-TAD, March 8, 1994).

Auty, Richard M., *Sustaining Development in Mineral Economies: The Resource Curse*

Thesis (London: Routledge, 1993).

Baland, J. M., & Francois, P. (2000). Rent seeking and resource booms. *Journal of Development Economics, 61,* 527-542.

Bandara, Jayatilleke S., An investigation of 'Dutch disease' economics with a miniature CGE model, *Journal of Policy Modeling,* Vol. 13, No. 1 (1991), pp. 67-92.

Benjamin, Nancy C., Shantayanan Devarajan and Robert J. Weiner, The 'Dutch' disease in a developing country: Oil reserves in Cameroon, *Journal of Development Economics,* Vol. 30 (1989), pp. 71-92.

Boone, Peter. "Politics and the effectiveness of foreign aid," Centre for Economic Performance Discussion Paper No. 272 (London: Centre for Economic Performance, London School of Economics and Political Science, December, 1995).

Brunnschweiler, C. N., & Bulte, E. H. (2008). The resource curse revisited and revised: A tale of paradoxes and red herrings. *Journal of Environmental Economics and Management*, in press.

Bulte, E. H., Damania, R., & Deacon, R. T. (2005). Resource intensity, institutions, and development. *World Development, 33*, 1029–1044.

Chenery, Hollis and Peter Eckstein. (1970). Development Alternatives for Latin America. *Journal of Political Economy, 78*(4), pp.966-1006.

Chenery, Hollis B. and Moises Syrquin, *Patterns of Development: 1950-1970* (Oxford: Oxford University Press, 1975).

Chenery Hollis, Sherman Robinson and Moshe Syrquin, *Industrialization and Growth: A Comparative Study* (New York: Oxford University Press, 1986).

Collier, P. and D. Dollar. (2002). Aid Allocation and Poverty Reduction. *European Economic Review*, 46:8, 1475-1500.

Dasgupta, P. (2001). *Human well-being and the natural environment.* New York: Oxford

University Press.

Davis, G. A. (1995). Learning to love the Dutch disease: Evidence from the mineral economies. *World Development, 23*, 1765–1779.

Easterly, W., Kremer, M., Pritchett, L., & Summers, L. (1993). Good policy or good luck. Country growth performance and temporary shocks. *Journal of Monetary Economics, 32*, 459–483.

Fardmanesh, Mohsen, "Dutch disease economics and the oil syndrome: An empirical study," *World Development,* Vol. 19, No. 6 (1991), pp. 711-717.

Gelb, Alan H., "Are oil windfalls a blessing or a curse? Policy exercises with an Indonesia-like model," Discussion Paper (Washington, DC: Development Research Department, Economics and Research Staff, World Bank, 1985).

Gelb, Alan H. and Associates, *Oil Windfalls: Blessing or Curse?* (New York: Oxford University Press, 1988).

Glaeser, E. L., La Porta, E., Lopez-De-Silanes, F., & Shleifer, A. (2004). Do institutions cause growth? *J. Econ. Growth, 9*, 271-303.

Gomanee, K., Girma, S., & Morrissey, O. (2005). Aid, Public Spending and Human Welfare: Evidence from Quantile Regressions. Centre for Research in Economic Development and International Trade, University of Nottingham.

Griffin, Keith. (1970). Foreign Capital, Domestic Savings and Economic Development. *Oxford Bulletin of Economics and Statistics, 32*, February, pp.99-112.

Hall, R., & Jones, C. (1999). Why do some countries produce so much more output than others. *Quarterly Journal of Economics, 114*, 83–116.

Harford, T., & Klein, M. (2005). Aid and the Resource Curse, The World Bank Group, Private Sector Development Vice Presidency, Note #291, Washington, DC.

Isham, J., Pritchett, L., Woolcock, M., & Busby, G. (2005). The varieties of resource

experience: Natural resource export structures and the political economy of economic growth. *World Bank Economic Review, 19*, 141–174.

Jensen, N., & Wantchekon, L. (2004). Resource wealth and political regimes in Africa. *Comparative Political Studies, 37*, 816–841.

Karl, T. (1997). *The paradox of plenty: Oil booms and petro-states.* Berkeley: University of California Press.

Kremers, Jeroen J. M., "The Dutch disease in the Netherlands," in J. Peter Neary and Sweder van Wijnbergen (Eds.), *Natural Resources and the Macroeconomy* (Cambridge, MA: The MIT Press, 1986), pp. 96-136.

Krugman, Paul, "The narrow moving band, the Dutch disease, and the competitive consequences of Mrs. Tatcher: Notes on trade in the presence of dynamic scale economies," *Journal of Development Economics,* Vol. 27 (1987), pp. 41-55.

Leite, C., & Weidmann, J. (2002). Does mother nature corrupt? Natural resources, corruption and economic growth. In G. Abed & S. Gupta (Eds.), *Governance, corruption, and economic performance* (pp. 156-169).

Levy, Victor. (1987). Anticipated Development Assistance and Temporary Relief Aid. *Quarterly Journal of Economics, 97*, pp.446-58.

Levy, Victor. (1988). Aid and Growth in Sub-Saharan Africa: The Recent Experience. *European Economic Review, 32*(9), pp.1777-95.

Lewis, Stephen R. Jr., "Primary exporting countries," in Hollis Chenery and R. N. Srinivasan (Eds.), *Handbook of Development Economics,* Vol. II (Amsterdam: Elsevier Science Publishers, 1989), pp. 1541-1600.

Lewis, Stephen R. Jr., "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), pp. 157-177.

Mehlum, H., Moene, K., & Torvik, R. (2006). Institutions and the resource curse. *The Economic Journal, 116*, 1–20.

Mehlum Mehlum, H., Moene, K., & Torvik, R. (2002). Institutions and the resource curse. Working Paper, Department of Economics, University of Oslo, Oslo.

Mihashi, R., & Yarime, M. (2013). Natural Resource Abundance and Human Development: Empirical Evidence for Period 1990-2010. 47th Annual Conference of the Canadian Economics Association. Mimeo.

Mihashi, R., Yarime, M., Akiyama, T., Li, J.(2013). Inclusive Capital and Human Development: Integrating Human and Natural Capitals. 10thInternationalConference of the European Society for Ecological Economics.

Millenium Challenge Corporation. (2013). *Mozambique Compact*. Retrieved January 25, 2014, from Millenium Challenge Corporation: http://www.mcc.gov/pages/countries/program/mozambique-compact

Mosley, Paul, John Huson, & Sara Horrell. (1987). Aid, the Public Sector and the Market in Less Developed Countries. *Economic Journal, 97,* September, pp.616-641.

Papanek, G.F. (1972). The Effect of Aid and other Resource Transfers on Savings and Growth in Less Developed Countries. *Economic Journal*, *82*(327), pp.934 951.

Papanek, Gustav F. (1973). Aid, Foreign Private Investment, Savings and Growth in Less Developed Countries. *Journal of Political Economy, 81*(1), pp.121-130.

Persson, R., & Tabellini, G. (2003). *The Economic Effects of Constitutions: What do the Data Say?* Cambridge, MA: MIT Press.

Persson, T., & Tabellini, G. (2004). Constitutional rules and fiscal policy outcomes. *Am. Econ. Rev., 94*, 25-46.

Pezzey, J. (1989). Economic analysis of sustainable growth and sustainable development.

Environment Department Working Paper No. 15, World Bank; Washington, DC.

Robinson, J. A., Torvik, R., & Verdier, T. (2006). The political foundations of the resource curse. *Journal of Development Economics, 79*, 447–468.

Rodrik, D., Subramanian, A., & Trebbi, F. (2004). Institutions rule: the primacy of institutions over geography and integration in economic development, *J. Econ. Growth, 9,* 131-165.

Roemer, Michael, "Dutch disease in developing countries: Swallowing bitter medicine," in Mats Lundahl (Ed.), *The Primary Sector in Economic Development* (London: Croom Helm, 1985), pp. 234-252.

Ross, M. L. (2001). Does oil hinder democracy? *World Politics, 53*, 325–361.

Sachs, J. D., & Warner, A. M. (1997). Natural resource abundance and economic growth. Working Paper Series WP 5398, NBER, Cambridge.

Sala-I-Martin, X., & Subramanian, A. (2003). Addressing the natural resource curse: An illustration from Nigeria. Working Paper 9804, NBER, Cambridge.

Sokoloff, K. L., & Engerman, S. L. (2000). Institutions, factor endowments and paths of development in the new world. *Journal of Economic Perspectives, 14*, 217–232.

Struthers, John J., "Nigerian oil and exchange rates: Indicators of 'Dutch disease'," *Development and Change,* Vol. 21, No. 2 (1990), pp. 309-341.

Torvik, R. (2002). Natural resources, rent seeking and welfare. *Journal of Development Economics, 67,* 455-470.

van Wijnbergen, Sweder. (1984). The 'Dutch disease': A disease after all?, *Economic Journal, 94*, pp. 41-55.

Weisskopf, Thomas E. (1972). The Impact of Foreign Capital Inflow on Domestic Savings in Underdeveloped Countries. *Journal of International Economics*, pp.25-38.

World Bank. (1997). Expanding the measure of wealth: Indicators of environmentally sustainable development. Environmentally sustainable development studies and

monographs series, no. 1