Does the Resource Curse Affect Education?

An Empirical Analysis of Oil Wealth and Public Education Spending, 1980–2006

Levon Marsland

Master's thesis in Globalization

Spring 2011

Acknowledgements

First and foremost, I would like to express my gratitude to Dr. Indra de Soysa for his guidance, insight and unfailing enthusiasm throughout, as well as his patience in repeating explanations as I stumbled through the magical world of multivariate regressions. I would also like to offer thanks to Dr. Fulvio Castellacci at the Norwegian Institute of International Affairs (NUPI) for his helpful suggestions in the early stages of this project. I am grateful to the Armenian General Benevolent Union (AGBU) and the Tekeyan Cultural Association of Detroit whose financial assistance was crucial in enabling me to continue my studies during a difficult time.

Last but not least, I want to thank Marie for her support and patience, and above all her ability to bear the innumerable negative externalities resulting from cohabitation with an unfinished Master's thesis and its somewhat bedraggled author.

Trondheim, June 5, 2011

Levon Marsland

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION

Globalisation, caused by increasing trade and investment, is debated as either a saviour or a villain for developing countries. Within this context, two factors have the potential to condition a country's encounter with globalisation – their natural wealth and their policy towards human capital. Globalisation will increase the demands for extractable resources, and many places that have an abundance of these resources will either benefit or fail depending on how they deploy this wealth in their societies. How countries manage their natural wealth and invest in human capital will be vital to whether countries either reap the benefits – or suffer the consequences – of globalisation. A number of empirical examinations of long-term growth rates have shown that countries, rich in natural resources, are among the poorest economic performers (Sachs & Warner, 1995, 1997, 2001; Auty, 2001; Gylfason, Herbertsson, & Zoega, 1999; Ross, 1999). This poor trend in growth is commonly referred to as "the natural resource curse". This apparent paradox goes against classical economic wisdom, which views natural resources as an important factor of production providing countries – rich in those resources – a key advantage that should translate into economic expansion and wealth creation. Indeed, recent studies have challenged the idea of a resource curse altogether, arguing that natural resources are in fact good for economic growth and questioning past findings of a negative correlation (Brunnschweiler, 2008; Brunnscheiler & Bulte, 2008; Alexeev & Conrad, 2009). As a result, the topic has re-emerged as a controversy in the political science and economics literature. This study departs from the focus on growth, which is often volatile and have differing social impacts in terms of welfare, to look at education spending, which is a longer-term investment in developing human capital.

Aside from the debate over growth rates, natural resources have also been argued to have other direct consequences for development through the negative impacts of mechanisms like civil war, corruption, undemocratic regimes, poor governance and education. In view of this, and in response to a seeming preoccupation with economic growth in the literature, this study concerns itself with the direct development impact of natural resources through its relationship to one of the most important factors in today's global economy – human capital. More specifically, it investigates how natural resource dependence may influence a country's development prospects by affecting government decisions to invest in educational provision.

1.1 Rational for study

The education level of a country's population is regarded as one of the most important determinants of its development. Since the 1980s, researchers in macroeconomics have taken on a more long-term outlook on growth, recognising that it is *long-term* growth rates that decide a country's prosperity (Barro, 1996; Romer, 1986). Simultaneous to this change, growth theory evolved with the emergence of endogenous growth models and their focus on technological advancement through increased human capital stocks, research, and improvement of methods and systems of production (see Romer, 1990; Lucas, 1988). The globalisation of production and capital, and the ever decreasing costs and time-scales of transportation, has meant that investment is increasingly dictated by less moveable production factors. In this context, an educated population and capable workforce has become the most important comparative advantage in the new global knowledge based economy (Ashton & Green, 1996). As a result, investment in human capital – especially education – is extremely important in facilitating a country's long-term economic growth. Consequently, government actions and policy decisions are expected to take a forward thinking approach by investing in educational improvement as a means to improving future development and prosperity. Education, while always important, has today taken on added significance for economic development. One could even argue that a country's human capital stocks – and not past or current growth rates – are perhaps the best indicator we have of a country's future development and prosperity.

As part of a body of literature on the resource curse a number of scholars have argued that human capital suffers as a result several mechanisms triggered by natural resource wealth. To support this there is some empirical evidence that resource rich countries appear to perform worse in promoting human capital accumulation through education (Gylfason, 2001; (Birdsall, Pinckney, & Sabot, 2001; Kronenberg, 2004). These studies have emerged in the context of a wider body of research that has sort to explore the variety of negative impacts that natural resources may have for a country's development, and has without doubt benefited from the input of political scientists to the existing economic literature. In this regard, explanations for the curse focus on economic and political negative externalities caused by natural resource abundance. These externalities have been referred to as the transmission channels by which abundance in natural resources is considered to retard development (see Gylfason, 2004; Papyrakis & Gerlagh, 2004). These include: rent seeking and corruption (Damania & Bulte, 2003; Shaxon, 2007), civil war and conflict (Collier & Hoeffler, 1998,

2005; Ross, 2004); poor quality institutions (Mehlum, Moene, & Torvik, 2006), poor quality governance (Iimi, 2007), a lack of democracy (Ross, 2001a), social inequality (Gylfason & Zoega, 2002), poor investment rates (Papyrakis & Gerlagh, 2004), oligopolistic capitalism and non-developmental policy making (Auty, 1997), high poverty and low levels of human development (Ross, 2001b), and poor levels of human capital through education (Gylfason, 2001a). Gylfason explains this by suggesting that governments in resource rich countries tend to deprioritised education. He also finds that poor education as one of the most important channels by which the resource curse on growth is transmitted, possibly even accounting for close to half of the negative impact of natural resource externalities on growth (Gylfason, 2001a, p. 856). Poor education then, has thusfar been viewed as one of a number of explanations for the ultimate concern of most scholars in the resource curse literature, that being the poor growth rates of the economies of resource rich countries[1]. Education then, has tended to be reduced to the status of explanatory variable and indirect tranmission mechanism.

Given the obvious vast importance of education for development, it would seem imperative to explore the relationship between natural resources and education in more detail. The theoretical mechanisms by which natural resource abundance can negatively impact on education are several and will be discussed in more detail in section 3. Such mechanisms are, however, mediated by government policy and investment decisions, indicating that any adverse effect of natural resources is not inevitable. This is supported by the experiences of Norway and Botswana, which have successfully translated their natural resource wealth into economic growth, good levels of education and improved living standards. Key to their success has been good policy measures and strong institutions that facilitate good governance (Gylfason, 2004). More commonly, however, the literature points to a tendency for corruption and sloth in government policymaking to prevail among countries rich in natural resources.

There are a number of reasons for concentrating on education, the principal being that while some studies have found a trend of poor long-term growth rates among resource dependent countries, there also appears to be some evidence that resource dependent countries tend to be worse at converting any increase per capita GDP into the development outcomes that are surely the end objective of economic development – rather than growth in itself. One

[1] With the exception of those coming to the topic from peace and conflict studies who place civil war and conflict as their ultimate dependent variable.

explanation for this is that economic growth in resource dependent countries tends not to be based in endogenous factors like human capital accumulation and technological innovation. In other words, such countries have managed to achieve growth without having to first invest in the domestic foundations of growth that would be the case in countries lacking natural resources. According to this idea, growth based on exogenous factors – such as high commodity prices – will always be unsustainable, unless the growth is used to fund investment in human capital which promotes endogenous growth (Ranis, Stewart, & Ramirez, 2000).

In this context it is important to ask the questions: does the available data actually demonstrate a deprioritisation of education in natural resource dependent countries? What are the potential explanations? and, can the curse be combated with other factors?

1.2 Approach and Research Question

This paper builds on existing empirical studies by Gylfason (2001a), Birdsall et al. (2001), and Kronenberg (2004) that have made examinations of the relationship of natural resources to education. This study, however, treats education as both a factor fundamental to development and as a development outcome in itself, and not just as a factor that influences growth. The first objective of the study then will be to explore whether natural resources are in fact correlated with a reduced commitment to education by governments. The second objective will be to assess the potential for improvements in governance and institutional quality, and economic liberalisation to mediate between the natural resource curse and education spending. Important theoretical and methodological issues related to the resource curse debate are also addressed. It is hoped therefore, that the present study will contribute to the wider debate on the role of natural resources for development and demonstrate the benefits of moving away from a fixation on growth studies towards trying to better gauge the more fundamental development impact of natural resources and resource dependence.

The advantages of studying the resource curse from this perspective are several: 1) a good deal of research has already been carried out to establish the link between natural resource abundance and low growth rates, and the hypothesis has been well established. A body of literature has recently emerged questioning the claims of a negative relationship between natural resources and economic growth, and has forwarded valid arguments against some of the evidence published regarding the negative correlation between the two (see Brunnschweiler, 2008; Alexeev & Conrad, 2009; Brunnscheiler & Bulte, 2008; Ding & Field,

2005). The lack of consensus on the topic is not helped by problems particular to growth studies that may reduce their explanatory potential. Subsequent studies will do better by seeking to probe the substantive direct impact of natural resources on development; 2) Economic growth is not always a good indicator of wellbeing or human development (Sen, 1998). This problem may or may not be more pronounced in resource dependent countries. According to theoretical advances in the concept of sustainability, natural resources are increasingly conceptualised as natural capital that is finite. Under this conceptual framework all types of capital should be utilised responsibly and used to invest in human capital through educational provision. So even if natural resources were shown to bring about growth, this is insufficient to conclude that natural resources are positive for development, since depletion of natural capital is not contemplated in growth statistics; 3) Educational performance also represents a future growth and development indicator as it increases human capital stocks. Under endogenous growth theory; long-term growth relies heavily on human capital accumulation. According to such arguments, commitment to education is one of the best indicators of the ability and willingness of a government to enact good policy measures.

1.3 Outline

In the following chapters, it is argued theoretically that there exist a number of factors that may reduce investment in education in resource dependent countries. Empirical evidence is then presented that oil dependent countries tend to spend less on education and appear to be victims of the curse, while there appears to be less evidence of a negative relationship between investment in education and dependence on non-fuel minerals. Further results – focussed on how political and policy changes may mitigate or exacerbate the negative correlation between oil and education – show that governance and institutional quality are important mitigating factors. In fact, well governed countries appear to use their oil for the benefit of education. Other findings suggest that economic openness in oil dependent countries is negative for education spending suggesting that economic liberalisation policies may not represent a quick fix for the resource curse (at least for education).

The thesis is structured as follows: Section 2 discusses the empirical basis for a natural resource curse, the historical evolution of the hypothesis and the basis for its present application to education. Section 3 describes why natural resource dependence could cause lower investment in education by focussing on how political decisions regarding investment may be affected by natural resources through a number of transmission mechanisms. Section 4 explains the research design for the current study including a methodological discussion on

how best to measure resources in regression models – an issue at the forefront of the resource curse debate. Section 5 presents the ensuing results and further discussion of the principal findings. Section 6 concludes.

2. EMPIRICS AND BACKGROUND TO THE RESOURCE CURSE

The following chapter provides an overview of some of the principal empirical findings that contributed to the establishment of the resource curse hypothesis. It then goes on to chart the evolution of thinking regarding natural resources and development, describing how the curse is being increasingly understood within the wider framework of sustainability and in relation to human capital and education. The chapter concludes by summarising the findings of a series of empirical studies that contradict the resource curse hypothesis, while suggesting potential implications for the present study.

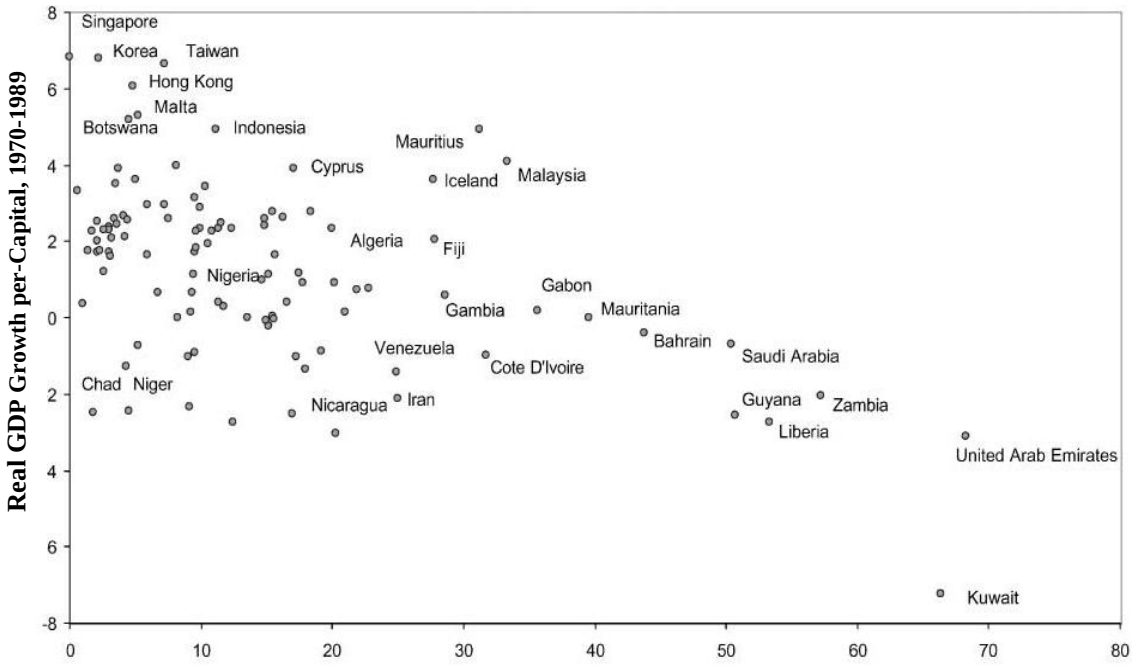
2.1 The Empirical Basis for a Natural Resource Curse

Sachs and Warner (1995) found natural resource abundance – measured as a high ratio of natural resource exports to GDP in the base year 1971 – to be negative for growth over the period 1971 – 1989. This finding was robust even when controlling for other variables important for growth. Results in Leite and Weidermann (2002) supported this finding, as did Gylfason et al. (1999) who looked at a sample of 125 countries. Auty (1997) using a sample of 85 countries found that natural resource poor countries showed growth rates that were more than double those of resource rich countries over the period 1960 – 1990 even allowing for the effect of country size. Gelb et al. (1988), in one of the most thorough studies of the resource boom of the 1970s, found that growth rates of the period 1971 – 1983 (this included the downturn as well as the boom) were not only below those predicted by neoclassical growth models, they were in fact below the average of developing countries during the 1960s, the period before the resource boom. Gelb argued that countries that had appeared to benefit from the resource boom did not show average growth rates that were higher than would have been predicted in the absence of the boom.

Figure 1 is taken from Sachs & Warner (2001). It shows a scatterplot of natural resource export intensity along the x-axis and real per-capita growth between 1970 and 1989 along the y-axis. The chart shows a trend of declining per-capita growth rates as the share of natural resources in exports increases, while there are a number of exceptions – notably Iceland, Malaysia and Mauritius. The chart does show however, that the fastest growing countries

over the period were all resource poor, while none of the highly resource dependent exporters managed to achieve high rates of growth. This trend then is the basis for the hypothesis for a resource curse on growth.

Figure 1. Growth and natural resource abundance 1970-1989



Source: **Sachs & Warner (2001)**

2.2 Roots and Evolution of the Resource Curse Hypothesis

While the term "natural resource curse" emerged relatively recently, scholars were studying the phenomenon much earlier. In fact, Adam Smith demonstrated an early scepticism to mining when he wrote:

> *Projects of mining, instead of replacing capital employed in them, together with ordinary profits of stock, commonly absorb both capital and stock. They are the projects, therefore, to which of all others a prudent law-giver, who desired to increase the capital of his nation, would least choose to give any extraordinary encouragement.*
>
> (Smith, 2001 [1776])

Although Smith was primarily discussing here the case of precious metals, his attitudes to mining in general were that it was a much less useful activity than was agriculture. He noted

that the profitability of mining was dependent on scarcity. So the production of such commodities was doomed to be less and less profitable because its price would be dictated by the richest, most efficient and profitable mines (Smith, 2001 [1776]). He argued that the value of agricultural products was absolute as opposed to the relative value of mined commodities. This was presumably because, in Smith's time, food was less likely to be transported great distances and still be profitable.

More modern examinations of natural resources studied them from the point of view of the overall development of nation states. Dependence on natural resources was used to explain the poor economic performance of Latin American economies during the 20th century. The mineral producing economies of the region had suffered the impact of a collapse in world commodity prices during the interwar period. After WWII, economists from the region (notably Raul Prebisch) argued for the existence of a systematic problem for Latin America's resource dependent economies. By historically tracing world commodity prices Prebisch (1950) found that prices of primary commodities fell faster than those of manufactured goods. He argued that since poor countries from the "periphery" tended to be net natural resource exporters, and net importers of manufactured goods from the rich "core" countries, that uneven development was built-in to the world economic system. Rooted in dependency theory – although not himself a Marxist – Prebisch's ideas as well as important contributions from other economists working at the Economic Commission for Latin America (ECLA), gave rise to the import substitution model that dominated Latin American economic policy for the following three decades.

Prebisch made an important contribution to the understanding of the development trajectories of natural resource dependent economies, as well as to wider theories of development. However, empirical studies of the post-war period have shown that his declining terms of trade explanation does not fully account for the poor performance of resource dependent economies (Sachs & Warner, 2001, p. 831). In fact Prebisch's findings were subsequently brought into question by evidence that the greatest drop in primary commodity prices occurred with those commodities that were mainly exported by developed countries; while those primarily exported by developing countries remained largely stable (Rosser, 2006, p. 14).

The ISI development model that was supposed to overturn the problems associated with primary commodity led development, was also found wanting in the long-run, culminating in

the debt crisis of the 1980s. The crisis led to the near collapse of the economies of the Latin American region and ironically left most of them even more dependent on their natural resources. The apparent bafflement of economists regarding the poor growth performance of resource dependent economies, perhaps had a hand in the coining of the term "resource curse" as a less than scientific explanation for the resources paradox.

Other attempts by economists to explain these poor growth rates included: the inherent instability of commodity markets (Nurske, 1958; Levin, 1960; and Van der Ploeg & Ploehekke, 2009), where painful periods of recovery from periodic commodity price crashes were seen to negate the benefits derived from the proceeding period of growth; the tendency for natural resource production to occur in enclaves preventing linkages with the wider economy (Hirschman, 1958); and Dutch Disease[2] (Corden & Neary, 1982; Bruno & Sachs, 1982).

While these economistic explanations are still considered to hold some explanatory power, a growing body of research has emerged questioning their ability to fully account for the trend of poor growth among resource dependent economies. For instance, research has also shown that the impact of commodity price fluctuations is perhaps more ambiguous than previously thought (Behrman, 1987), and that Dutch Disease can be combatted by sound economic policy (Usui, 1997; Larsen, 2004). Furthermore, such explanations have been shown wanting in cross-country empirical studies into the poor economic performance of resource dependent countries (Mikesell, 1997). Gelb et al. (1988), in a report on the natural resource boom and bust of the 1970s and 1980s, although sighting price fluctuations and elements of Dutch disease as contributing factors, concluded that bad government policy appeared to be the principal culprit. This was often because of over optimism and sometimes political pressure to satisfy interest groups (Gelb et al., 1988, pp. 139-141).

In this vein, more and more economists and non-economists have since begun to look to political economy theories to elucidate further regarding the trend in poor economic performance of natural resource dependent economies. Any resource curse then is increasingly regarded as being caused through the mechanism of policy failure and unproductive or destructive behaviour, and less as the result of the inherent properties of

[2] Dutch disease is the rise in the real exchange rate of countries with resources relative to trading partners. This means that resource exports affect the competitiveness of other tradable sectors, which can affect growth and long-term development prospects.

natural resources that cause unavoidable exogenous economic distortions (see Gelb et al., 1988; Auty, 2000, 2001b; Torvik, 2002 as good examples of this trend in thinking).

The profits available from the exploitation of natural resources are undeniable, as is their potential for creating rapid growth – at least in the short term – as well as providing governments with much needed revenue from rents captured through taxation. It is also clear that many of the economic distortionary pressures can be combated through prudent policy. Despite this, the negative correlation between natural resource dependence and successful economic development appears to persist. Explanations for the poor performance of resource dependent economies have, therefore, shifted to reflect a more nuanced view of the internal political and societal dynamics and their interaction with resources. Such efforts have also sort to explain diverging experiences of natural resource driven economies by studying differences in patterns of resource rent allocation and investment.

2.3 Natural Resources and Sustainability: the Role of Human Capital

Good levels of saving and investment are seen as essential to bring about sustained economic growth. As such, the generally poor growth performance of natural resource dependent economies can be partially explained by the low savings and investment levels that are common to resource dependent economies. Papyrakis & Gerlagh (2004) suggest that poor investment rates may be the most marked link between natural resources and poor growth rates. In explaining the mechanisms that translate resource abundance to low investment and saving rates, Gylfason & Zoega (2006) argue that natural resource exploitation simultaneously reduces the need for capital investment, as this is replaced by the profits that go to resource owners. As a result, interest rates drop causing a reduction in saving and investment.

Other explanations focus on the ability of governments to manage and utilise resource rents efficiently. Genuine, or net, savings is a measure of sustainable development under a softer interpretation of sustainability. Under this approach, revenues obtained from natural resource extraction are not included as part of a country's capital income without correspondingly reducing the country's overall natural capital stocks. This contemplates a country's total capital stocks, which also includes human capital as well as produced capital and natural capital. According to this system, a country can convert one kind of capital into another and be considered to be developing sustainably, so long as the total capital stocks of the country are not reduced. Given that natural capital is difficult to create, the obvious route to

sustainability would be to use both natural and produced capital to invest in human capital. The clearest way of doing this would be to invest in education.

One of the features of resource driven economies seems to be that natural capital is converted into produced capital, which is then used to fund consumption rather than invested (Mikesell, 1997), thus diminishing a country's total capital stocks. This could occur in the private sphere where resource rents are concentrated in the hands of a wealthy few and go to fund lavish lifestyles. On the other hand, in the public sector, governments may use resource rents to pay public wages of a bloated bureaucracy, or fund a large military rather than investing in education, or infrastructure. Atkinson & Hamilton (2003) point out that poor growth performance in resource rich countries is linked to government resource rents being spent unsustainably in this way, with low rates of genuine saving. They provide some evidence that governments that invest rents towards future – non resource related – development, such as investment into human capital accumulation, tend to be better at avoiding the resource curse.

In an empirical study of long-term growth trends, Ranis et al. (2000) found that investment in human development – measured as health and education – is *always* a necessary precondition to sustained economic growth. They found that countries that experienced periods of growth that were not accompanied by investment in human development could not sustain growth. Countries that invested in human development outcomes, either prior to, simultaneous to, or immediately after the onset of growth were much better at sustaining their growth. Their explanation was that growth and investment in human development creates a virtuous self-perpetuating cycle. Failing to invest in human development inevitably leads to a vicious cycle manifested as periodic economic stagnation accompanied by poor levels of human development (Ranis et al., 2000, pp. 208-213). This seems particularly applicable to resource rich countries where volatile commodity markets can cause boom and bust cycles.

Those governments that, instead of making the kind of investment described above, have utilised resource rents to sustain general government consumption (e.g. public wages) appear to have experienced the curse far worse (Atkinson & Hamilton, 2003, p. 1804). Neumayer (2004) found some evidence in support of this claim and found resource abundance to be negatively correlated with net savings. Genuine saving is being increasingly used as a framework in which to interpret the resource curse (see Dietz, Neumayer, & de Soysa, 2007; Auty, 2007) and possibly represents a much better way of evaluating a country's encounter

with natural resource extraction than does economic growth. It also places education at the forefront of discussions on the resource curse.

2.4 Natural Resources and Education

As mentioned above, education has to varying degrees been focussed on as a potential mechanism for economic underperformance in natural resource dependent economies. Gylfason (2001) found that a high share of natural capital in national wealth was negative for education. He found similar findings using a range of measures for education and argued that human capital is crowded out by natural capital. Gylfason & Zoega (2006) also found natural resources to be negative for education and added that this effect was partially due to the quality of social institutions (Gylfason & Zoega, 2006, p. 1107). Birdsall et al. (2001), using Auty's (1997) country categorisations, found that resource rich countries invested less in education and had poorer adult literacy when compared to resource poor countries. They argue that this is due to resource led growth as well as the typical increases in social inequality reducing the rate of return to educational investment resulting in a lack of demand. The general finding that education suffers in resource rich countries is also supported by Kronenberg (2004), who in his study of the transition economies of the former Soviet Union, found that the neglect of basic education (along with corruption) accounted for the poorer economic performance among resource rich countries. Papyrakis & Gerlagh (2004) also found education to be a factor in the poor growth of natural resource rich countries, but placed it behind general investment and lack of openness to trade in importance.

2.5 Counter Arguments to the Curse Hypothesis

Before going on to expand further on the possible mechanisms with the potential to impact on education, we should first point out that the idea of a natural resource curse does not go unchallenged. On the contrary, a body of research is emerging questioning the existence of a resource curse. Such studies have forwarded counterarguments to the resource curse hypothesis focussing mainly – although not exclusively[3] – on growth studies rather than on development outcomes. Brunnschweiler (2008), for instance, found that by using subsoil wealth as a measure of resource abundance, natural resource abundance had a positive effect on growth. This finding is supported in Lederman & Maloney (2008) who made similar conclusions. Ding & Field (2005) found resource dependence to be negatively associated with growth, but found that resource endowment was positive for growth. Brunnschweiler & Bulte (2008) found not only that resource abundance was positive for growth; they also found resource dependence had no impact. Boyce & Herbert-Emery (2011) argue that income levels are more important than growth when discussing any possible curse. Using historical

[3] See Stijns 2006. Natural Resource Abundance and human capital accumulation. *World Development* 34:1060–1083.

empirical data of US states they found resource abundance to be positively correlated with income levels while negatively correlated with growth. Stijns (2005) found both positive and negative effects of natural resource abundance on growth and argued that what was done with natural resources was more important than their existence or not. Stijns (2006) took the same measure of resource abundance and found natural resources to have positive effects on education.

Central to many of the counterarguments to the curse hypothesis is the seeming interchangeable use of the terms "natural resource abundance" and "natural resource dependence". The basic argument is that, in studies supporting the curse hypothesis, the proxies used to measure resource abundance are in fact measures of resource dependence. Critics argue that resource dependence most likely does not result from an abundance of natural resources dwarfing all other types of economic activity; it more likely demonstrates the simple absence of other economic activities – the result of unsuccessful development of other sectors. They argue that countries with vast reserves of natural resources that have developed away from dependency on those resources, through industrialisation and the growth of knowledge based services, will be classified as resource poor. On the other hand, countries whose reserves are not so great, but have failed in their development in other sectors, will be classified as resource rich. Following this argument then, influential studies like Sachs and Warner (1995) are comparing the growth rates of countries who are already development failures (resource dependent) to those of the development winners (non-resource dependent).

This criticism makes a valid argument that requires further attention. It also has methodological implications for the current study that will be discussed further in section 4. One should bear in mind however, that the observation that countries that base their development on natural resources tend to perform poorly is not just based on a few recent empirical studies, but has rather been a subject that has warranted attention throughout history.

3. THEORETICAL MECHANISMS FOR A RESOURCE CURSE ON EDUCATION

Below is an overview of some of the literature discussing the dynamics of the resource curse, as well as possible explanations regarding the impact of natural resources on education. Education is typically assigned its own category as a potential mechanism for the curse. Here, however, it is focussed on throughout, because of the fact that most of the other mechanisms – thought to transmit the curse on growth – can also have a more direct impact on education. The chapter finishes with an outline of the relationship of governance and institutions, and economic openness to natural resources and a discussion of their potential to mediate the effect of natural resources on education.

3.1 Political Dutch Disease

Dutch disease refers to the crowding out of other sectors – usually manufacturing – by natural resources. The resulting inflow of greater quantities of foreign currency drives up exchange rates, making the manufacturing sector relatively more costly and less attractive to foreign direct investment (FDI). Fluctuations in world commodity prices will, in turn, cause the country's exchange rate to become more volatile, further discouraging both foreign and domestic investment in manufacturing. The end result of these mechanisms could even be that total exports decrease despite an increase in exports of natural resources (Gylfason, 2004).

One of the indirect consequences of Dutch disease is considered to be a general sloth in government policy making (Sachs & Warner, 1995, 1998; Gylfason, 2004). Easy revenues from resource rents reduce the perceived need for developmental policy designed to ensure sustained future growth rates through education and skills promotion. The country's comparative advantage will be further embedded in its natural capital, because of reduced human capital stocks. This will, in turn, further reduce the perceived benefits from education spending for short-sighted governments (see Gylfason, 2001a).

Additional consequences are seen through unemployment in the manufacturing sector. Since manufacturing generally creates significantly more employment – relative to investment – compared to the natural resource sectors, less manufacturing also means the loss of the positive spillovers associated with the sector. These are knowledge and skills acquisition that are easily transferable across industries and sectors. A workforce with a high level of this knowhow, and not just formal education, is considered to be important in attracting FDI and

facilitating technology transfers from other countries with successful research and development sectors. These positive effects are less prevalent in the natural resource sector since they generally create less employment, while the employment that is created is generally split between a few highly educated engineers and managers and the less skilled mine workers who would find it difficult to transfer their skills to other industries (Gylfason, 2001a, p. 856).

However, given that improvements in educational provision are always seen as positive for development, there is little reason why Dutch disease should impact on public commitment to education unless policy is impacted on by an irrational and/or short-sighted belief that education is less important in countries that are rich in natural resources. In other words, Dutch disease will only affect a government's decision regarding how much to spend on education, if the government is short-sighted enough to believe that sustained development can be attained without the widespread provision of good quality education. Additionally, for policy makers to see less reason to fund education, they would have to have resigned themselves to a permanent restructuring of the country's economy meaning a permanent decline in manufacturing.

An alternative explanation could be that a decline in manufacturing and an increase in the importance of natural resource extraction would also see a shift in the relative influence of business elites in the two sectors. Those with investments in the manufacturing sector would soon have less lobbying power than those in the natural resource sector. Manufacturing elites and business associations would likely have been lobbying government for increased educational provision to provide a well-qualified workforce, because manufacturing in most cases (at least in developing countries) is labour intensive. Those with investments in natural resources would have less incentive to do so given that resource extraction is capital intensive and employs few workers.

Those who have examined the reactions of policy makers to resource booms suggest a tendency towards over optimism that can lead to complacency (Gelb et al., 1988; Gylfason, 2001b), while rationalist perspectives could explain the relative incentives for business lobbies to influence government spending policy. However, given the obvious benefits of education, for Dutch disease to have a negative impact, it appears that there needs to exist some other complementary dysfunctional features for policy makers to choose to deprioritise

educational funding. Dutch disease alone then cannot be sighted as the cause of bad policy. In fact, it is much more likely to result from bad policy.

3.2 Civil War and Conflict

Another popular area of study has been the relationship between natural resources and civil conflicts and wars. General trends from the literature suggest that natural resources can increase the likelihood and duration of conflict, because of fighting over resource rents, or through the rents providing increased capacity to continue fighting. Much of the civil war literature takes a rational actor perspective looking at the topic from the point of view of incentive (in this case gaining control of resources) and opportunity (the chances of being successful through taking up arms). In this vein, while natural resources can provide the incentive to take up arms, they could also prove to reduce the chances of success by providing the sitting government with the necessary funding to support a powerful military that would reduce the chances of success of a rebel uprising.

Collier & Hoeffler (1998) made an important contribution to the civil war literature when they suggested that fighting to gain control of natural resources was an important determinant of civil war, rather than other popular explanations such as ethnic fractionalisation. However, the literature is not conclusive and new discoveries of natural resources have, in some cases, been seen to encourage an end to conflict (see Ross 2004 for an overview of some of the research on civil war and natural resources). Wick & Bulte (2006) even argue that, in the long run, conflict may be less detrimental to the overall economy than general low intensity rent seeking. Nevertheless, natural resource related conflict is widely agreed to be an important contributor to poor growth and continued underdevelopment, especially in Africa. In relation to human capital promotion, conflict may divert government spending to the police and military away from health and education, because of increased insecurity, or to simply maintain control over rents. However, this notion has not been tested empirically.

3.3 Rent Seeking and Corruption

A number of studies into the resource curse have devoted attention to increased rent seeking behaviour commonly associated with resource booms (Torvik, 2002; Wick & Bulte, 2006; & Hodler, 2006). Torvik (2002) suggests that increased rents available from natural resources divert entrepreneurial talent towards capturing those rents and away from more productive economic activities. Hodler's (2006) model proposes that increased fighting activities between groups over resource rents produces instability and inefficiencies, as well as

weakening property rights, and thus reduces economic performance. He states that this occurs predominately in fractionalised societies and not in homogenous ones.

As an extension of general rent seeking, corruption is focused on as another of the ways in which the resource curse is brought about (see Leite & Weidermann, 2002; Mauro, 1998; Shaxon, 2007; Papyrakis & Gerlagh, 2004). Here, the larger potential resource rents give rent seekers greater incentives to bribe officials as a means of gaining access to rents from the resource. Furthermore, in the case of government controlled resources, politicians and officials may use their positions to themselves appropriate rents that could have been put to the good of the society and economy at large. Mauro (1998) argues that education spending provides less opportunity for rent seeking compared to other types of government spending and provides empirical evidence that education spending is lower in countries where corruption is more prevalent.

3.3.1 Structural Implications of Rent-seeking

At this point, we should perhaps make a distinction between corruption and rent-seeking. While corruption may be one way of gaining access to rents, rent-seeking in general can also occur in a formal setting adhering to a country's laws and regulations. Some explanations for the curse consider such a situation to give rise to a particular type of economic class of businessmen and women who exercise their entrepreneurial talent towards capturing rents rather than for more productive activities (Torvik, 2002). This may involve a significant number of firms working in the financial service sectors involved in brokering deals and facilitating investments, likely taking advantage of the personal links and alliances within the country's elite class.

In most countries, either the state or large multinational companies – or a combination of the two – are responsible for the majority of natural resource extraction. This is due to the need for large capital inputs and specialist knowhow in the natural resource sector. In countries where foreign oil and mining companies account for the majority of natural resource extraction, these local firms and individuals will act as agents offering access to both official and informal environments that are difficult for outsiders to negotiate. At the same time other firms will set themselves up as suppliers of necessary inputs and services to the mining operations. Gaining such contracts may have less to do with market forces than with personal ties and connections. This will likely be especially true where state resource extraction

predominates, as these firms will take advantage of family and other links to officials and politicians for gaining lucrative contracts.

Irrespective of who is responsible for the majority of natural resource production, the state almost always gains significant revenues from production, either directly through export revenues, or indirectly by means of taxes placed on exports. In the majority of cases governments use these rents to play an important role in the country's economic life through investments, subsidies and large scale projects of various types. This gives rise to an economic class that specialises in exploiting a relationship with the state in order to gain access to government spending directly funded from resource rents (Karl, 2004, p. 665). Those firms that are best suited to operating in such conditions are often those owned by a private elite of wealthy families and influential business groups, who while very adept at building successful business empires, are often of less benefit to a country's broad based social and economic development (Broad, 1995). Even in cases where business groups played an important role in successful periods of long-term economic development – as in the cases of Japan, South Korea and Taiwan – this occurred in resource poor countries where elites were forced to engage in more competitive manufacturing for export in order to create wealth (see Amsden, 1997; Morikawa, 1997). Key to their success was autonomous active government that was comparatively free to follow independent policies, as well as to negotiate and collaborate with domestic business elites from a strong position and with the objective of increasing welfare through economic growth (Stiglitz, 1996; Fields, 1997).

The success of these countries is often contrasted to the poor economic performance of Latin American countries, where government policies failed to foster efficiency improvements in industry, and careless macro-economic policies were more common. One observation made of the Latin American experience has been a lack of government independence from powerful elite business interests, which favoured the status quo of protectionism. An important observation of the East Asia experience is a lack of any significant natural resources (Auty, 1994). This in turn meant a comparative lack of rents available to be captured. It also meant an alignment of interests of business, government and the wider society that educational provision be improved and expanded in order to provide skilled workers for an expanding manufacturing sector.

Domestic business commonly predominates in the import and commercial sectors. Furthermore, because of the tendency for manufacturing to be crowded out in natural

resource dependent economies, any manufacturing that does take place will likely be dependent on closed trade policies, subsidies and other forms of preferential treatment. As a result, manufacturing will likely be inefficient and dependent on government favour for survival (Auty, 2001c; Karl, 2004). If countries were to move towards a more diversified competitive industrial economy, such groups would likely lose their advantageous positions both in economic and political terms.

From the issues discussed above, we can begin to paint a picture of the development of an economic structure where elites are in fact dependent, not only on the rents obtained from natural resource extraction; but on resource dependence itself. In the absence of resource dependence, the power of these interest groups would be reduced by the emergence of manufacturing firms who would try to influence government policy to favour their interests over those of others. As such, elites in resource dependent countries will likely have an interest in preserving the status quo. The development of such an economic environment would appear to be further bolstered by the economic distortions associated with natural resources like Dutch disease, making the likelihood of this kind of scenario emerging even more probable. As such, an oligopolistic variety of capitalism where privileged unproductive business groups dominate has been increasingly linked to natural resource based development (Auty, 2001c).

In such a system, education may suffer for two reasons. Firstly, the powerful interest groups have little interest in pushing the government for more investment in education, as it does not directly benefit the areas of business they themselves are involved in. Secondly, due to the fact that their position in society is cemented by a government that represents their interests over those of the poor majority, increased political participation (a common result of a better educated populace) would risk losing this control. Then the end result may be then the emergence of an econo-political structure that is at odds with adequate educational provision.

3.4 Natural Resources and the State

One of the areas thus far neglected here in the discussion on rents has been the nature of the state itself. This shift of focus recognises that the rents from natural resources do not only have the potential to affect the behaviour and incentives of individuals within and without government and the economic and political structure in which they operate. In fact they can change the nature of the state itself, both formally in its shape and its role in public life, and fundamentally in its purpose regarding society and development. Research is this direction

however, is not an alternative explanation to those offered above, it is rather a shift of emphasis that sees the state as a more dynamic entity, as opposed to a more static structural actor (see Acemoglu & Robinson, 2008).

The state centred explanation for a resource curse is that resource rich countries tend to cultivate political states that are less equipped – or even less motivated – to facilitate the country's sustained economic and social development. Researchers have identified a tendency among resource dependent states to be less democratic, as well as being non-developmental in outlook, preferring to govern the distribution of rents rather than facilitating development through regulation, investment and the impartial rule of law.

3.4.1 The Rentier State

Taking the rents approach a step further, a number of scholars have suggested that natural resources are associated with the emergence of a certain type of political state, referred to as a "rentier state" (see Mahdavy, 1970; Karl, 2004; Skocpol, 1982; Beblawi, 1987; Ross, 2001a). The term in its current usage was brought into vogue by Mahdavy and later Beblawi – both scholars of Middle East area studies. Karl (2004, p. 661) defines rentier states generally as "a state that lives from externally generated rents rather than from the surplus production of the population". Beblawi (1987, p. 51) also argued that an important component of a rentier state is that the majority of those who come into contact with the rents do so at the time of distribution, while only a few are responsible for its production. In other words rentier states are characterised by large bureaucracies specialised in the spending and distributing rents – rather than collecting taxes from the general population – as rents substitute for taxes in the state budget. Low taxes then tend to be an important component of rentier states and natural resource dependent economies (Ross, 2001a, p. 332).

Rentier states are focussed on in the resource curse literature for two main reasons. One is that natural resource rich rentier states are associated with lower levels of democracy and even authoritarian regimes (Ross, 2001a). The second is that governments of rentier states are associated with weak industrial policymaking and a general lack of developmentalism seen as a necessary precondition for long-term development (Auty, 2001c).

3.5 Democracy and Regime Type

A number of studies have shown a positive correlation of greater democracy and education spending (Lindert, 2004; Rudra & Haggard, 2005; Stasavage, 2005; Kaufman & Segura-Ubiergo, 2001). Although there is some variation in explanation, most theories rest on the

principal that: as democracy increases, the middle and working classes become the median voters, and politicians must therefore comply with their demands for education provision. If resource dependent states were shown to be less democratic then, that would offer a potential explanation for any poor performance in the area of education.

The literature points to four principal mechanisms with the potential to make rentier resource rich states less democratic and more authoritarian. The following section draws heavily from Ross (2001a, pp. 332-337) who refers to three of these mechanisms as the *Rentier Effect*, the *Repression Effect*, and the *Modernisation Effect*. He also points out that they are not mutually exclusive and all focus on rents as an intrinsic factor in retarding democratisation. Ross concludes that a combination of the three probably conspire to make resource dependent countries less democratic. The fourth mechanism relates to the way in which natural resources condition the relationship between foreign powers and the state of the resource rich country. The argument is that foreign powers will generally play a more negative role in countries with natural resources because of pragmatic self-interested behaviour.

At this point it would seem important to point out that the relationship between democracy and education is slightly ambiguous because each would seem to benefit from improvements in the other. So while it is likely to find a strong correlation between the two, the direction of causality will be harder to discern. This point has relevance for the present study and will be returned to in chapter two. Greater levels of democracy are likely to bring about more investment in education since societies will usually ask for more to be spent in this area. Better educated citizens will also be better placed to hold politicians and governments to account thus further strengthening democracy. This kind or virtuous cycle, however, suggests the possibility of a two-way causality in multivariate regressions focussing on the relationship between democracy and education (see Dahl, 1956 and Lipset, 1959).

3.5.1 Repression

The most obvious and simplest explanation for a lack of democracy in natural resource dependent countries is repression. A government has easy access to rents that is uses to fund increases in security spending and extend its monopoly on violence – the muscle behind antidemocratic policies. However, this does not explain the initial root of the state's authoritarianism. This could result for two main reasons. The first explanation is that powerful interest groups wish to capture the state to further their own interests of enriching themselves by appropriating rents through corruption and other means. Their authoritarian

policies then, are simply to prevent descent and challenges from the general population who are witness to the unequal distribution of rents. Secondly, and in slight variation to the first mechanism, governments of resource rich countries – or groups that control them – fear military challenges from other interest groups that wish to gain control of the country's lucrative resources. This is supported by several studies that show a connection between civil war and natural resources (de Soysa, 2002; Collier & Hoeffler, 1998). Increasing the size of security forces under its control reduces the apparent feasibility – an important factor in the decision to go to war (Collier, Hoeffler, & Rohner, 2009) – of other actors capturing the state through violent means. In some cases those in power will have, themselves, gained power through civil war and are therefore wary of losing their hold on the state in the same way. Neither would it make sense to relinquish their hold on the state through democratic elections if their motivation for the conflict was not democracy in the first place. Smith (2004) finds that while oil does tend to make regimes more durable, this durability cannot be fully explained through a repression mechanism. Smith's view is challenged to some degree, however, by de Soysa & Binningsbø (2009) who found natural resources to play a role in state repression.

3.5.2 The Rentier Effect

The rentier effect on democracy is the idea that states use rents to avoid demands for greater democracy from the general public. The argument for this is based mainly on two proposed mechanisms: firstly, low taxes; and secondly, paternalistic increases in public spending aimed at buying acquiescence. Low taxes are considered to be important because a very low tax rate is considered to make government less accountable. The idea is that people will demand more rights and representation when their taxes are high, or increase, and so become more engaged in politics. The second component simply assumes that lavish public spending will convince the general population that democratic reform is unnecessary by reducing discontent and removing one possible incentive to demand reform. Ross (2001) finds evidence that oil – and to a lesser extent mineral – dependent countries are more authoritarian partly through the rentier state mechanism.

Both mechanisms also have the potential to impact on education spending. If people are less likely to demand democracy because of lower taxes, they will also likely be less fervent in their demands for more investment in education. On the other hand, if governments do try to buy off their citizens through spending, then one area they may choose to increase spending could be education as this would likely be popular with citizens. However, if the reason for

the increase in public spending is to avoid demands for democratic reform – given that more educated populations are more likely to demand democracy (Lipset, 1959; Barro, 1999) – education is unlikely to be the area where authoritarian governments choose to invest.

3.5.3 Failed Modernisation

One of the clearest explanations for why resource dependent countries tend to be less democratic is presented by modernisation theory. According to the thesis, a prerequisite for countries to become more democratic is economic development through industrialisation involving greater levels of urbanisation and education (Lipset, 1959). Lipsett, however, also pointed out the importance of legitimacy in a democratic system and that legitimacy did not necessarily exist because of economic development. However, this nuance suggested by Lipsett was given a backseat by a generation of modernisation researchers who commonly presented a linear or curvilinear relationship between economic development and democracy, a view that has subsequently been criticised (see Arat, 1988).

Studies of democracy have suggested that natural resources may represent the missing variable explaining low levels of democracy (Lam & Wantchekon, 2003; Jensen & Wantchekon, 2004; Ross 2001a). A mechanism proposed along the logic of the modernisation thesis is that natural resources tend to push out manufacturing with its propensity to occupational specialisation and investment in education (Ross, 2001a, pp. 336-337).

A mechanism proposed in Auty (2000, pp. 350-355) largely follows the modernisation thesis suggesting that the onset of labour intensive industrialisation is key to both democracy and wider development. According to the model, the employment created by labour intensive manufacturing promotes urbanisation and in turn reduces wage inequality because it reduces the drag that a large unemployed rural population creates on wages. The expansion of manufacturing results in rapid skills accumulation, both through on-the-job learning and by encouraging individual workers, the state and the private sector to invest in training. This reduces the wage premium on skills further compressing wages and reducing inequality in the middle sector of society. Here, democracy is promoted in a number of ways. Firstly, the more educated population will demand a greater participation in decision making; Secondly, the government's tax revenues will depend more on taxes on individuals wages leading to calls for accountability for how these revenues are spent; Thirdly, greater income equality in the middle sector of society raises trust and social capital accumulation supporting consensual

and less polarised approaches to government resource allocation; Fourth, the manufacturing lobby is bolstered at the expense of rent-seeking interest groups. Manufacturers will call for more investment in education further promoting democracy.

Auty (2000) suggests that such a scenario is more likely in a resource poor country, since resource poor countries tend to implement policies towards early industrialisation at a much lower per capita income. According to this idea then, for a given per capita income, natural resource dependent countries will likely be less democratic and invest less in education than countries that are lacking in natural resources. Furthermore, resource rich countries have tended to skip the labour intensive stage of industrialisation choosing to invest directly in heavy industry with the proceeds gained from natural resources. This was the case in the ISI period in Latin America, where capital intensive industrialisation failed to provide extensive employment and never reached a level of international competitiveness.

3.6 Governance, Institutions and the Developmental State

We have seen from the themes discussed above, and generally from the development literature that economic development, democracy, education, and good governance are bound together in a way that requires some kind of virtuous cyclicity for positive outcomes to occur in each. The other variable of great importance that has the potential drive both virtuous as well as vicious cycles are the collective and individual efforts of politicians through state policymaking. While there is still considerable ideological disagreement surrounding the optimal degree of participation that a state should play in a country's economy, it is also clear that no country in history has achieved long-term developmental success without some kind of targeted government policy aimed at facilitating improvement.

3.6.1 Developmentalism

Countries as diverse as Sweden, Japan, South Korea, Singapore and Switzerland can all site as intrinsic the state's role in their successful economic development. Whether this involved considerable state involvement in the economy and support for national industry as occurred in Sweden and Taiwan, the strong system of incentives for efficiency improvements as was the case in Japan and South Korea, or the liberalising policies and legal frameworks that support the financial sectors in Singapore and Switzerland, all of these countries demonstrate a central role of the state in facilitating development. Some form of developmental state then would seem to be an indispensible component for successful durable economic and social development (Wade, 1990). A key component in this would have to be a degree of state autonomy from powerful interests from both within and without the country, enabling

alignment with the interests of the majority of citizens whose standard of living is ultimately the measure of any country's development.

Some scholars – the most vocal of them being Richard Auty – have long argued that the biggest problem that has faced natural resource dependent countries has been their inability to engender developmental states. This may be because natural resource dependent countries tend to develop the kind of parasitic states that have been captured by elites as mentioned in proceeding sections of this chapter. The other explanation is that well-meaning governments of resource rich countries, that try to be developmental, often end up enacting misguided overoptimistic policies that are negative in the long run (Gelb et al. 1988). If this is the case, the complexity of recent histories of most resource dependent countries may indicate a combination of the two.

Auty (2001c) argues that developmental states tend not to develop in natural resource dependent countries for the following reasons: Firstly that the poor majority in resource poor countries have a lower tolerance for rent seeking behaviour and the inequitable distribution of assets. This makes it more likely that politically minded states will align themselves with the interests of the poorer majority. Secondly, scarcity of resources necessarily requires the efficient use of those resources that are present. The abundant rents from natural resource extraction allow wasteful or risky spending practices to go on for longer in resource rich countries. This is evidenced by the large ambitious infrastructure projects that often ended in disaster during oil windfalls, because of poor planning and risk assessment (Gelb, 1988, p. 117). Thirdly, resource poor countries are less likely to experience Dutch disease that can lead governments to enact more closed trade policies in order to protect industry. While developmental states have used tariffs, quotas and other such mechanisms in the past (see South Korea and Japan) as good examples, this was done to protect industry in its infancy that was rapidly maturing towards competitiveness on the world market, rather than to protect industry that had become inefficient with little prospect of improvement (Dicken, 2003, p. 175). The trade policy closure in resource rich countries may even be related to protecting the interests of influential business elites who have little interest in competing with foreign companies on an open market. Fourth, the mechanism described above as the "failed modernisation effect" on democracy describes how government policy, economic development and democracy can be closely bound together. The kind of state described in the failed modernisation mechanism is clearly not developmental in outlook. It is passive rather than being active in policy making, it is answerable to a predatory self-interested business

elite instead of to the poor majority, and is short-sighted with spending as opposed to forward thinking with investments.

An important factor that should not be forgotten is that just because a tendency has been identified, that is not to say that poor policy is an automatic consequence of natural resource abundance or even dependence. A policy is at its core a decision of how to achieve a goal or how to overcome a problem. Those who make those decisions do not do so in a bubble. They are likely more conscious than most of the dangers associated with natural resource driven development. So with enough political will, there is the potential to enact policies to overcome these dangers.

This viewpoint is supported by the experiences of a small number of countries who have turned their natural resources to their advantage quite spectacularly. Norway, through careful management of its considerable oil revenues has raised the living standards is its population and consistently sits on top of the United Nations human development index. Botswana, while starting from a much lower level of development, used its vast diamond reserves to stimulate a period of very high growth over the last three decades. It has also managed to transmit this growth into real improvements for its population (Iimi, 2007a). Key to both countries' successes has been efforts to limit the quantity of rents flooding into the economy. This was achieved by channelling most of the revenues into international investment funds. This has the added benefit of sterilising government revenues and protecting the state budget from economic shock, such as those caused by steep fluctuations in commodity prices.

Another feature in both countries has been targeted investment in human capital. Norway has invested highly in education which is free at all levels including the higher level and Botswana has the highest rate of school enrolment in Africa. While both countries still exhibit some problems associated with natural resources – both countries have appeared to show some signs of Dutch disease (Iimi 2007; Larsen, 2005), and other sectors have not gone entirely unaffected by the primary sector – they have managed to avoid the most serious of the potential negative externalities associated with natural resources through the developmentalist policies of their governments. One could argue that discoveries of vast quantities of natural resources in these two countries occurred within special social and political contexts. However favourable these contexts may have been though, their manifestation was ultimately successful development policy. These types of policies could be emulated by other states, if only they could develop the political will and/or autonomy to do

so. One of these key policy areas is investment in human capital through education. Commitment to education then would appear to be as good a measure as any of a state's commitment to development.

3.6.2 Good Governance and Institutions

One of the most prominent explanations regarding the divergent experiences of the few natural resource success stories compared to the majority of failures lies in differences in institutional quality between countries. Although Sachs & Warner (1995) found that an effect of natural resources on institutional quality did not explain the curse on growth, a number of more recent studies have contradicted these findings. Robinson, Torvik, & Verdier (2006) find that the quality of institutions represents a key deciding factor regarding whether countries suffer the curse or not. They argue that the curse occurs because of incentives for harmful self-interested behaviour created by rents. Countries with institutions that constrain such behaviour, by holding government and politicians accountable, will tend to escape the curse. Kolstad & Wiig (2009) forward the same general argument while introducing the term "impartiality enhancing institutions". Mehlum, Moene, & Torvik (2006) also found institutions to be a key component of the curse, as did Boshchini, Pettersson, & Roine, (2007), Collier & Goeris (2007), Butkiewicz & Yanikkaya (2010) and Dietz et al. (2007).

At the same time a number of studies have argued that natural resource abundance itself reduces the quality of institutions. Sala-i-Martin & Subramanian (2003) assert that the negative consequences caused by natural resources – especially oil – are transmitted though the negative impact they have on institutions. Arezki & van der Ploeg (2007) find worse institutions to be a side-effect of natural resource abundance, while Gylfason and Zoega (2006) suggest that part of the effect of natural resources on growth occurs through institutions.

The subtle difference in interpretation here is likely mainly due to explanation of causality. A number of studies have clearly demonstrated that resource dependence is associated with poor institutional quality. However, it is less clear whether natural resources cause poor institutions to develop, or whether countries that happen to have poor institutions suffer the curse because they are less prepared to deal with pressures exerted by resource booms. The answer is likely that both assertions are correct to some degree. It is clear that resource dependent countries have not developed their institutions as well over time as have other countries, not dependent on natural resources. However, there is less clear evidence that

natural resource discovery actually corrupted and weakened institutions and there is certainly no evidence that good institutions became bad after a country's natural resource discovery. The key factor would appear to be the quality of a county's institutions prior to the resource boom. A comparison of Norway to the majority of other natural resource producers would appear to support this claim. On the other hand the experience of Botswana shows that institutional improvement is not impossible after the discovery of the resources and the ensuing resource boom. However, Botswana stands out as a marked exception and most natural resource dependent countries appear to have had the development of their institutions hampered by their natural resources.

3.7 Economic Openness and Education

A significant quantity of literature is available regarding the potential for economic integration to influence public spending (see Dreher, Sturm, & Ursprung, 2008; Rudra & Haggard 2005; Rodrik 1997). Some studies have also narrowed their focus to the impact of such processes on education spending (e.g. Ansell, 2008). Such studies have great significance for the globalisation debate and may also provide clues regarding the relationship of education spending to natural resources. The following section provides an overview of some of the literature that may prove useful for the present study.

Critics of globalisation have argued that openness leads to a process in which a national government's policy autonomy is eroded, as spending is constrained by the need to be competitive in the global economic system. Governments must reduce taxation levels in order to retain or attract investment due to fewer restrictions on capital flows. As a result, social spending, including education spending, may have to be cut. While these concerns are often debated in the rich welfare states, they are equally applicable to developing countries. In a study of developing countries, Kaufman & Segura-Ubiergo (2001) found openness to trade to be inversely correlated with social spending due to more austere fiscal policies. This claim is known as the "disciplining or efficiency hypothesis" and sits within the general race to the bottom argument.

Critics of this position argue that it regards national policy to be solely the product of global economic pressures and fails to recognise the impact of domestic political negotiation between actors. It is argued that since increased openness to the restructuring effects of globalisation will have negative consequences for some sectors (creating winners and losers from globalisation), those sectors will demand to be compensated Rodrik (1997). This

"compensation hypothesis" argues that political parties must, to some degree, acquiesce to the demands of the median voter. Such arguments are based on the model developed in Meltzer & Richard (1981). While this approach works best for democratic systems that respond to the demands of an electorate free from coercion, more dictatorial governments also need to consolidate their positions through some degree of public spending. This is supported by the fact that the costs involved in losing power, are likely to be much greater in an undemocratic system.

The available evidence on the openness discussion appears to be ambiguous. Empirical work by Dreher et al. (2008), for instance, found no robust connection between globalisation and the composition of government expenditure. Rudra & Haggard (2005), in their study on welfare spending in less developed countries, also found no evidence of a globalisation effect, although they did find that education spending was the sector "most vulnerable to external pressures" (Rudra & Haggard, 2005, p. 1038). While the possibility does exist that neither the disciplining nor the compensation hypotheses hold water, it is also possible that both are valid and merely cancel each other out. This may occur at a case level where external pressure to cut spending is counteracted by domestic pressure to increase welfare. It may also be true that each may be pervasive in different cases, making identification of a single trend difficult through cross country empirical comparisons.

The available evidence on the impact of trade openness on the resource curse is unfortunately just as ambiguous. A number of studies have argued that trade policy closure has played a role in partially explaining the poor economic performance of resource dependent economies (Sachs & Warner, 1995; Arezki & van der Ploeg, 2007; and Papryrakis & Gerlagh, 2004). This supports influential studies from the globalisation debate like Dollar & Kraay (2001) who found trade to be good for growth. On the other hand, Butkiewicz & Yanikkaya (2010) find that openness to trade is correlated to poor growth in mineral dependent economies and Garfinkel, Skaperdas, & Syropoulos, 2008) present a model suggesting that some oil exporters will tend to lose under free trade.

Birdsall & Hamoudi (2002) contribute to the discussion by questioning the direction of causality of openness and growth. They argue that a decline in openness to trade in resource dependent countries was a result of the stagnation they suffered during the 1980s because they did not have the income to finance imports. This was represented statistically as an overall decline in trade, which was correlated to their stagnation. However, the stagnation

began at a point when resource dependent economies were trading more. Birdsall and Hamoudi's observation questions the findings of some of the studies that find closure to trade acts as a component of the curse. It also questions the findings in Dollar & Kraay's oft cited paper, in that they claim some of the negative result for non-traders was driven by the fact that natural resource producers' sudden lack of trade was more related to commodity prices and less to do with their openness to trade (Birdsall & Hamoudi, 2002).

Given that natural resource dependent economies are often less democratic, perhaps of most interest to the present study are theories which consider the interaction effect of democracy and openness, (see Ansell, 2008; Bourguignon & Verdier, 2000; Falkinger & Grossmann, 2005; Rudra & Haggard, 2005). Ansell (2008) finds that openness and democracy in conjunction are positive for education spending. Rudra & Haggard (2005) did not find an increase in education spending in democracies open to trade. However, they did find liberalisation among authoritarian countries did produce a drop in education spending. This supports the idea that authoritarian governments react to the external pressures of globalisation unconstrained by domestic political dissent. This trend is supported by Bourguignon & Verdier's (2000) model which predicts that in a closed economy, oligarchic capitalists may have an interest in investing in more education, as it can increase their profits. In an open system, they have no such interest, because the returns from subsidising education are less given that the educated workers would demand higher wages in the open market. The more educated population also threaten their political control. This idea is supported by Falkinger & Grossman (2005) who traced historical development in Latin America's resource dependent economies. They argue that economic liberalisation delayed democratisation by reducing investment in education by the land and mine owning oligarchy. While they had an economic incentive to open up to trade, they had a political incentive to limit education in order to maintain their power. Additionally, they had no economic incentive to invest in education that would have been the case in a closed economic system. While Falkinger & Grossman (2005) add that the ideal combination for structural change is economic liberalisation in conjunction with a democratic system, they conclude that natural resource based economies should not undertake economic liberalisation without first undergoing a process of democratisation.

3.8 Natural Resources and Education in Light of Theoretical Mechanisms

In summary of the theoretical discussions above, there seem to be a number of reasons why natural resources could cause governments to invest less in education. These appear to be

related to: (a) a lack of incentive to invest in education for short and medium term economic reasons, (b) a lower political incentive to invest in education, and (c) a political incentive not to invest in education. Since there are few positive reasons to limit investment in education, the reason for doing so will, therefore, be likely due to irrational behaviour, or rational self-interest. The first is explained mainly by behaviourist perspectives and contemplates a scenario of a well-meaning government behaving imprudently, either because of over optimism – the belief that striking oil negates the need for good development policy – or because of distortionary economic pressures – the Dutch disease mechanism. Either way the government foolishly discounts the future by not prioritising investment in education. It is not clear how much explanatory potential this idea has since it requires us to accept that governments are generally: a) well-meaning, and b) imprudent and behave irrationally, since the government would have to deprioritise education because of a perception that education is less important for the economy than other types of public spending.

The second principal area is explained by more rational choice perspectives and is related to controlling rents and rent-seeking, as well as maintaining political power. These ideas are related to the rational actions of self-interested elites with the objective of self-enrichment and maintaining power, and may be related to a country's level of democracy. The principal mechanisms are summarised below:

1. Due to a lack of manufacturing in resource dependent countries, influential elites, with the power to influence state spending policy, have less incentive to push the government to invest in education. In fact, they may have incentives to limit educational provision.
2. Rent seeking and corruption prevalent in many resource rich states may direct spending away from education since education spending gives less opportunities for rent seeking than larger infrastructure and military spending projects.
3. Political leaders and influential elites in undemocratic resource rich states will have less incentive to invest in education, as this would likely strengthen the public's demand for democracy over time. They may also divert spending away from education towards funding and large military and police force designed to maintain their hold on power.
4. Taxes are commonly lower in resource dependent countries. This is because Governments in resource dependent countries commonly use resource rents to fund the public budget meaning that lower taxes are usual. This also reduces public

pressure for spending increases since tax payers are likely to demand value for their taxes.

By looking at these issues as a whole, there appears to be a strong possibility that any negative impact from natural resources on education spending will be cumulative, occur indirectly, and be the result of any of several possible mechanisms. This also suggests that pinpointing the exact causes of any curse through cross-country empirical tests may be difficult. However, while it may not be possible to pinpoint exact mechanisms, there is enough reason to believe that natural resource rents – and/or economic pressures – may impact on the decisions of governments regarding investment in education. This claim warrants testing, especially in the light of recent challenges the resource curse hypothesis.

Hypothesis 1: Education spending in countries where resource rents are high will be comparatively lower than in countries where rents are less.

Based in the literature, there is a good deal of evidence to suggest that good governance reduces the effect of any resource curse. There is even more evidence that institutions are of particular importance and that countries with good institutions can escape the curse.

Hypothesis 2: Better governance and institutions mitigate any negative effect of natural resources.

The potential for economic openness to influence education spending is, on the other hand, somewhat ambiguous. There exist theoretical arguments for why openness may be positive, or negative, for education spending. There are also reasons why openness may reduce, or worsen any natural resource effect. Openness is therefore assigned two conflicting hypothesis.

Hypothesis 3a: Greater economic openness will mitigate any negative effect of natural resources.

Hypothesis 3b: Greater economic openness will exacerbate any negative effect of natural resources.

4. RESEARCH DESIGN AND DATA

4.1 Methodology

The subject of how natural resources impact on development outcomes can be approached in a variety of ways. Given the continued controversy of the topic, studies of the resource curse hypothesis generally employ quantitative cross-sectional designs in order to test the hypothesis and explore potential mechanisms. The variation usually involves substituting variables intended as indicators, as well as adapting models, in an attempt to improve on the reliability and validity of results from previous studies. While a number of studies have sought to document how natural resources negatively impact on single countries (see, for example Karl, 1987 and Broad, 1995), or even smaller locations like individual communities, the resource curse debate is fundamentally related to the identification of a dominant trend across countries. In addition, the resource curse hypothesis is itself the product of an observation derived from such studies (that resource rich countries tend to grow slower than resource poor countries). In this context, entering into the debate requires a certain degree of similarity in approach. In order to test the specific hypotheses presented above then, it will be necessary to employ a research design that can capture large trends where findings are replicable and can be outwardly generalised.

The philosophical drawbacks and advantages of this approach, as well as those of its epistemological foundations, are well known and have been discussed at length elsewhere (see Freedman, 2010 and, for a critical view Mckeown, 1999). It is sufficient to say then that while such a study will be at a disadvantage in attributing causality to observed patterns, it will always be necessary to document such patterns before expending time and effort on explaining them more fully. In the present context this requires a body of research to substantiate, or contradict, a negative correlation between natural resources and education, before thorough investigations can be made to explain such a trend. Moreover, common sense and an attention to theory are useful tools that can aid us in discounting the least credible causal mechanisms.

4.2 Estimation Method

The model is based in cross-country time-series regressions using data running from 1980 – 2006 and is estimated with ordinary least squares (OLS). All countries are included where data is available and which have populations of over 1 million inhabitants. Most regression models are run twice, once including all available countries and a second time just including developing countries. Newey-West standard errors are used to reduce the problem of

heteroskedasticity and autocorrelation of error terms, inherent in time-series analyses of this type where data is pooled across countries and over time. However, in one model the Newey-West errors are dropped in favour of including the lagged dependent variable as a regressor in the model. The lagged dependent is the previous year's education spending as a percentage of GNI and is represented as *L.EDUCATION%gni* in the tables. The reason for including the lagged variable is to guard against the possibility that autocorrelation is biasing the results and due to omitted variables bias. Since an unknown explanatory variable would also be correlated to a similar degree with the previous year's education spending, the lagged dependent variable works as a good proxy to control for the effect of any unknown variable causing specification bias (Baker 2007). The inclusion of the lagged dependent variable in the basic model is a very conservative strategy. A year dummy is also employed to control for time related fixed effects.

4.3 Operationalisation and Variable Information

The study examines the indirect role of natural resources as factors that have the potential to influence the education spending policy of governments. Due to the wide availability and accessibility of data for most of the variables employed, the size of the sample of countries is large at 125 countries and covers the period from 1980 – 2006. The number of observations available of course varies with the country availability of each variable for each year. Countries with populations of less than one million are purposely excluded however. It is likely that these countries will exhibit characteristics particular to very small countries that would exert a disproportionate influence on the results of this study.

4.3.1 Towards a Conceptual Understanding of a Natural Resources Variable

Much of the disagreement regarding the idea of a curse of natural resources is related to the variables researchers have tended to employ as indicators for resource abundance – the most common way being primary export intensity. Sachs & Warner (1995) began this trend by using primary exports as a percentage of national wealth as a proxy for resource abundance. Subsequent studies have found evidence for a curse based on the same or similar measures of resource abundance that involve gauging the economic role of natural resources in relation to the rest of the economy. The principal of these alternatives being: mineral production as a percentage of GDP, and the proportion of exports made up of primary exports. Gylfason (2001b) takes a slightly different tack by employing a measure of the primary sector's share in the labour market as an indicator of resource abundance. The principal argument however, against any of these measures as indicators of resource abundance, is that such measures

indicate a country's *dependence* on natural resources rather than measuring *abundance* (see Stijns, 2005). Furthermore, measuring natural resources as a percentage amount of GDP means problems of endogeneity for growth studies (Brunnscheiler & Bulte, 2008, p. 249).

Critics of the hypothesis also argue that countries will generally show up as natural resource dependent, not as a result of an abundance of natural resources, but rather because of the limited size of other sectors of the economy. As a result, any country that has failed through its development to engender expansion in other more advanced sectors – such as manufacturing or knowledge based services – will inevitably depend to a greater extent on any natural resources they have, be they great or limited in gross per capita terms (Alexeev & Conrad, 2009). Conversely, countries that possess vast quantities of natural resources in gross per capita terms, but have successfully developed other sectors to the point where an expansion of overall income has diminished the proportional role of natural resources, will appear resource poor using such measures. Put another way, comparing natural resource dependent countries to non-dependent countries is akin to comparing development failures to the development success stories (Wright & Czelusta, 2004, p. 7).

Brunnschweiler (2008) points out that the best way we currently have of quantifying wealth is GDP per capita. Therefore, any way of assessing natural resource wealth must also be a per capita wealth measure and not a percentage intensity measure that gauges dependence. Furthermore, even gross per capita natural resource income could be misleading as a measure of natural resource abundance, as it demonstrates natural resource production rather than actually showing the amount of natural resources a country possesses within its boundaries (Brunnschweiler, 2008, p. 400-401). For this reason, some studies have utilised data on subsoil reserve estimates available from the World Bank, arguing that they represent the closest approximation available of natural resource abundance. By using this or similar data a number of studies have found evidence to support an argument against any resource curse and have in fact found some evidence of a positive effect of natural resources on economic growth (Brunnschweiler, 2008; Brunnscheiler & Bulte, 2008; Ding & Field, 2005), and investment in human capital (Stijns, 2006), in cross country studies.

The arguments raised above clearly point out a weakness in a portion of the early resource curse literature. There is clearly a problem of validity in using a measure of the relative economic role of natural resources as an indicator for endowment. In short, the concept of abundance is not properly reflected by measures of dependency. This would be particularly

true if – as the critics of the curse hypothesis claim – this discrepancy were systematically biased towards producing a particular result.

However, the solution proposed above for measuring natural resource abundance may also be still somewhat unsatisfactory. The logic for changing indicators is based on the fact that the previous measures that claimed to demonstrate resource abundance were in fact indicating resource dependence. The best approach then must surely be to switch to a better indicator of resource abundance. On the other hand, if we are to learn more about the dynamics regarding any impact of natural resources on development, it may not be so wise to discard dependence altogether. Firstly, while it is true that underdeveloped countries are more likely to depend on their natural resources because of a lack of alternative economic activity, it would be naïve to suggest that the gross quantity of natural resources has no impact on dependence at all. After all, a country lacking any kind of natural resources whatsoever, will show up as resource poor in under any indicator of abundance no matter how successful or unsuccessful it has been in other sectors, while a country with vast amounts of natural resources will also be more likely to be resource dependent even if it has experienced success in other sectors. What is more, a portion of the resource curse literature provides theoretical arguments that natural resources tend bring about the economic pressures and poor policy-making that lead to a vicious cycle of greater and greater resource dependence (Auty, 2001c, p. 844). Secondly, most of the resource curse literature discusses the impact of natural resources once they have been extracted from the ground, either through the economic destabilisation of Dutch disease, or through the infectious impact of rents. Few would argue that resources have much of an impact while lying beneath the ground. So by measuring what is estimated to be under the ground we gain little insight regarding the economic, political and social impact these resources may have when (if ever) they are extracted.

Some countries will also tend to extract more of these resources than others. In fact, more developed countries with developed manufacturing and service sectors may be less inclined to exploit all their reserves of natural resources. This may be for a number of reasons: (1) Environmental regulations in more developed countries will likely be more stringent than in developing countries. This will make extraction relatively more expensive and in some cases will prevent projects from ever commencing. (2) Some countries will prevent natural resource exploitation because of negative externalities on other sectors. The government of Costa Rica, for example, has discouraged mining investment and banned open cast mining with cyanide in order to protect its biodiversity – the basis for its successful tourist industry;

(3) in countries where manufacturing exports are important, government policymakers – aware of some of the pitfalls associated with resource booms – will be wary of allowing increased natural resource exports to drive up the real exchange rate reducing competitiveness in manufacturing exports. (4) Knowledge regarding the quantity of reserves found within a country will depend largely on the quality of scientific and commercial research that has gone into geological mapping. It is possible that more developed countries will appear to be more resource abundant due to greater expertise from investment in specialist education at an earlier period resulting in the carrying out of more geological studies over a longer period of time (Stijns, 2006, p. 1065). This could have relevance for present study as countries with better education could also be better at finding their resources. While one can argue that foreign mining and oil companies also conduct exploration in the developing world, such activities are usually supported by government and smaller domestic firms that sell on concessions after finding exploitable deposits. Such measures then may not themselves be such useful indicators of natural resource abundance.

Another measure of natural resources used that is considered to avoid many of the problems associated with both of the approaches mentioned above is natural capital's share of a country's total capital stocks taken from World Bank estimations. This measure is considered to be adequate for growth studies, as is it exogenous from GDP (Gylfason & Zoega, 2003). However, natural capital as a share of total capital would be inappropriate for the present study given its obvious interdependence with human capital – and therefore education – as a share of total capital. Any increase in education would cause a seesaw effect thereby decreasing natural capital's overall share and *vice versa*.

In deciding on an appropriate natural resources variable for the present investigation, this study applies a measure of natural resource dependence, rather than trying to approximate pure abundance. It is argued here that there is, in fact, good reason to focus on natural resource dependence rather than pure abundance. The basis for this is that most of the theoretical reasoning presented in the previous section requires a degree of dependence to be applicable. After all, it would be absurd to expect natural resources to somehow disrupt a country's long-term growth and development without, to some degree, impacting on economic and political life. A measure of resources in gross terms – be it a total or per capita value – is of little use since it is its relative importance that will surely decide its impact on the behaviour of governments and other actors in a society.

Furthermore, while the arguments against using a measure of natural resource dependence as an indicator of abundance are valid, it is rather simplistic to argue that resource dependent countries are dependent simply because of development failure, while non-resource dependent countries are such because of development success. After all, natural resource dependence cannot come about in the absence of natural resources, and neither can countries with no natural resources become natural resource dependent simply by failing in other sectors. Common sense tells us that the real basis for a country's level of dependence on natural resources will most likely result from first, pure natural resource abundance, combined with second, how successful it has been in its historical economic development in expanding into others sectors. This leads us to a concept of dependence that specifies both abundance and lack of alternatives and as dimensions of varying importance.

Pure abundance, on the other hand, refers to the existence of natural resources and a measure of their quantity (for simplicity, we will ignore the accessibility of the resources). It is difficult to argue in favour of a causal relationship, since there is no real theoretical explanation for why abundance in itself should have any impact at all on a country's economy. Dependence, on the other hand, refers to the relative role natural resources play. It implies that a), the resource has in fact been extracted and is not lying in the ground, and b) it provides an indicator of how important this activity is for the national economy in comparison to other activities. Unlike abundance then, natural resource dependence provides us with a conceptual rational to study it.

The criticism of dependence, that it also reflects failure in other sectors, is still valid one, however. It is proposed here then that the best manner to represent natural resources in regression models is to use a measure of natural resource dependence, while attempting to control for the possibility that dependence came about completely or partially through development failure. The most commonly used standard measure we have available for assessing success in economic development is GDP per capita.

In view of the above then, the present study will utilise oil rents as a percentage of GDP and non-fuel mineral rents as a percentage of GDP as measures of natural resource *dependence*, while including GDP*pc* as a catch-all control variable. While still imperfect, it is the author's opinion that such an approach is superior to simply looking at dependence or abundance and comes closer to isolating the "natural resources" variable in an explanatory form, where an impact on economic and political life can be better understood.

4.3.2 The Dependent Variable

It is difficult to measure education in a manner where cross country comparisons are possible, not least because most available measures show quantity of inputs rather than capturing quality of output. Different studies have chosen a variety of measures including average total years of education, primary and secondary enrolment rates, dropout rates, educational attainment, and variations on education spending. Studies that use enrolment rates or total years of education, while having the advantage of measuring how many people are involved in education, still suffer from the problem of measuring inputs rather than outputs. Knowing how long people spend in education tells us little about how educated they are upon completion. This is particularly prevalent given the disparity in educational quality across the world. Enrolment rates, on the other hand, tell us little if people do not stay in school (a common problem across the developing world). Some developing countries may have compulsory secondary enrolment, while also experiencing high rates of non-attendance. Additionally, much less data is available for these measures, thus reducing the sample size of any cross-country statistical study. Educational attainment represents another possible measure of education. However, this also suffers from the problem of lack of reliable data. It is also probable to suffer a sampling effect because those countries with the poorest education records are likely those where data is less available. These points are additional to the major problem of comparing grades across countries (see Barro & Lee, 2001).

The present study employs education spending data from the World Bank's (2008) National Accounts data on Adjusted Net Savings, and refers to education spending as a percentage of gross national income (GNI). This measure of education expenditure is comprised of all operating expenditures, including wages and salaries, but excluding capital investments in buildings and equipment. The data compiled by World Bank staff using estimates based on data held by the United Nations Statistics Division's Statistical Yearbook, and the UNESCO Institute for Statistics database. The variable is logged to draw in outliers and is represented by the *EDUCATION%gni* in the tables. While this manner of measuring education has a number of important limitations – principally that it fails to capture how education expenditure is distributed between sectors, the quality of the expenditure, and the outcomes of such expenditure – it does provide a proxy for government intent. Given that many of the different theoretical mechanisms for why natural resources could prejudice education occur through a reduced incentive for governments to invest in education, education to GNI as a measure will be adequate to capture this.

While increased public spending has been linked to government corruption, as a means of facilitating rent-seeking (Keefer & Knack, 2007), this problem is less likely with education spending than in other sectors. In fact, some studies have provided empirical evidence that more corrupt governments tend to spend less on education, because it gives less opportunity for rent seeking than large-scale capital intensive projects in infrastructure and the military (Mauro, 1998; Delavallade, 2006). By excluding investments in buildings, using education to GNI further guards against the possibility that spending is undertaken in order to indulge in rent extraction, since government capital investment in construction would be the area of educational expenditure most vulnerable to corruption. It is for this reason that education to GNI rather than Public education expenditure as a percentage of GDP – another commonly used measure of education expenditure available from the World Bank – is being used. Another important reason is availability of data given that education spending to GNI has three times as many data points as public spending on education to GDP. The two are also highly correlated with a coefficient of 0.89.

The objective is not simply to measure education, which will be subject to a wide variety of variables particular to each country, but rather to gauge government intent and commitment to education. While it may not be ideal to reduce such a concept down to pure monetary expenditure in terms of national wealth, it does represent a viable indicator enabling comparison of policy across countries. For this reason as well as those argued above, it is the view here that education to GNI is a useful measure of education expenditure for such purposes.

4.3.3 Explanatory Variables

As discussed above, oil and mineral rents as a percentage of GDP are used as the preferred measure of natural resources. The data source is the World Bank Environmental Indicators and is calculated annually as the difference between the value of production at world prices and the costs involved in production. Oil and gas are separated from non-fuel minerals and are represented as *LnOILRENT%gdp* and *LnMINERALRENT%gdp* in the tables. Both variables are logged to pull in outliers. The reason for separating oil from non-fuel minerals is that several studies have suggested different types of resources may exhibit distinct patterns in their impact (Boshchini et al., 2007). Table 1 lists the countries most dependent on oil and minerals in 2006, the final year of the time-series used in this study. One can see immediately a difference in the relative role of oil compared to minerals both in the number of dependent countries and the extent of their dependence.

Table 1. Countries ranked by contribution of oil and minerals to GDP for the year 2006

Oil share of GDP, 2006	*%*	*Mineral share of GDP, 2006*	*%*
1. Iraq	92.61	1. Papua New Guinea	35.45
2. Equatorial Guinea	79.14	2. Mauritania	23.17
3. Congo, Rep.	75.79	3. Chile	22.15
4. Libya	62.35	4. Mongolia	21.79
5. Azerbaijan	61.89	5. Zambia	21.58
6. Angola	60.82	6. Peru	10.51
7. Kuwait	57.39	7. Congo, Dem. Rep.	10.38
8. Saudi Arabia	56.71	8. Guinea	9.22
9. Chad	55.60	9. Botswana	6.83
10. Gabon	53.35	10. Suriname	5.90
11. Oman	42.74	11. Zimbabwe	5.41
12. Yemen, Rep.	38.57	12. Guyana	4.97
13. Brunei Darussalam	38.01	13. Australia	4.46
14. Iran, Islamic Rep.	37.97	14. Bolivia	3.84
15. Turkmenistan	32.98	15. Kazakhstan	3.29
16. Nigeria	32.96	16. Ghana	3.03
17. Venezuela	32.69	17. Tanzania	2.86
18. United Arab Emirates	31.91	18. Dominican Republic	2.61
19. Kazakhstan	28.33	19. Indonesia	2.60
20. Qatar	27.59	20. Cuba	2.51
21. Ecuador	27.44	21. South Africa	2.36
22. Syrian Arab Republic	26.42	22. Brazil	2.33
23. Bahrain	24.25	23. Jamaica	2.09
24. Algeria	23.10	24. Bulgaria	2.05
25. Sudan	19.17	25. Namibia	2.00
26. Russian Federation	18.77	26. Philippines	1.64
27. Papua New Guinea	18.15	27. Russian Federation	1.49
28. Trinidad and Tobago	16.42	28. Armenia	1.48
29. Norway	13.83	29. India	1.36
30. Vietnam	12.20	30. Honduras	1.26

Source: World Bank Environment Indicators (2011). www.worldbank.org

Other studies have suggested that the resource curse may operate through a threshold effect (Mehrara, 2009). While Mehrara discussed principally a threshold in the growth of the sector (i.e. the size of a boom), there is also reason to believe that the relative size of the sector may also have an impact that operates at a threshold. To allow for this possibility, two dummy variables are created (*OIL.DUMMY* and *MINERAL.DUMMY*) that set a threshold of 10%, where countries whose oil or metal rents are less than 10% of GDP are assigned the value of 0 with those exceeding 10% being assigned 1. The value of 10% is very close to the mean plus two standard deviations of the initial rents data.

4.3.4 Control Variables

Per capita GDP is highly correlated with how much a country spends on its education (in percentage terms as well as total expenditure). It also captures a wide variety of other factors that have influenced a country's historical development and may have an impact of education policy. This variable is logged to pull in outliers and is represented as *LnGDPpc* in the tables. Many critics of the curse hypothesis point out that resource dependence is likely the result of a country's failed historical development. As discussed above, GDP per capita is perhaps the single best measure available of a county's economic development and represents a catch all control that goes a long way to isolating the variables of interest.

Per capita GDP growth (*GDPpcGRW*) is also included, as it tends to be negatively correlated with education spending. While this may sound counterintuitive, it is simply because education spending tends to be "stickier" than growth rates, resulting in countries with fast growth rates appearing like poor performers on education even if education spending is increasing. So while the government of a growing economy would be expected to increase public spending as its revenues increase, these budget decisions would generally lag behind the publication of growth statistics. Additionally, this controls for any natural convergence between poorer countries, which are expected to grow at faster rates, and richer countries that tend to grow more steadily.

Population density and Population

Two variables are used to control for demographic differences between countries. A logged population density variable (*LnPOPDEN),* because densely populated countries tend to spend less on education in per capita terms, as a given level of spending tends to be more effective when people are concentrated in a smaller geographical area. Countries with a large population have also been found to spend less on education. So a logged population variable (*LnPOP*) is also included.

Democracy and Autocracy

The democracy dummy is constructed from the Polity IV data series, which is a standard measure of institutional democracy (Gurr & Jaggers, 1995). Democracy takes on the value "1" if a country's democracy rating equals +6 or above on the polity scale and "0" if it falls below. This sets a high threshold for democracy since the Polity scale ranges from -10 to +10. This variable is included since democracy is considered to enable a society to demand better education from its government. Therefore, policy options that promote democracy

could have the potential for improving education spending. The autocracy dummy is created in the same way. Autocracy takes on the value of "1" if a country's democracy rating equals -6 or lower and "0" if it falls above. Aside from the discussions mentioned above related to the role of democracy, there is also reason to believe that autocracies in particular may exhibit distinct characteristics from other regime types along the polity scale (Ansell, 2008).

Civil War

The civil war dummy is made using the backdated Uppsala dataset on armed conflict. An on-going civil war is coded 1 if a country is experience political conflict where at least 25 deaths have occurred in a single year and 0 if not (Gleditsch, Wallensteen, Eriksson, Sollenberg, & Strand, 2002). Because of the high costs and inefficiencies associated with civil war, it could be expected to suck investment away from welfare spending.

4.3.5 Other Explanatory Variables

Other explanatory variables employed represent economic freedom (*EC.FREEDOM*), as a measure of economic openness; a measure of institutional quality and legal security (*INSTITUTIONS*); and a measure of governance (*GOODGOV.*).

Good Governance

The good governance variable comes from the Control of Corruption Index from the International Country Risk Guide and represents the ability of a government and its institutions to combat corruption. Since predatory governments and high degrees of rent seeking have been associated with natural resource based economies, this variable may be illustrative.

Economic Freedom and Instituions

Data on economic freedom comes from the Economic Freedom Index produced by the Canadian Fraser Institute. The index is produced using data collected for forty-two variables within the five broader categories of: size of government; legal structure and security of property rights; access to sound money; freedom to trade internationally; and the regulation of credit, labour and business (Gwartney & Lawson, 2008). By including economic freedom, it is possible to gauge its impact on education, thus representing another area where policy changes could make improvements. The measure of institutional quality also comes from the Economic Freedom index and represents the Legal Security and Property Rights subcategory. By controlling for this category against the main Economic Freedom Index, we can better ascertain the impact of openness through policy rather than legal and institutional factors that may make a country

more or less attractive to trade and investment, but are likely attributed to its historical development. Without controlling for these institutional factors, there would be a high risk of endogeneity since the Economic Freedom Index assigns a higher score for countries with good institutional and legal systems not just trade policies that may be more, or less open. The influence of the institutions variable also provides a manner with which to assess the impact of variation in institutional quality as a potential factor mediating any effect of natural resources, as has been argued by a number of studies mentioned in section three.

Interaction Terms: Oil x Good Governance and Oil x Economic Freedom

Aside from using the variables mentioned above, interaction terms of oil and economic freedom (*EC.FREEXOIL*) and oil and good governance (*GOODGOVxOIL*) are used. The rationale for using the variables in this way is that, while two variables may generally tend towards a particular effect, they may combine to produce a wholly different impact. Using the interaction variables may be of particular value given that much of the literature on education indicates different effects depending on regime type and trade policy (see section 3). Table 1 provides descriptive variable information.

Table 2. Descriptive variable information

	N	Mean	Std. Dev.	Minimum	Maximum
LnEDUCATION%gni	5099	1.28	0.49	-1.14	2.56
LnOILRENT%gdp	4316	-6.07	5.70	-11.51	4.66
LnMINERALRENT%gdp	4299	-7.21	4.72	-11.51	3.20
INSTITUTIONS	2655	5.09	2.06	1.02	9.62
EC.FREEDOM	3525	5.88	1.22	2.1	8.79
GOODGOV.	3052	3.08	1.38	0	6.17
LnGDPpc	4316	8.41	1.26	4.92	11.20
GDPGROWTHpc	6308	1.94	6.19	-50.49	90.07
LnPOPULATION	7404	15.53	1.85	9.89	20.99
LnPOP.DENSITY	7288	3.76	1.49	-0.46	9.72
DEMOCRACY	7962	0.33	0.47	0	1
AUTOCRACY	7962	0.36	0.48	0	1
CIVILWAR	8109	0.15	0.35	0	1

5. RESULTS

In view of the on-going debate regarding the resource curse hypothesis, the model presented in this study was intentionally conservative. For instance, variables representing civil war and regime type – thought to be indirect mechanisms through which the resource curse is transmitted – are used as control variables, since their omission or inclusion as explanatory variables may have be contentious for some. Secondly, the variable used for resource intensity was logged even though the precise focus of the study is resource dependent countries, which are naturally outliers from the mean. One could argue that using the logged values may underestimate the effect of natural resources. Another point worth mentioning is that all regressions bar one were run first using a sample of all countries and then a second time using a sample of only developing countries. None of the models run displayed differences in results of any note. In fact, the findings were remarkably similar.

5.1 Results for Resource Curse Effect

Column 1 of Table 3 presents the basic regression model for the effect of natural resources on education spending. The sample includes results for 125 countries with 3285 observations over the period 1980 to 2006. Year dummies are included, but not shown in the table. The control variables for per capita GDP (*LnGDPpc*) and per capita growth (*GDPGROWTHpc*) behave as expected and are both highly significant at the 1% level with GDP having a positive and growth a negative effect on education spending. The demographic variables (*LnPOPULATION* and *LnPOP.DENSITY*) are also significant at the 1% level and, as predicted, are both negatively associated with education spending. Democracy (*DEMOCRACY*) is positive, but not significant, as is autocracy (*AUTOCRACY)*. Civil war's (*CIVILWAR*) effect on education spending is intuitively negative and is significant at the 1% level. Oil (*LnOILRENT/gdp)* is negatively correlated with education spending and is significant at the 1% level. Minerals (*LnMINERALRENT/gdp)*, on the other hand are positive, but not significant.

Column 2 shows the same model applied to a sample reduced to non-OECD countries. The sample size drops to 2788 observations. Changes in the coefficients and significance of *LnGDPpc, GdpGROWTHpc, LnPOPULATION, LnPOP.DENSITY,* and *CIVILWAR* are all negligible, while *DEMOCRACY* and *AUTOCRACY* remain insignificant. Oil's effect remains negative and significant at the 1% level with a slight increase in the negative value of the coefficient from -0.0533 to -0.0636. Minerals (*LnMINERALRENT/gdp)* remain positive and not significant.

Columns 3 and 4 show the same model for all countries and non-OECD countries respectively, while two dummy variables (*OIL.DUMMY* and *MINERAL.DUMMY)* substitute for the logged values used in the first two columns. The dummy variables give the value of 1 to those observations where the value of oil or mineral rents were above 10% of total GDP and 0 to those under 10%. This is aimed at capturing any possible threshold effect that has been discussed in some of the resource curse literature. In both columns, the effect of the demographic and economic control variables is substantively unchanged, as is the impact of *CIVILWAR. DEMOCRACY* and *AUTOCRACY* remain insignificant. The effect of oil remains negative and highly significant at the 1% level. Minerals become negative and just miss significance at the 10% level (13%). There is almost no difference between the results for the regression run for all countries and the one for non-OECD countries.

The basic regression model shown in Table 3 shows a strong negative correlation between oil dependence and education spending for both the logged continuous variable and a dummy variable of oil rents. In contrast to oil, the logged minerals variable was positive for education spending, while failing to achieve significance. The minerals dummy, however, was negative just failing to achieve significance. The idea of a threshold effect then is only weakly supported. Interestingly, regime type appears to have little impact with both democracy and autocracy dummies remaining insignificant throughout.

Column 5 includes a lagged version of the independent variable *(L.EDUCATION%gni)*, which is the education spending in the year previous to the observation in question. The inclusion of this variable is designed to counter autocorrelation resulting from unknown explanatory variables causing a bias in the Newey West estimations. The Newey West standard errors are therefore dropped from this regression. Including this variable is a rather severe test of the model, since the lagged variable will almost certainly dominate in its predictive power. The number of observations falls slightly from the 3285 in the basic model to 3249. This is most likely due to gaps in data where a previous year's education spending was not available. This will have resulted in some observations being dropped because of a need to have consecutive years of education spending data.

Table 3 Regressions of natural resources on education spending globally and among non-OECD countries, 1980-2006

	LnEDUCATION%gni				
	(1)	(2)	(3)	(4)	(5)
LnOILRENT%gdp	-0.0533***	-0.0636***			-0.00755***
	(0.0154)	(0.0172)			(0.00287)
LnMINERALRENT%gdp	0.0191	0.0248			-0.00570
	(0.0310)	(0.0323)			(0.00702)
LnGDPpc	0.186***	0.186***	0.182***	0.178***	0.0103***
	(0.0110)	(0.0133)	(0.0103)	(0.0121)	(0.00253)
GdpGROWTHpc	-0.00892***	-0.00935***	-0.00879***	-0.00909***	-0.000959*
	(0.00203)	(0.00208)	(0.00201)	(0.00207)	(0.000552)
LnPOPULATION	-0.0592***	-0.0592***	-0.0652***	-0.0675***	-0.00189
	(0.00669)	(0.00777)	(0.00689)	(0.00793)	(0.00128)
LnPOP.DENSITY	-0.0507***	-0.0511***	-0.0506***	-0.0517***	-0.00107
	(0.00815)	(0.00947)	(0.00716)	(0.00857)	(0.00158)
DEMOCRACY	0.0392	0.0312	0.0446	0.0407	0.00376
	(0.0279)	(0.0280)	(0.0273)	(0.0275)	(0.00582)
AUTOCRACY	0.00917	0.0154	0.00656	0.00986	0.00924
	(0.0358)	(0.0368)	(0.0355)	(0.0364)	(0.00703)
CIVILWAR	-0.0827***	-0.0863***	-0.0858***	-0.0886***	-0.00357
	(0.0318)	(0.0334)	(0.0317)	(0.0334)	(0.00698)
OIL.DUMMY			-0.191***	-0.200***	
			(0.0481)	(0.0514)	
MINERAL.DUMMY			-0.204	-0.213	
			(0.136)	(0.140)	
LagEDUCATION%gni					0.957***
					(0.00683)
Constant	0.942***	0.959***	1.070***	1.157***	0.0141
	(0.133)	(0.171)	(0.130)	(0.164)	(0.0279)
Observations	3,285	2,788	3,285	2,788	3,249

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10
Ln = natural log
Year dummy included in all models

Lagged education spending dominates the model as expected predicting almost 96% of education spending. As one would expect, the introduction of lagged education has a dramatic effect on all of the other variables. Civil war, population, and population density all undergo a drop in their coefficients of at least 1 decimal place and all of them become insignificant. Autocracy and democracy stay insignificant, while minerals become negative but not significant. The only variables to remain significant after the introduction of lagged education spending are per capita growth, GDP per capita and oil rents. Growth undergoes a reduction in its significance and falls to the 10% level, and drops in its coefficient by a decimal place. GDP per capita remains significant at the 1% level, while experiencing a drop in the coefficient by a decimal place. Oil rents also maintains significance at the 1% level, while the coefficient falls from – 0.0533 to – 0.00755. The robustness of oil to the introduction of the lagged dependent variable further supports the hypothesis of a negative effect of oil dependence. It also suggests that oil dependence is not only correlated with lower education spending in each year, it is also negatively correlated with year on year increases in education spending.

5.2 Results for Effects of Governance on Education Spending

Table 3 demonstrated a strong negative correlation between oil and education expenditure. In Table 4, a measure of good governance (*GOODGOV.)* is added, as well as an interaction term of good governance and oil (*OILxGOODGOV.)* intended to capture interactive effects. Columns 1 and 3 again represent the regression models including all countries, while 2 and 4 present results for non-OECD countries only.

Column 1 sees the number of observations drop to 2376 from the 3385 in Table 3. This is due to the more limited data availability for the good governance variable. As expected, we see a strong positive correlation between good governance and education spending. *GOODGOV.* is positive and significant at the 1% level. Oil maintains its negative effect at the 1% level, while changes in the coefficient are negligible. Mineral rents become negative and significant at the 10% level with a coefficient similar to that of oil. *GdpGROWTHpc* remains negative, but loses significance, while *CIVILWAR* remains negative, but loses significance. This is likely due to a strong negative correlation of good governance with civil war. *DEMOCRACY* and *AUTOCRACY* remain insignificant. Column 2 sees a drop in the number of observations to 1962 and paints an identical correlatory picture, with only slight changes in the value of coefficients as a distinguishing feature from Column 1.

Table 4 Regressions of natural resources and governance on education spending globally and among LDCs only, 1980-2006

	LnEDUCATION%gni			
	(1)	(2)	(3)	(4)
LnOILRENT%gdp	-0.0557***	-0.0751***	-0.0567	-0.0578
	(0.0183)	(0.0204)	(0.0409)	(0.0507)
GOODGOV.	0.0758***	0.0824***	0.0756***	0.0854***
	(0.0123)	(0.0156)	(0.0130)	(0.0154)
OILxGOODGOV.			0.000358	-0.00733
			(0.0113)	(0.0172)
LnMINERALRENT%gdp	-0.0618*	-0.0683*	-0.0619*	-0.0679*
	(0.0353)	(0.0367)	(0.0354)	(0.0368)
LnGDPpc	0.176***	0.197***	0.176***	0.196***
	(0.0155)	(0.0172)	(0.0156)	(0.0173)
GdpGROWTHpc	-0.00337	-0.00390	-0.00337	-0.00391
	(0.00240)	(0.00253)	(0.00241)	(0.00253)
LnPOPULATION	-0.0599***	-0.0536***	-0.0599***	-0.0534***
	(0.00770)	(0.00929)	(0.00770)	(0.00927)
LnPOP.DENSITY	-0.0893***	-0.105***	-0.0893***	-0.104***
	(0.00904)	(0.0105)	(0.00904)	(0.0107)
DEMOCRACY	-0.0455	-0.0487	-0.0455	-0.0484
	(0.0314)	(0.0318)	(0.0316)	(0.0319)
AUTOCRACY	8.67e-05	0.00340	2.26e-05	0.00520
	(0.0437)	(0.0443)	(0.0435)	(0.0442)
CIVILWAR	-0.0308	-0.0336	-0.0308	-0.0337
	(0.0347)	(0.0364)	(0.0348)	(0.0364)
Constant	1.058***	0.867***	1.059***	0.853***
	(0.156)	(0.203)	(0.156)	(0.203)
Observations	2,376	1,962	2,376	1,962

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10
Ln = natural log
Year dummy included in all models

Column 3 introduces the interaction term *OILxGOODGOV.* to the model shown in column 1. The interactive effect of oil and good governance is positive, but does not reach significance. Oil rents' also becomes insignificant at, while good governance remains positive at 1%, while mineral rents stay negative and significant at 10%. Democracy, autocracy and civil war undergo little change and remain insignificant. Again, column 4 displays little variation when limiting the sample the non-OECD countries showing negligible variation in the value of coefficients and significance of each variable.

The failure of both oil, and the interaction term of oil and good governance, to achieve significance is likely due to a problem of high intercorrelation between the three variables producing inflated standard errors. The three variables were tested for joint significance (not shown), by testing the significance only of the three terms. This showed them to be jointly highly significant meaning the result for the interaction term can be accepted.

Table 4 shows, as one would intuitively expect, that good governance is positive and strongly correlated with higher education spending. However, even when holding good governance constant, oil rents maintained an independent and significant negative effect. The further introduction of an interaction term of oil and good governance showed as positive effect, while good governance remained positive and oil remained negative. This interesting result clearly requires further probing.

Figure 2. Conditional effects plot of oil rents and good governance on education spending

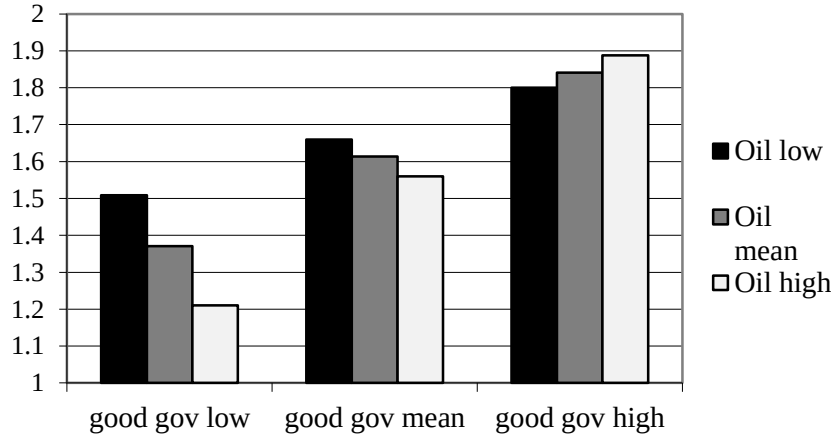


Figure 1 represents the conditional effects plot of oil rents and good governance. The graph divides countries into those whose good governance is low, those with a level of governance around the mean and those with high levels of governance. One can see that the negative

effect of oil is greatest in countries with low levels of governance. In countries with governance levels around the mean, oil has a reduced, but still negative effect. However, in countries with higher levels of governance, oil's effect is reversed and becomes positive compared to countries with low or no oil. This finding tentatively suggests that well governed countries make use of oil rents to increase the educational budget, while less well governed countries may be more likely to suffer the negative externalities associated with dependence on high oil rents.

5.3 Results for Interaction of Economic Freedom and Oil

Table 5 introduces the variables *EC.FREEDOM,* and *INSTITUTIONS* to the basic model, as well an interaction term of oil and economic freedom *(OILxEC.FREEDOM).* Column 1 shows a drop to 2285 observations from the 3285 in the original model in Table 3. This is due to the data availability in the Economic Freedom Index from the Fraser Institute. The *INSTITUTIONS* variable is the ILSPR subdivision of the overall index and represents the legal and institutional components. Including the institutions variable is designed to control for the positive effect that good institutions have on the overall economic freedom score in the index, thereby isolating the more policy related components. Both *EC.FREEDOM* and *INSTITUTIONS* show a highly significant effect on education spending at the 1% level. Institutions are positive, as one would expect, while Economic freedom's effect is negative for spending on education. Oil becomes positive, but loses significance, as does minerals. Democracy is positive and civil war negative, but both fail to reach significance, due probably to a strong correlation to the institutional variable. Interestingly, *AUTOCRACY* becomes negative and, for the first time, highly significant at the 1% level. Column 2 shows 1855 observations for same model limiting the sample to non-OECD countries. The only differences of interest are that oil becomes negative, but not significant, while economic freedom's coefficient undergoes a slight increase in its negative effect level. Additionally, autocracy drops in significance from the 1% to the 5% level.

Column 3 introduces an interaction term of oil with economic freedom *(OILxEC.FREEDOM.),* which is negative and significant at the 10% level and has a coefficient of -0.0218. Oil becomes positive and significant at 10% with a coefficient of -0.126, while economic freedom on its own remains negative at 1% level significance with a coefficient of -0.0479, a slight drop from Column 1. Institutions remain positive at the 1% level with a negligible change in its coefficient. Minerals remain positive, but not significant. Democracy and civil war are not significant, while autocracy remains negative and

significant at 5%. Column 4 paints a very similar picture with the only observation of interest being a slight increase in the significance of the interaction term to the 5% level.

Table 5 Regressions of natural resources and economic freedom on education spending globally and among non-OECD, 1980-2006

	LnEDUCATION%gni			
	(1)	(2)	(3)	(4)
LnOILRENT/gdp	0.00162	-0.0188	0.126*	0.132*
	(0.0186)	(0.0205)	(0.0736)	(0.0800)
INSTITUTIONS	0.0952***	0.0928***	0.0975***	0.0953***
	(0.0114)	(0.0126)	(0.0115)	(0.0127)
EC.FREEDOM	-0.0614***	-0.0849***	-0.0479***	-0.0677***
	(0.0171)	(0.0193)	(0.0184)	(0.0210)
OILxEC.FREEDOM			-0.0218*	-0.0274**
			(0.0114)	(0.0132)
LnMINERALRENT/gdp	0.0531	0.0501	0.0567	0.0522
	(0.0439)	(0.0451)	(0.0441)	(0.0453)
LnGDPpc	0.134***	0.157***	0.129***	0.153***
	(0.0178)	(0.0189)	(0.0180)	(0.0190)
GdpGROWTHpc	-0.00395	-0.00380	-0.00402	-0.00403
	(0.00254)	(0.00266)	(0.00253)	(0.00266)
LnPOPULATION	-0.0694***	-0.0714***	-0.0711***	-0.0733***
	(0.00794)	(0.00970)	(0.00806)	(0.00981)
LnPOP.DENSITY	-0.0386***	-0.0380***	-0.0382***	-0.0363***
	(0.00966)	(0.0118)	(0.00976)	(0.0121)
DEMOCRACY	0.0149	0.0177	0.0131	0.0142
	(0.0317)	(0.0322)	(0.0320)	(0.0326)
AUTOCRACY	-0.119***	-0.112**	-0.114**	-0.104**
	(0.0453)	(0.0464)	(0.0453)	(0.0467)
CIVILWAR	-0.00537	-0.0204	6.47e-05	-0.0151
	(0.0366)	(0.0388)	(0.0364)	(0.0385)
Constant	1.672***	1.664***	1.644***	1.612***
	(0.250)	(0.288)	(0.252)	(0.291)
Observations	2,285	1,855	2,285	1,855

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10
Ln = natural log
Year Dummy included in all models

In view of the dramatic change in the sign of oil's coefficient and significance after the introduction of the institutions and economic freedom variables, the model was tested (not shown) to reveal if the change in the effect of oil was due to the introduction of *INSTITUTIONS* or *EC.FREEDOM*. This demonstrated that the change in oil's coefficient and significance was due to the introduction of the institutional variable and not due to economic freedom. This strengthens the argument that the quality of institutions and governance has a major bearing on any curse effect.

Table 5 also demonstrates a negative correlation between economic freedom and education spending – once institutional quality is controlled for. Columns 3 and 4 also demonstrate a negative and significant interactive effect of oil and economic freedom suggesting and exacerbation of the negative effect in oil dependent countries. Of further interest in Table 4 is the consistent negative and significant effect of autocracy on education spending. This may indicate some kind of relationship between autocracy variable and economic freedom. However, without further probing, this remains speculatory.

5.4 Summary of findings

The results presented above can be summarised into three main findings. Firstly, oil showed a consistent negative correlation with education spending, while maintaining significance at the 1% level in all of the standard multivariate regressions. This finding was net of the inclusion of a variety of control variables, including the introduction of the lagged dependent variable into the model – a severe test of oil's predictive power. Oil only lost significance when measures of institutional quality and economic freedom were introduced in the final table. The results for minerals showed less evidence of any curse effect. In fact, the standard logged minerals variable was often positive – although not significant – for education spending. The oil dummy was also strongly correlated with reduced education spending and was significant at the 1% level, while the use of the mineral rents dummy showed minerals – at over 10% of GDP – to be negative for education spending coming close to significance at 13%. While the change in sign of minerals should be interpreted with some caution, it is important to note that the effect of minerals turned negative after substituting the dummy variable for the natural log of the continuous variable. The first hypothesis then, that natural resources are negatively correlated with education spending, is supported for oil. Minerals, on the other hand, did not exhibit a consistently negative effect on education.

The second finding of note is that good governance was intuitively positive for education spending. Its introduction failed to alter oil's negative coefficient, however, indicating an independent negative effect of oil. However, further probing of the conditional effects of the interaction term of oil and good governance revealed that oil has a positive impact on education spending in well-governed countries. Further regressions that introduced a measure of institutional quality showed a very strong impact of institutions. Not only were institutions positive for education spending, the introduction of the variable knocked out the negative effect of oil altogether. The second hypothesis then, that good governance and institutional quality are mitigating factors with the potential to prevent the resource curse is supported.

The final set regressions are designed to capture the effect of economic policy openness on education spending. The results show economic freedom to be negatively associated with education spending – once institutional and legal quality is controlled for – and to be significant at the 1% level. Further results showing the interaction effect of economic freedom and oil show that the interaction of the two has an added negative effect on education. These results do not support the hypothesis that greater policy openness will reduce the negative effect of oil. They provide support, however, for the contrary hypothesis that a more open economic policy may compound the problem of low education spending in oil dependent states.

5.5 Discussion and Interpretation of Results

Based in the theoretical reasoning behind the resource curse hypothesis, this study set out to test whether natural resources are negatively correlated with government education expenditure. More specifically, this involved investigating the relationship between the intensity of natural resource rents (a measure of natural resource dependence) and the share of national income spent on education (a measure of government priority towards education). The results for oil demonstrate evidence supporting a hypothesis for a resource curse effect on education spending. These findings support the argument, forwarded by Gylfason (2001a) and Birdsall et al. (2001), that dependence on natural resources reduces the incentive for governments to invest in education and contradicts a view that governments will spend a higher proportion on education where state budgets are bolstered by resource rents.

However, the hypothesis does not hold for all natural resource sectors. While oil is consistently associated with reduced education spending, there is less evidence of a negative correlation with non-fuel minerals. This finding is arguably as important as the findings for

oil, in that it may demonstrate a need to distinguish between categories within the natural resource sector. Numerous influential studies of the resource curse have used a variety of measures of resource abundance/dependence as a whole, with some studies even including agriculture (Sachs & Warner, 1995, 2001; Gylfason, 2001b). While it is not the task of this paper to question the findings of such studies, these results cast doubt on the wisdom of treating natural resources as a uniform group.

This disparity in findings between oil and non-fuel minerals, rather than muddying the theoretical waters surrounding the curse hypothesis, may in fact clarify some of its finer points. Gylfason's (2001a) argument that human capital investment is crowded out as an effect of Dutch Disease provides one potential explanation. This process requires a degree of sloth and lack of forward thinking on the part of policy makers. Therefore, it should follow that for sloth to have an impact on policy, government captured resource rents – as well as the prospect of future rents – must be sufficiently high to lure governments into thinking they have found the answer to all their woes. The rents that governments are generally able to capture from oil production are markedly higher than those that are produced from non-fuel mining. There are various technical as well as economic reasons for this: one is that oil producers have been able to counteract the terms of trade problem by maintaining high oil prices through OPEC. As a result, profit margins are likely to be higher with oil production than with metal mining where market forces require production to be more or less as efficient as other mines throughout the world just to stay viable. Lower profit margins for companies also mean governments have less bargaining power and scope for maximising rent capture through taxation. In order for mining investment to be economically viable under these circumstances, governments may find they need to provide tax incentives to encourage FDI or domestic investment. A number of developing world governments have even given mining companies varying degrees of tax exemption in a similar vein to manufacturing export zones[4]. This in turn, means that the governments capture less of the rents, thus reducing the likelihood of sloth inhibiting policy. From a behaviourist standpoint then, it is less likely that a new discovery of vast tin or nickel reserves would cause governments to forget about the benefits of education. On the other hand, the considerable rents captured from a new discovery of oil during sustained periods of high oil prices is more likely to blind governments into discounting the future.

[4] A good example of this was the Honduran mining law passed in 1997.

The idea that there exists a disparity between oil and minerals in the rents available to be captured by the state, also suggests that rent seeking and rentier state arguments may be more applicable to oil abundant states than those rich in metals and other non-fuel minerals. On the other hand the disparity in the findings may simply reflect the relative dependence on non-fuel minerals, given that they usually represent a much smaller share of GDP. Table 1 demonstrates that only 7 countries in 2006 were dependent on minerals for more than 10% of GDP, compared to oil where 10 countries depended on the resource for over 50% of GDP. The simple answer then could be that the comparatively high value of oil means that more countries depend on the commodity compared to very few countries that depend on minerals.

It has been argued in the previous theoretical sections of this study that a degree of dependence is required for a resource curse to take hold. The results here support such a proposition. The results from regressions using dummy variables for natural resources point tentatively towards a threshold effect for the curse, whereby even minerals were negative in the few countries where dependence was highest. This is intuitively correct in that it is unlikely that, for every barrel of oil produced, a country would see a corresponding drop in education spending. Far more likely is that a threshold exists whereby oil – or possibly other natural resources – begins to shape an economy and condition political and institutional life. Dependence by its very nature then must operate at a threshold.

It has been argued above that there exists a wide array of channels by which natural resource dependence could potentially impact on government attitudes towards education spending. The behaviourist perspective above offers one explanation. However, a major weakness of this explanation is that it requires governments to fall into the trap of deprioritising education, because of an irrational belief that education is less important where resource rents are plentiful. Furthermore, for such a pattern to show up as a trend in cross-country empirical comparisons, it would not be enough for some governments to exhibit such behaviour. It would have to emerge as a trend among the governments of resource dependent countries generally. Given all we know regarding the problematic nature of natural resource led development, it is unlikely that so many governments would enact bad policy due to an irrational over optimism.

It is more likely then, that incentives, and not foolishness, will shape how the powerful act. More rational actions based in the incentives for both public and private elite to engage in deleterious activities as a means of capturing rents seems a much more plausible explanation.

High rent oil dependent countries appear to create a unique environment whereby elites can maximise profits without a degree of co-operation from the majority of citizens, as would be the case in a resource poor country where labour intensive production would be more important. It would appear that elites in resource dependent countries do not require this co-operation. Instead they achieve acquiescence with a mixture of repression, low taxes and boondoggle spending. Such states have been referred to as rentier or petro-states (Karl, 2004). Importantly though, education is less likely to form part of this spending due to its tendency to empower people and embolden calls for democracy and a fairer allocation of wealth.

Such explanations, however, remain hypothetical since it has been beyond the scope of this study to test specific causal avenues, not least due to inadequacy in the availability of data. However, given that almost all of these mechanisms are ultimately mediated by a policy decision – whether or not to prioritise education in the state budget – the quality of governance and institutions clearly has the potential to counteract these tendencies. The findings here provide strong evidence supporting the idea that good governments can, not only avoid the curse; but also utilise the extra revenue to reinvest in the country's human capital. Mehlum et al. (2006), Boschini et al. (2007), Collier & Goeris (2007) and Butkiewicz & Yanikkaya (2010) have, amongst others, found quality of institutions and government to be key explaining the poor economic performance of resource dependent countries. The present findings support such a hypothesis as being also applicable to education. Such a proposition is also supported by the successful experiences of Norway and Botswana where institutions and legal instruments – and not the day to day actions of politicians – are primarily responsible for the hitherto successful allocation and investment of natural resource rents.

Whether institutions then can be considered a mechanism of the resource curse, or simply the regulating factor for other transmission channels, is open to debate. However, striving to improve institutional quality and governance appears to offer the most effective – it not necessarily realistic – manner of combatting the negative externalities on education associated with oil led development.

While improving the quality of institutions and governance will clearly not be easy to implement, changes than can be made through policy are perhaps a more achievable goal in the short term. In this regard, the final set of results tested the potential for greater integration with the global economy to mitigate the negative effect of oil on education expenditure. Sachs & Warner (1995), Arezki & van der Ploeg (2007), and Papryrakis & Gerlagh (2004) all

argue that a lack of openness is one of the principal reasons for poor growth rates among resource dependent countries. Butkiewicz & Yanikkaya (2010), on the other hand, find the opposite, with openness being a negative factor within the curse thesis. What is more, the theoretical arguments for why openness might have a positive or negative impact on education spending are distinct to those applicable to economic growth. For this reason the present study turned to some theories from the public spending and globalisation literature for possible explanations regarding the effect of greater economic liberalisation on education. The subsequent findings suggest a negative effect of policy openness on education expenditure. Further results point to the possibility that the interaction of greater policy openness with oil may even exacerbate oil's negative effect. While it would be difficult to argue that openness accounts for some of the negative impact from oil on education spending, the results certainly do not indicate economic liberalisation to be a viable policy option to poor levels of education spending in oil rich states.

Proponents of the efficiency hypothesis (discussed in section 3) would argue that the negative affect of openness is simply the result of increased exposure to global market forces that make constraints on welfare spending by the need to be competitive. The problem with this argument is that one would expect that countries with high oil rents would be better placed than most countries to compensate citizens for such events by spending on desirable public goods like education. On the other hand, it is also possible that this alternative compensation hypothesis is less likely, since oil rich countries tend to be more authoritarian and more immune to internal demands to be compensated for the negative aspects of greater economic integration.

This idea is in tune with Rudra & Haggard (2005) who found reduced education spending in authoritarian countries with open economies. However, the results could be interpreted along the lines of the models proposed by Bourguignon & Verdier (2000) and Falkinger & Grossman (2005), who seem to agree that elites in oligopolistic systems have an interest in investing in education within a closed economy, because the need to produce manufactured goods domestically provides opportunity to profit from the investment in education. In an open system trade would replace domestic production and take away the incentive to invest in education. Both of the explanations given above require the assumption of some degree of autarchy and/or undemocratic system. Since we know that oil rich states tend to be more authoritarian (Ross, 2001; Karl, 2004), these ideas may explain the ambiguous results for democracy and autocracy, given that authoritarian governments may make diametrically

opposite decisions regarding education spending depending on the trade regime. Furthermore, the autocracy dummy became negative and significant when openness was introduced into the model. However, these ideas remain speculative and it is beyond the scope of the present study to do more than hypothesise regarding their explanatory potential. Furthermore, the variables for democracy and autocracy were mostly consistent in their lack of predictive power. This may, however, have been due to the coding of the variables that set a high standard for democracy in classifying countries. It may also be a reflection that changes in the level of formal democracy may do little to change established social and economic structures as proposed by Acemoglu & Robinson (2008).

The present findings indicate the existence of a negative impact from natural resources on education through the path of a reduced government prioritisation of education due to resource dependence. However, it would be wrong to assert that these results contradict the findings of a number of scholars who find against the resource curse hypothesis. The reason for this is that this study has focussed on resource dependence rather than abundance as its primary explanatory variable. The disagreement then is more conceptual than empirical. Although alternative abundance measures are being favoured because they are exogenous to the dependent variables in question, it is likely that this exogeneity, rather than making such measure more appropriate, in fact stems from the lack of any logical causal mechanism.

6. CONCLUSION

The analysis presented above demonstrates a consistently strong and statistically significant resource curse effect of oil on education spending. Further empirical analysis shows no evidence that a more open economic policy mitigates this effect. In fact, increased openness appears to exacerbate the negative impact of oil on education spending, with potential knock-on effects for human capital stocks. Those prescribing blanket economic liberalisation for closed oil dependent economies should take heed. However, further results indicate that good governance and better institutions may be a way around the resource curse. Efforts to assist in the improvement of these factors should therefore be prioritised.

The results showing a negative effect of oil cannot be explained by a simple crowding out hypothesis thought to occur as a result of Dutch Disease. It is argued here that the negative effect of oil will more likely be capturing the elite bias over budgeting decisions towards their interests over those of the majority of citizens in oil dependent countries. The public spending literature indicates that education spending policy is far more nuanced and subject to political

and economic interests that are, in turn, conditioned by a variety of incentives and disincentives among those with power and influence. Further research may wish to examine these issues in the context of natural resource dependent economies, where rent-seeking along with more authoritarian governments is commonplace. Such research should also recognise the disparity between the curse effects of different subdivisions of the natural resource sector. The same tests carried out for oil revealed little evidence of a negative association between minerals and education spending indicating the need for specificity.

In regard to the on-going debate surrounding the resource curse hypothesis, it is argued that focussing on resource abundance is of limited value to understanding the potential consequences of following a natural resource led development strategy. Measures of abundance give little indication of the relative importance of natural resources to other sectors. Abundance, therefore, is isolated from the relative role of rents and therefore from the incentives for elites within and without government to engage in rent-seeking. While the prevalence of rent-seeking will partially depend on the gross quantity of rents available to be captured, the relative benefit of engaging in such activity will be more likely to decide the extent to which individuals have an incentive to do so. Moreover, the relative influence on policy of those elites who benefit from such activities will be reduced as dependence is reduced. According to this logic education spending should be higher where a higher proportion of the rich and influential have invested in labour intensive production. In oil dependent countries, elites are more likely to specialise in rent capture to the detriment of education.

Many of the issues raised above clearly require further probing. Future studies for instance, may do well to investigate the composition of education expenditure in oil dependent countries, focussing of the distribution of funding between primary, secondary and tertiary sectors. Evidence from the public spending literature suggests that spending is often targeted at the tertiary sector, subsidising the education of elites, rather than investing in primary and secondary education (Ansell, 2008). Future studies may also benefit by focusing on the direct impact of natural resources on other development outcomes, rather than continuing the somewhat finicky debate on growth. Indeed, it is suggested here that arguments over measurements of abundance are of little value for our understanding of the particular economic and political dynamics that seem to exist in resource dependent countries.

The fundamental problems associated with natural resources and development may not be ones of natural resources in themselves. They may, in fact, be the same problems for development that all countries have had throughout history. The difference made by natural resources may be to permit bad policy to persist. The findings with regard to education support such a hypothesis. In short, the key to the resource curse may not be that natural resources cause countries to fail. It may be that natural resources allow incompetent and corrupt governments to survive by staving off the most extreme forms of failure. The case of education is perhaps the best to capture this in that there is no worthy reason for good governments not to invest in education. This will be especially so given that investment in education will decide how likely a country is to escape resource dependence and succeed in today's global economy.

BIBLIOGRAPHY

Acemoglu, D., & Robinson, J. A. (2008). Persistence of Power, Elites, and Institutions [Electronic Version]. *American Economic Review, 98*(1), 267–93.

Alexeev, M., & Conrad, R. (2009). The Elusive Curse of Oil [Electronic Version]. *The Review of Economics and Statistics, 91*(3), 586–598.

Amsden, A. H. (1997). South Korea: Enterprising Groupsand Entrepreneurial government. In A. D. Chandler, F. Amatori, & T. Hikano, *Big Business and the Wealth of Nations* (pp. 336-367). Camebridge: Cambridge University Press.

Ansell, B. W. (2008). Traders, Teachers, and Tyrants: Democracy, Globalization, and Public Investment in Education [Electronic Version]. *International Organisation, 62*, 289–322.

Arat, Z. F. (1988). Democracy and Economic Development: Modernization Theory Revisited [Electronic Version]. *Comparative Politics, 21*(1), 21-36.

Arezki, R., & van der Ploeg, F. (2007). *Can the Natural Resource Curse Be Turned Into a Blessing? The Role of Trade Policies and Institutions.* (Working Paper7/55). Retrieved May 8th, 2011, from International Monetary Fund: http://www.imf.org/external/pubs/ft/wp/2007/wp0755.pdf

Ashton, D., & Green, F. (1996). *Education, training and the global economy* . Cheltenham: Edward Elgar.

Atkinson, G., & Hamilton, K. (2003). Savings, Growth and the Resource Curse Hypothesis [Electronic Version]. *World Development, 31*(11), 1793–1807.

Auty, R. M. (1994). Industrial Policy Reform in Six Large Newly Industrializing Countries: The Resource Curse Thesis [Electronic Version]. *World Development, 22*(1), 11-26.

—.(1997). Natural Resource endowment, the state and development strategy [Electronic Version]. *Journal of International Development, 9*(4), 651-663.

—.(2000). How Natural Resources Affect Economic Development [Electronic Version]. *Development Policy Review, 18*, 347-364.

—.(2001a). *Resource abundance and economic development.* Oxford: Oxford University Press.

—.(2001b). The political state and the management of mineral rents in capital-surplus economies: Botswana and Soudi Arabia [Electronic Version]. *Resources Policy, 27*, 77–86.

—.(2001c). The political economy of resource driven growth [Electronic Version]. *European Economic Review, 45*, 839-846.

—.(2007). Natural resources, capital accumulation and the resource curse [Electronic Version]. *Ecological Economics, 61*, 6 2 7 – 6 3 4.

Baker, R. M. (2007). *Lagged Dependent Variables and Reality: Did you specify that autocorrelation á priori?* Paper presented at the 2007 Annual General meeting of the American Political Science Association. Retrieved May 20th, 2011, from: http://www.allacademic.com/meta/p_mla_apa_research_citation/2/0/9/6/9/p209695_index.html

Barro, R. J. (1996). *Determinants of economic growth: a cross-country empirical study* (Working Paper No. 5698.). Retrieved May 8th, 2011, from National Bureau of Economic Research: http://www.nber.org/papers/w5698.pdf?new_window=1

—.(1999). Determinants of Democracy [Electronic Version]. *The Journal of Political Economy, 101*(6), 158-183.

Beblawi, H. (1987). The Rentier State in the Arab World. In H. Beblawi, & G. (. Luciani, *The Rentier State: Volume 2* (pp. 49-62). New York: Croom Helm.

Behrman, J. R. (1987). Commodity price instability and economic goal attainment in developing countries [Electronic Version]. *World Development, 15*(5), 559-573.

Birdsall, N., & Hamoudi, A. (2002). *Commodity Dependence, Trade and Growth: When "Openness" is Not Enough* (Working Paper No. 7). Retrieved May 8th, 2011 from The Centre For Global Development: http://www.cgdev.org/content/publications/detail/2783/

Birdsall, N., Pinckney, T., & Sabot, R. (2001). Natural resources, human capital, and growth. I R. M. Auty, *Resource abundance and economic growth* (pp. 57–75). Oxford: Oxford University Press.

Boshchini, D. A., Pettersson, J., & Roine, J. (2007). Resource curse or not: a question of appropriability [Electronic Version]. *Scandinavian Journal of Economics, 109*(3), 593–617.

Bourguignon, F., & Verdier, T. (2000). Is financial openness bad for education? A political economy perspective on development [Electronic Version]. *European Economic Review, 44*, 891-903.

Boyce, J. R., & Herbert Emery, J. C. (2011). Is a negative correlation between resource abundance and growth sufficient evidence that there is a ‘‘resource curse’’? [Electronic Version]. *Resources Policy, 36*(1), 1-13.

Broad, R. (1995). The Political Economy of Natural Resources: Case Studies of the Indonesian and Philippine Forest Sectors [Electronic Version]. *The Journal of Developing Areas, 29*(3), 317-340.

Brunnscheiler, C. N., & Bulte, E. H. (2008). The resource curse revisited and revised: A tale of paradoxes and red herrings [Electronic Version]. *Journal of Environmental Economics and Management, 55,* Journal of Environmental Economics and Management.

Brunnschweiler, C. N. (2008). Cursing the Blessings? Natural Resource Abundance, Institutions, and Economic Growth [Electronic Version]. *World Development, 36*(3), 399–419.

Bruno, M., & Sachs, J. (1982). 'Energy and Resource Allocation: A Dynamic Model of the "Dutch Disease". *Review of Economic Studies, 49,* 845–59.

Butkiewicz, J. L., & Yanikkaya, H. (2010). Minerals, Institutions, Openness, and Growth: An Empirical Analysis [Electronic Version]. *Land Economics, 86*(2), 313–328.

Collier, P., & Goderis, B. (2007). *Commodity Prices, Growth, and the Natural Resource Curse: Reconciling a Conundrum* (CSAE Working Paper Series/2007-15). Retrieved May 7th, 2011 from The Center for the Study of African Economics: http://economics.ouls.ox.ac.uk/13218/1/2007-15text.pdf

Collier, P., & Hoeffler, A. (1998). On economic causes of civil war [Electronic Version]. *Oxford Economic Papers, 50,* 563-573.

—.(2005). Resource Rents, Governance, and Conflict [Electronic Version]. *The Journal of Conflict Resolution, 49*(4), 625-633.

Collier, P., Hoeffler, A., & Rohner, D. (2009). Beyond greed and grievance: feasibility and civil war [Electronic Version]. *Oxford Economic Papers, 61,* 1–27.

Corden, W., & Neary, J. (1982). Booming Sector and De-Industrialisation in a Small Open. *The Economic Journal, 92,* 825–48.

Dahl, R. A. (1956). *A preface to democratic theory.* Chicago: University of Chicago Press.

Damania, R., & Bulte, E. (2003). *Resources for Sale: Corruption, Democracy and the Natural Resource Curse* (Discussion Paper No. 0320). Retrieved April 2nd, 2009 from Centre for International Economic Studies: http://www.adelaide.edu.au/cies/

de Soysa, I. (2002). Paradise Is a Bazaar? Greed, Creed, and Governance in Civil War, 1989-99 [Electronic Version]. *Journal of Peace Research, 39*(4), 395-416.

de Soysa, I., & Binningsbø, H. M. (2009). The devil's excrement as social cement: natural resources and political terror, 1980–2002 [Electronic Version]. *International Social Science Journal, 57*(1), 21–32.

Delavallade, C. (2006). Corruption and Distribution of Public Spending in Developing Countries [Electronic Version]. *Journal of Economics and Finance, 30*(2), 222-239.

Dicken, P. (2003). *Global shift: reshaping the global economic map in the 21st century.* London: Sage Publications.

Dietz, A., Neumayer, E., & de Soysa, I. (2007). Corruption, the resource curse and genuine saving [Electronic Version]. *Environment and Development Economics, 12*, 33–53.

Ding, N. & Field, B. C. (2005). Natural Resource Abundance and Economic Growth [Electronic Version]. *Land Economics, 81*(4), 496–502.

Dollar, D. & Kraay, A. (2001). *Trade, Growth, and Poverty* (Policy Research Working Paper No. 2615). Retrieved May 8th, 2011, from The World Bank: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2002/08/23/000094946_02082304142939/Rendered/PDF/multi0page.pdf

Dreher, A., Sturm, J. E. & Ursprung, H. W. (2008). The impact of globalization on the composition of government expenditures: Evidence from panel data [Electronic Version]. *Public Choice, 134*, 263–292.

Falkinger, J. & Grossmann, V. (2005). Institutions and Development: The Interaction between Trade Regime and Political System [Electronic Version]. *Journal of Economic Growth, 10*, 231–272.

Fields, K. (1997). Stong Stages and Business Organization in Korea and Taiwan. I S. Maxfield, & B. R. Sneider, *Business and State in Developing Countries* (pp. 120-151). New York: Cornell University Press.

The Fraser Institute (2008). 'Economic Freedom of the World Data', Retrieved 02/04/2009 at http://www.freetheworld.com/datasets_efw.html.

Freedman, D. A. (2010). *Statistical Models and Causal Inference: A Dialogue with the Social Sciences.* (D. Collier, J. S. Sekhon, & P. B. Stark, Eds.) Cambridge: Camebridge University Press.

Garfinkel, M. R., Skaperdas, S., & Syropoulos, C. (2008). Globalization and domestic conflict [Electronic Version]. *Journal of International Economics, 76*, 296–308.

Gelb, A. & Associates. (1988). *Oil windfalls: blessing or curse?* New York: Oxford University Press.

Gleditsch, N. P., Wallensteen, P., Eriksson, M., Sollenberg, M. & Strand, H. (2002). Armed Conflict 1946-2001: A New Dataset [Electronic Version]. *Journal of Peace Research, 39*(5), 615-637.

Gurr, K. & Jaggers, T. R. (1995). Tracking Democracy's Third Wave with the Polity III Data [Electronic Version]. *Journal of Peace Research, 32*(4), 469-482.

Gwartney, J. D. & Lawson, R. A. (2008). *Economic Freedom of the World: 2008 Annual Report.* Vancouver: Fraser Institute.

Gylfason, T. (2001a). Natural resources, education, and economic development [Electronic Version]. *European Economic Review, 45*, 847-859.

—.(2001b). Nature, power and growth [Electronic Version]. *The scottish journal of political economy, 48*(5), 558-588.

—.(2004). *Natural resources and economic growth: from dependence to diversification* (Disussion Paper No. 4804). Retrieved April 10th, 2009, from Centre for Economic Policy Research: http://www.cepr.org/pubs/dps/DP4804.asp

Gylfason, T., & Zoega, G. (2002). *Inequality and economic growth: do natural resources matter?* (Working Paper No. 712). Reteived May 8th, 2011 from Center for Economic Studies & Ifo Institute for Economic Research: http://www.ifo.de/portal/page/portal/DocBase_Content/WP/WP-CESifo_Working_Papers/wp-cesifo-2002/wp-cesifo-2002-04/712.pdf

—.(2006). Natural Resources and Economic Growth: the role of investment [Electronic Version]. *The World Economy, 29*(8), 1091-1115.

Gylfason, T., Herbertsson, T. T. & Zoega, G. (1999). A mixed blessing: natural resources and economic growth [Electronic Version]. *Macroeconomic Dynamics, 3*, 204 – 225.

Hirschman, A. (1958). *The Strategy of Economic Development.* New Haven: Yale University.

Hodler, R. (2006). The curse of natural resources in fractionalized countries [Electronic Version]. *European Economic Review, 50*, 1367 – 1386.

Iimi, A. (2007a). Escaping from the Resource Curse: Evidence from Botswana and the Rest of the World [Electronic Version]. *IMF Staff Papers, 54*(4), 663-699.

Jensen, N. & Wantchekon, L. (2004). Resource Wealth and Political Regimes in Africa [Electronic Version]. *Comparative Political Studies, 37*(7), 816-841.

Karl, T. L. (1987). Petroleum and Political Pacts: The Transition to Democracy in Venezuela [Electronic Version]. *Latin American Research Review, 22*(1), 63-94.

—.(2004). Oil-Led Development: social, politica,l and economic consequences [Electronic Version]. *Encyclopedia of Energy, 4*, 661-672.

Kaufman, R. R. & Segura-Ubiergo, A. (2001). Globalization, Domestic Politics, and Social Spending in Latin America: A Time-Series Cross-Section Analysis, 1973-97 [Electronic Version]. *World Politics, 53*(4), 553-587.

Keefer, P. & Knack, S. (2007). Boondoggles, Rent-Seeking, and Political Checks and Balances: Public Investment Under Unaccountable Governments [Electronic Version]. *The Review of Economics and Satistics, 89*(3), 566-572.

Kolstad, I. & Wiig, A. (2009). It's the rents, stupid! The politica leconomy of the resource curse [Electronic Version]. *Energy Policy, 37*, 5317–5325.

Kronenberg, T. (2004). The curse of natural resources in the transition economies [Electronic Version]. *Economics of Transition, 12*(3), 399–426.

Lam, R. & Wantchekon, L. (2003). *Political Dutch Disease* (Working Paper). Retrieved from http://www.nyu.edu/gsas/dept/politics/faculty/wantchekon/research/lr-04-10.pdf

Larsen, E. R. (2004). *Escaping the Resource Curse and the Dutch Disease? When and Why Norway Caught up with and Forged ahead of Its Neighbors* (Discussion Paper 377). Retrieved April 4, 2011 from Research Department of Statistics Norway: http://www.ssb.no/publikasjoner/DP/pdf/dp377.pdf

—.(2005). Are rich countries immune to the resource curse? Evidence from Norway's management of its oil riches [Electronic Version]. *Resources Policy, 30*, 75–86.

Lederman, D., & Maloney, W. F. (2008). In Search of the Missing Resource Curse [Electronic Version]. *Economia, 9*(1), 1-56.

Leite, C., & Weidermann, J. (2002). Does mother nature corrupt? Natural resources, corruption and economic growth. I G. T. Abed, & G. (. Sanjeev, *Governance, corruption and economic performance* (ss. 159-196). Washington D.C.: International Monetary Fund.

Levin, J. (1960). *The Export Economies: Their Pattern of Development in Historical.* Camebridge: Havard University Press.

Lindert, P. H. (2004). *Growing Public, Volume 1 : Social Spending and Economic Growth since the Eighteenth Century.* West Nyack, NY: Cambridge University Press.

Lipset, M. S. (1959). Some Social Requisites of Democracy: Economic Development and Political Legitimacy [Electronic Version]. *The American Political Science Review, 53*(1), 69-105.

Lucas, R. (1988). On the mechanics of economic development [Electronic Version]. *Journal of Monetary Economics, 22*, 3–42.

Mahdavy, H. (1970). The Patterns and Problems of Economic Development in Rentier States. I M. (. Cook, *Studies in the Economic History of the Middle East* (ss. 428–67). London: Oxford University Press.

Mauro, P. (1998). Corruption and the composition of government expenditure [Electronic Version]. *Journal of Public Economics, 69*, 263–279.

Mckeown, T. J. (1999). Case Studies and the Statistical Worldview: Review of King, Keohane,and Verba's Designing Social Inquiry: ScientiŽ c Inference in Qualitative Research. *International Organization, 53*(1), 161–190.

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

Mehrara, M. (2009). Reconsidering the resourcecurse in oil-exporting countries [Electronic Version]. *Energy Policy*(37), 1165–1169.

Meltzer, A. H., & Richard, S. F. (1981). A Rational Theory of the Size of Government [Electronic Version]. *The Journal of Political Economy, 89*(5), 914-927.

Mikesell, R. F. (1997). Explaining The Resource Curse With Special Reference To Mineral Exporting Countries [Electronic Version]. *Resources Policy, 23*(4), 191-199.

Morikawa, H. (1997). Japan: Increasing organizational capabilities of large industrial enterprises, 1880s-1980s. I A. D. Chandler, F. Amatori, & T. (. Hikano, *Big Business and the Wealth of Nations* (ss. 307-335). Cambridge: Cambridge University Press.

Neumayer, E. (2004). Does the ‘‘Resource Curse’’ hold for Growth in Genuine income as well? [Electronic Version]. *World Development, 32*(10), 1627–1640.

Nurske, R. (1958). Trade Fluctuations and Buffer Policies of Low-Income Countries [Electronic Version]. *Kyklos, 11*(2), 141-154.

Papyrakis, E., & Gerlagh, R. (2004). The resource curse and its transmission channels. *Journal of comparative economics, 32*, 181 – 193.

Prebisch, R. (1950). *The economic development of Latin America and its principal problems.* New York: United Nations.

Ranis, G., Stewart, F., & Ramirez, A. (2000). Economic Growth and Human Development [Electronic Version]. *World Development, 28*(2), 197-219.

Robinson, J. A., Torvik, R., & Verdier, T. (2006). Political foundations of the resource curse [Electronic Version]. *Journal of Development Economics, 79*, 447– 468.

Rodrick, D. (1996). Understanding Economic Policy Reform [Electronic Version]. *Journal of Economic Literature, 34*(1), 9-41.

Rodrik, D. (1997). *Has Globalization Gone Too Far?* Washington D.C.: Institutie for International Economics.

Romer, P. M. (1986). Increasing returns and long-run growth [Electronic Version]. *The Journal of Political Economy, 38*, 1015-1049.

Romer, P. M. (1990). Endogenous Technological Change [Electronic Version]. *The Journal of Political Economy, 98*(5), 71-102.

Ross, M. L. (1999). The Political Economy of the Resource Curse [Electronic Version]. *World Politics, 51*, 297-322.

—.(2001a). Does Oil Hinder Democracy? [Electronic Version]. *World Politics, 53*(3), 325-361.

—.(2001b). *Extractive sectors and the poor*. Retrieved May 8th, 2011 from Oxfam America: http://www.oxfamamerica.org/files/extractive-sectors-and-the-poor.pdf

—.(2004). What Do We Know about Natural Resources and Civil War? [Electronic Version]. *Journal of Peace Research, 41*(3), 337-356.

Rosser, A. (2006). *The Political Economy of the resource curse: a literature survey* (Working Paper No. 268). Retrieved November 12th, 2009, from Institute of Development Studies Web site: http://www.ids.ac.uk/go/idspublication/the-political-economy-of-the-resource-curse-a-literature-survey

Rudra, N., & Haggard, S. (2005). Globalization, Democracy, and Effective Welfare Spending in the Developing World [Electronic Version]. *Comparative Political Studies, 38*, 1015-1049.

Sachs, J. D., & Warner, A. M. (1995). *Natural resource abundance and economic growth* (Working paper No. 5398). Retrieved May 8th, 2011 from National Bureau of Economic Research: http://www.nber.org/papers/w5398.pdf?new_window=1

—.(1997). Sources of slow growth in African economies [Electronic Version]. *Journal of African Economies, 6*(3), 335 – 376.

—.(2001). Natural resources and economic development: the curse of natural resources [Electronic Version]. *European Economic Review, 45*, 827 – 838.

Sala-i-Martin, X., & Subramanian, A. (2003). *Addressing the Natural Resource Curse: An Illustration From Nigeria* (Working Paper No. 9804). Retrieved October 13th, 2010 from The National Bureau of Economic Research: http://www.nber.org/papers/w9804

Sen, A. (1998). Mortality as an Indicator of Economic Success and Failure [Electronic Version]. *The Economic Journal, 108*(446), 1-25.

Shaxon, N. (2007). Oil, corruption and the resource curse [Electronic Version]. *International Affairs, 83*(6), 1123–1140.

Skocpol, T. (1982). Rentier State and Shi'a Islam in the Iranian Revolution [Electronic Version]. *Theory and, 11*, 265–83.

Smith, A. (2001). *An Inquiry into the Nature and Causes of the Wealth of Nations* [Electronic Version]. London ElecBook: (Origional Version Published 1776).

Smith, B. (2004). Oil Wealth and Regime Survival in the Developing World, 1960-1999 [Electronic Version]. *American Journal of Political Science, 48*(2), 232-246.

Stasavage, D. (2005). Democracy and Education Spending in Africa [Electronic Version]. *American Journal of Political Science, 49*(2), 343–358.

Stiglitz, J. E. (1996). Some Lessons from the East Asian Miracle[Electronic Version]. *The World Bank Research Observer, 11*(2), 151-177.

Stijns, J. C. (2005). Natural resource abundance and economic growth revisited [Electronic Version]. *Resources Policy, 30,* 107–130.

—.(2006). Natural Resource Abundance and human capital accumulation [Electronic Version]. *World Development, 34*(6), 1060–1083.

Torvik, R. (2002). Natural resources, rent seeking and welfare [Electronic Version]. *Journal of Development Economics, 67*, 455–470.

Usui, N. (1997). Dutch disease and policy adjustments to the oil boom: a comparative study of Indonesia and Mexico [Electronic Version]. *Resources Policy, 23*(4), 151-162.

Van der Ploeg, F., & Ploehekke, S. (2009). Volatility and the natural resource curse [Electronic Version]. *Oxford Economic Papers, 61*, 727–760.

Wade, R. H. (1990). *Governing the Market:Economic Theory and the Role of Government in East Asian Industrialization.* Princeton, N.J.: Princeton University Press.

Wick, K., & Bulte, E. H. (2006). Contesting resources – rent seeking, conflict and the natural resource curse [Electronic Version]. *Public Choice, 128*, 457 – 476.

World Bank (2008). World development indicators CD-Rom. Washington, DC: World Bank.

Wright, G., & Czelusta, J. (2004). The Myth of the Resource Curse [Electronic Version]. *Challenge, 47*(2), 6–38.