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국제학석사학위논문

Conditions for Resource Curse:

**By Comparing Industrial Structure and Trade Patterns of
Coal and Oil**

자원의 저주의 조건:

석탄과 석유의 산업 구조와 무역 패턴의 비교를 통하여

2014년 8월

서울대학교 국제대학원

국제학과 국제협력전공

전희주

Conditions for Resource Curse:

**By Comparing Industrial Structure and Trade Patterns of
Coal and Oil**

Thesis by

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Seoul National University

Seoul, Republic of Korea

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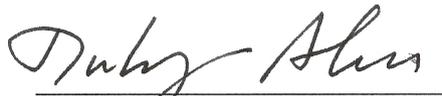
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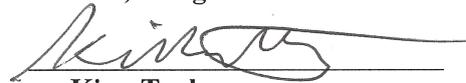
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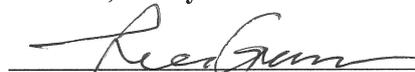
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Abstract

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The primary concern of the thesis is to identify heterogeneous impacts of different types of natural resources on economic development of countries. Although there have been extensive researches conducted on the phenomenon of resource curse, it is shown that they remain incomplete in failing to explain cases of resource-led economic developments found in historical perspective. Acknowledging this shortcoming, this research proposes *the extended Schwartz's model of resource-led development* on the basis of *Schwartz's model of late development*, as a new framework to understand divergent outcomes of economic development between resource-dependent countries.

First of all, this new extended model is applied to compare different characteristics of coal and oil, in terms of the geographic concentration, fluidity and means of transport, and the level of technology. Second, in more detail, it proceeds to examine two linkages connecting these distinctive characteristics of natural resources and their lead up to different consequences between existence and absence of resource curse. Here, two linkages are sequential in that the first linkage of how different types of natural resources result in distinctive trade patterns and industrial structure is what influences the second linkage of interactions between state and society vis-à-vis external factors of influence.

Here, two case analyses cover the case of the U.S. with its reliance on large coal reserves and production in comparison with the case of Saudi Arabia with its role as a powerful oil producer.

Moreover, by incorporating different principles such as economy, history, and politics altogether in comparative perspective, this research highlights the importance of domestic politics where many different motives and interests of domestic actors are in constant contest as well as its relations to external sources of influence.

By distinguishing coal and oil and in particular by drawing a new political economy framework into the analysis, this research departs from conventional takes on resource curse, better situated to capture the comprehensive picture of the varying courses of resource-led economic development.

Keywords

Resource curse, Resource blessing, Characteristics of natural resources, Resource-led economic development, Political economy, Coal, Oil

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Table of Contents

Acknowledgements

Abstract

Table of Contents

List of Tables

List of Figures

I. Introduction	1
II. Review on Previous Studies	3
2.1. Resource Curse	3
2.2. Resource Blessing.....	12
2.3. Theoretical approaches to economic development	15
2.3.1. Comparative Advantages and Trade	17
2.3.2. Industrialisation and late development.....	20
2.4. Types of natural resources	24
2.5. Research Question	26
2.5.1. Shortcomings of previous studies	26
2.5.2. Research Question.....	27
III. Analytical Framework	29
3.1. Schwartz’s Model of Late Development.....	29
3.2. Extended Schwartz’s model of resource-led development	36
3.3. Proposition	43
3.4. Methodology	46

IV. Analysis I- Coal and the U.S.	49
4.1. Overview	49
4.2. Basic characteristics of coal	52
4.3. Trade patterns and Industrial structure.....	57
4.4. Extended Schwartz’s model of resource-led development	61
V. Analysis II- Oil and Saudi Arabia	68
5.1. Overview	68
5.2. Basic characteristics of oil	
5.3. Trade patterns and industrial structure	73
5.4. Extended Schwartz’s model of resource-led development	77
VI. Conclusion	85

References

Appendix I - Coal Production in the Leading Coal-Producing Countries of the World

Appendix II - GDP by Industry (U.S.)

Appendix III - GDP by Industry (Saudi Arabia)

Abstract (Korean)

List of Tables

[Table 1] Cases of Late Development.....	31
[Table 2] Extended Schwartz’s model of resource-led development.....	41
[Table 3] Major characteristics of coal	67
[Table 4] Market formation and state-society interactions in relations to external forces	67
[Table 5] Major characteristics of oil.....	84
[Table 6] Market formation and state-society interactions in relations to external forces	84

List of Figures

[Figure 1] Schwartz’s Model of Late Development.....	35
[Figure 2] Extended Schwartz’s model of resource-led development	42
[Figure 3] Primary Energy Consumption by Source and Sector 2013.....	50
[Figure 4] Industrial Sector Share of Total U.S. Coal Consumption (1949-2011)	51
[Figure 5] Location of the world’s main fossil fuel reserves (Coal, oil, and gas).....	52
[Figure 6] Domestic/foreign consumption of Coal production.....	57
[Figure 7] Domestic/foreign consumption of Oil production	74
[Figure 8] Extended Schwartz’s Model of Resource-led Development.....	87

I. Introduction

Historically, natural resources have been a source of liberator for humanity. The frontier-based development model has identified the critical roles of natural resources in providing opportunities for social and economic betterment. This was evident in both cases of Great Britain and the United States in which natural resources paved the way for economic development and rise as a global hegemon. Likewise, many economic historians including Wrigley and Pomeranz saw coal and related technological developments as key transformative factors to have accelerated the process of industrial revolution in Britain¹. This resource-blessing equation, however, gradually lost its grounds to symptoms of resource curse, when discrepancies were newly observed between resource-abundance and economic development in many countries, especially in Latin America, the Middle East, and recently Africa.

One interesting aspect is that two eras of dependence on coal and oil largely coincide with two rounds of globalisation in the 18th-19th centuries and 20th-21st centuries, respectively. It is assumed at this stage that coal is not dubbed 'curse' as is oil with oil curse. Thus, why natural resources have acted as a blessing at one time and as a curse at other times is the question this paper aims to uncover. The primary concern of the paper is to identify and compare heterogeneous impacts of different types of natural resources in

¹ Clark, Gregory and Jacks, David (2007) "Coal and the Industrial Revolution, 1700-1869," *European Review of Economic History*, Vol.11, No.1, pp.39-72; according to the authors, however, the issue of causality between coal and industrial revolution or the extent to which coal contributed to the latter is questionable. Still, their findings on the existence of the ceiling up to which rents for coal reserves were allowed are quite relevant to the central question of the paper and will be discussed further in the third section.

economic development of countries. In due process, it is assumed that there exist two linkages that lead up to certain outcomes between resource curse and non-existence of resource curse.

First of all, this paper looks into how different types of natural resources such as coal and oil resulted in distinctive trade patterns and industrial structure. Second part of the paper turns to examine how natural resources and its impacts on trade patterns and industrial structure influence interactions between state and society by incorporating Schwartz's model of late development.

In doing so, this paper deviates from conventional takes on resource curse in that it distinguishes coal from oil or vice versa. That said, this paper adopts comparative approach, in which the case of the U.S. with its reliance on large coal reserves and production is compared with the case of Saudi Arabia with its role as a powerful oil producer, yet suffering from oil curse at the same time. However, this is not to say that other factors than natural resources had negligible impacts in shaping distinct courses of economic developments of these two countries. Indeed, they share more differences than similarities, for example, different histories, different socio-economic circumstances, different mind-sets, and the like. Nonetheless, this resource-oriented approach is expected to provide new perspectives to the discussion on resource curse by claiming that certain characteristics endogenous to natural resources create certain conditions in both domestic and international political economy that are central to determining the course for economic development or failure of a country.

II. Review on Previous Studies

2.1. Resource Curse

It was not until after the World War II (*WWII*) that the understanding on resource curse began to surface. Before then, the idea that natural resources invariably lead to economic growth was prevalent and rarely put under suspicion. As mentioned earlier, the use of coal was instrumental in bringing about industrial revolution in the UK in the 18th century. Pomeranz (2000) admits that there were no substantial or systemic differences between Europe and Asia at the outset of the Revolution. However, he identifies that it was the coal and cotton that made Britain reap off successfully, thus resulting in the great divergence between economies of China and Britain². In particular, coal was essential to generating heat, in fact in ways that proved more productive than other existing fuels such as timbers and charcoals. Moreover, it also contributed to enhancing productivity in both manufacturing and transportation by means of steam power.

On similar grounds, many attempted to review the case for the U.S by examining historical paths of its rapid economic development in the 19th century with respect to natural resource exploitation. Interestingly, the timing of American industrialisation and world economic leadership in manufacturing sector coincided with the exact time when it assumed the status as the world's leading mineral economy³.

On the contrary, there have been also a lot of studies on the topic of resource curse as well as debates surrounding whether resource curse really exists or not. The initial resource

² Vries, P.H.H. (2001) "Are Coal and Colonies Really Crucial? Kenneth Pomeranz and the Great Divergence," *Journal of World History*, Vol.12, No.2, pp.407-446

³ Wright, Gavin and Czelusta, Jesse (2004) "Why Economies Slow: The Myth of the Resource Curse," *Challenge*, Vol.47, No.2, pp.6-38

course thesis was closely related to the dependency theory which perceived that world is divided into two exclusive zones, the core and periphery. It was found that primary commodities in the periphery such as Latin America were being exploited to support economic growth of the core, including the U.S. and the Western Europe. Later, the focus of the studies moved from ideological splits rather to empirical data and more advanced statistical models. Sachs and Warner (1995), in this regard, provide one of the most influential blueprints in understanding the curse of natural resources. By examining 97 countries over the period of 1970-1989, they find adverse effects of natural resources on growth; countries with a high ratio of resource-based exports to GDP experience abnormally slower growth, especially compared to resource poor counterparts in East Asia⁴. Here, it should be noted that resource-based exports include agriculture, minerals, and fuels altogether.

Most of the previous studies on resource curse adopt comparative approaches in which these aforementioned regions with natural resource wealth are contrasted with those without, particularly, East Asian region. That is, as opposed to common belief that resource-rich countries would undergo faster and more successful economic growth, those seemingly cursed in terms of geologic endowment have been better off. Among many, four tigers along with Japan in East Asia were the most striking examples that broke the myth of 'resource wealth=growth' equation. Since then, economists started pointing out paradoxical aspects of oil wealth that are likely to retard economic growth in developing countries, and provoke corruption, weak governance, rent-seeking, and plunder⁵. Later, it came to be coined as 'rentier state' model which this paper shortly turns to in more details.

⁴ Sachs, Jeffrey and Warner, Andrew (2001) "Natural Resources and Economic Development: The curse of natural resources," *European Economic Review*, Vol.45, pp. 827-838

⁵ Ross, Michael L. (2012) "The Oil Curse: How petroleum wealth shapes the development of nations," Princeton University Press, p.189

This finding sparked a new round of researches to verify its methodological validity, and then to question the proposition that natural resources are detrimental to economic growth. First, arguments that oil states have displayed slower growth in comparison with other developing countries are based on relative expectations. Given that economic growth is influenced by many different, socio-economic and even cultural factors, presupposed relativity obscures exactly what conditions intervene to what degree.

Second, now the importance of relativity put aside, further examination suggests that economic growth of resource-rich countries has not been unusually slow, but more or less the same with resource-poor counterparts. Ross (2011), for example, compares average annual economic growth per capita of oil producers (1.67%) with that of non-oil producers (1.76%) between 1960 and 2006, whose difference is only 0.09%⁶. If narrowed down to developing countries only, the difference gets even smaller to 0.02%⁷. Although in both cases oil producing countries are found to slightly lag behind by 0.09% and 0.02%, respectively, these differences are not significant enough to allege oil wealth *per se* as amounting to resource curse.

Furthermore, Stijns (2000) reveals mixed results for natural resources and its roles in economic growth, in due course highlighting the importance of learning process⁸. Similarly, Brunnschweiler (2006) finds a positive relationship between natural resource abundance and economic growth between 1970 and 2000, especially when coupled with sound institutional bases⁹.

Sach and Warner (2001), confronted with many counter-arguments, re-affirm in their 2001 study the strong evidence for resource curse. For one thing, countries extremely well-

⁶ *Ibid.*, p.190

⁷ *Ibid.*, p.190

⁸ Stijns, Jean-Philippe (2000) "Natural Resource Abundance and Economic Growth Revisited," Berkeley Economics Dissertations-in-Progress Series

⁹ Brunnschweiler, Christa (2006) "Cursing the blessing? Natural resource abundance, institutions, and economic growth," *World Development*, Vol. 36, No. 3, pp.399-419

endowed with natural resources such as the oil countries in the Gulf or Mexico and Venezuela in Latin America have not been successful in sustaining rapid economic growth¹⁰. Moreover, they also change the definition of natural resources, by disaggregating them into minerals and agriculture, only to emphasize again the negative effects of high rents derived from mineral exports intensity on growth¹¹. To avoid unnecessary controversies, this paper largely agrees with what Ross calls ‘disappointingly normal growth’ of oil producing countries, for whom faster growth is expected given the access to massive capital.

Debates on resource-blessing versus resource-curse are unsolved to date, but it hints at several points overlooked for some time. In fact, it is important to recognise that resource-blessing literatures have focused on certain natural resources that were used in certain periods of time, notably, the use of coal. On the other hand, for most of the studies on resource curse, there have been no clear distinctions made between different types of natural resources, thus encompassing virtually every type of natural, extractive resources, including coal, oil, natural gas, gold, and the like.

Based on this understanding, it is equally important to examine studies focusing on ‘why’ question, that is, why there prevails such negative or relatively weak correlation between the natural resource wealth and other types of economic wealth. To start with, Barbier (2012), by comparing successful cases for resource-led developments in the past and those not in the contemporary era, sets out two conditions that should be fulfilled to achieve the frontier-based development¹². The first condition has to do with sufficient rents generated from frontier expansion even after taking into account input prices, labour and

¹⁰ Sachs and Warner (2001)

¹¹ *Ibid.*

¹² Barbier, Edward (2012) “Scarcity, frontiers and development,” *The Geographical Journal*, Vol. 178, No.2, pp. 110-122; here the great frontier expansion encompasses the exploitation not only of land and agriculture but also other natural resources such as minerals and extractive activities.

infrastructure, for instance. This in turn leads to the second condition which premises that those profits earned should be invested in other productive sectors. Only then can strong linkages between the resource sector and other production sectors be established, facilitating spill-over effects throughout the entire economy.

Often, most of the studies on the resource curse can largely be divided into two categories, one focusing on economic aspects, and the other on political aspects. For example, Sarraf and Jiwaji (2001) acknowledge first, the vicious cycle of the Dutch Disease for economic part of explanation and second, inappropriate policy decisions and rent-seeking behaviours for political explanation¹³. On the other hand, Ross (1999) and Frankel (2006) provide more comprehensive accounts on this economic-political nexus¹⁴. Thus, the categorisation of various resource curse studies presented in this section is largely based on that suggested by Ross and additionally Frankel.

As for the economic explanations of the resource curse, four key models are addressed. First of all, structuralists, most notably, Prebisch and Singer, proposed a declining trend in the price of primary commodities. Given that world demand for raw materials is inelastic with the increase in income, it is conceivable that the poor resource-reliant countries would not benefit as much from further exports and developments as other rich industrialised countries, which can amount to resource curse. Frankel, however, argues that evidence of falling commodity prices in the long-term are mixed at best, as shown in two oil shock in the 1970s and also as hypothesized by Hotelling and Malthus¹⁵. To be concise, Hotelling assumed that if short-term unexpected fluctuations averaged out, the price of oil should rise

¹³ Sarraf, Maria and Jiwaji, Moortaza (2001) "Beating the Resource Curse: The Case of Botswana," The World Bank, Environment Economics Series, No. 24753

¹⁴ Ross, Michael L. (1999) "Political Economy of Resource Curse," World Politics, Vol.51, pp.297-322; Frankel, Jaffrey (2006) "The Natural Resource Curse: A Survey," Discussion Paper 10-21, Harvard Kennedy School

¹⁵ Frankel (2006)

in accordance with the interest rate in the long run. And Malthus held more traditional views that the supply of depletable natural resources is fixed, ultimately perishable, and unable to satisfy growing demands with population, thus naturally leading to the rise in price.

The second strand of studies focused on the volatility of international commodity markets. The prices for natural resources are more vulnerable to external market variances than those of manufactured products and services, oil and natural gas being prime examples¹⁶. Hence, in the face of sharp price fluctuations, states highly dependent on commodity exports would be burdened with instable government revenues and repayment of foreign debts.

The third explanation centres on the unbalanced development between non-resource sectors and resource sectors, especially when foreign multinationals are involved in extracting oil and other mineral reserves¹⁷. This problem of linkages is further exacerbated given little interests that multinational corporations (*hereafter MNCs*) have with regards to investing profits earned from resource sale in local markets. Due to its specific condition concerning the role of MNCs, however, this third model was dismissed after the extensive nationalisation procedures undertaken by many oil exporting countries.

Related is the fourth, so-called the Dutch Disease model. Here, a boom in resource exports, strong yet temporary in its characteristic, are thought to cause market distortions that affect the structure of production and investment. The Disease underlies cyclical process that follows through the surge in resource trades, real currency appreciation, increase in government spending, increase in the price of non-traded goods such as services and construction, re-allocation of labour and land out from non-booming traded goods such

¹⁶ *Ibid.*, p.10

¹⁷ Ross (1999)

as manufacturing sectors, and lastly a current account deficit and foreign indebtedness¹⁸. Similarly, the staple trap trajectory implies that mineral windfalls harbour few incentives for the development of capital and investment but instead promote higher consumption, primarily targeted for domestic markets, and closed economy in ways that adopt protectionist strategies for non-competitive manufacturing industries. Also, it is important to emphasise that the benefits of positive externalities are limited for mining sectors, whereas manufacturing sector is more likely to see increasing returns to scale through extended spill-over of knowledge and technologies or put differently, learning-by-doing¹⁹. In this regard, the contraction of manufacturing sector is particularly dangerous as it depresses renovations and growth in productivity, which otherwise is enjoyed by non-mining economies.

As for the political aspects, Ross explores three major developments in resource curse thesis. First, the cognitive explanation concerns short-sighted mentality of policymakers that renders them more satisfied with the sudden exuberance of government revenues on the one hand, and on the other hand, less prepared for the future crisis²⁰.

The second is societal explanation that looks into how non-state actors intervene in the decision-making process of the states. It should be noted here that there are two different kinds of non-state, industrial actors that are capable of penetrating their interests effectively into state policies. First is the non-booming tradable sectors whose presence is strongly felt in Latin American countries. In comparison with East Asian countries, which resorted to export-oriented economic policies with little resource wealth, resource-rich countries in Latin America adopted import-substituting industrialisation (ISI) policies, notorious for its growth-impeding effects. This difference is attributed to the political leverage that

¹⁸ Frankel (2006)

¹⁹ Sarraf and Jiwanji (2001); Sachs and Warner (1997)

²⁰ Ross (1999)

uncompetitive manufacturing sectors in Latin America could enjoy in drawing subsidies and protectionism from the states.

The second sector is booming tradable sector in resource-rich countries, that is, resource industry *per se*. On this, Shafer contrasts mineral industries as high/high sectors with light manufacturing and agricultural sectors as low/low sectors²¹. The former industries tend to be high in capital intensity and economies of scale on the one hand, and highly inflexible in production methods and output mix on the other hand²², thereby hindering effective restructuring wherein necessary. Moreover, as the number of firms involved in the resource industry is small as opposed to peasants, large in volume, yet dispersed, they are likely to be well-organised to resort to collective actions and state protection during the adverse market conditions²³.

Lastly, the third political explanation is the state-centred approach, which despite its separate heading, is overarching in that it incorporates a mix of cognitive, societal, and institutional insights altogether. Basically, this approach is two-fold, one focusing on the state's inability to establish sound economic policies and institutions, and the other to enforce property rights and prevent rent-seeking conflicts. As for the former, it is important to understand the characteristics of rentier states, mostly applicable to the Middle East, oil producing countries. So-called rentier-states, heavily dependent on revenues drawn from natural resource rents, easily translate into poor economic governance, preferring status-quo instead of further socio-economic developments. This is primarily because states are discouraged from establishing institutions to collect tax, making it difficult to hold states accountable to their own constituency. In addition, most rentier states are devoid of

²¹ Vernon, Raymond (1997) "Review on Winners and Losers: How Sectors Shape the Developmental Prospects of States by D. Michael Shafer," *Economic Development and Cultural Change*, Vol.46, No.1

²² *Ibid.*

²³ *Ibid.*; also see Ross (1999)

institutional constraints to monitor and regulate the beneficiary-patronage relationships between elites and politicians and a few, inflexible and well-organised, industries as shown above. Recent studies on African countries allude to the failure of states to enforce property rights, which in turn exacerbates resource-related conflicts and violence with more incentives to rely on criminal gangs and private militias in due course.

Additionally, there also have been studies focusing on certain cultural and religious aspects that impede a supposed trajectory of modernisation theory; economic growth and thus political liberalisation. For example, some identified Muslim as least likely to conform to democracy, which happened to be the largest bread basket for oil reserves. The former vice president of the U.S. under Bush administration, Dick Cheney's remarks are illustrative of commonly shared understanding of the relationship between oil, Islam, and democracy; *'The good Lord didn't see fit to put oil and gas only where there are democratically elected regimes friendly to the United States²⁴.*'

Oil in this case was seen as courting the needs of Islamic ruling elites that can effectively disaggregate public upheavals opting for democratisation. In short, revenues accrued directly from nationalised oil industry and abundant oil and mineral resources could be used to reinforce the military and police designed as a means to protect autocratic or theocratic regimes intact²⁵. Therefore, it was conceived that a large sum of economic growth at the surface, measured in terms of a country's GDP, does not necessarily lead to democratisation, especially when coupled with Islamic autocracy. Nonetheless, this correlation between Muslim and economic and political development is beyond the scope of this paper. It might be sufficient at the moment to say that much has been explored to

²⁴ Cheney, Dick (1998); from the Speech delivered at the Cato Institution (June 23, 1998)

²⁵ Center for European Policy Evaluation (2012) "Islam and the curse of oil, limit in the process of democratization in the Middle East?," <http://cepeoffice.com/2012/10/23/islam-and-the-curse-of-oil-limit-in-the-process-of-democratization-in-the-middle-east/> (accessed May 9, 2014)

dissipate the myth of modernisation theory in which the type of political regimes proves irrelevant to directing a course of economic development of a state; put differently, that democracy is not necessarily a prerequisite for modernisation and vice versa.

2.2. Resource Blessing

As noted above, resource blessing was the norm in the past as it was largely believed that a country's resource wealth would result in both economic and political development. The reasoning for this belief is largely based on the modernisation theory²⁶. First, countries endowed with natural resource wealth were expected to overcome constraints of means of production of their own; relatively cheap and abundant labour force, yet insufficient investment capital. This was because government revenues derived from sales of natural resources could be invested in social infrastructure that are necessary for faster growth, transportation and education, for example.

Second, this series of economic development would eventually lead to democratisation, in which process will enhance many aspects of political goods from effectiveness and accountability of a government to empowerment of women and so on²⁷. This is in line with the modernisation theory that saw the relationship between economic development and political development as being positive and linear. To be more specific, such phenomenon as increases in GDP, industrialisation, and urbanisation are likely to change and complicate society drastically and put pressures on harmonisation of civil norms and values, in turn necessitating political democratisation.

²⁶ Ross (2012)

²⁷ *Ibid.*

More important studies came from those who heeded to the role of coal in times of industrial revolution in efforts to find a correlation between resource abundance and economic development. At the centre, there lay the transition to the fossil economy, run on the basis of combusting fossil fuels, as opposed to organic economy whose fundamental production is based on land. According to Malm (2013), the fossil economy refers to '*an economy characterised by self-sustaining growth predicated on growing consumption of fossil fuels, and therefore generating a sustained growth in emissions of carbon dioxide*²⁸.'

One of most influential studies on resource blessing is found in Pomeranz's analysis that examined why there erupted a sudden disparity between Western Europe and East Asia, namely, China and Japan. According to Pomeranz (2000), not until 1800 did there exist major differences between these two regions and indeed China was performing as good as, if not much better, European states in the other side of the hemisphere²⁹. Criticising previous euro-centred arguments that saw the demography, ecology, accumulation or institutions such as the emergence of efficient markets and property rights as endogenous and exclusive only to Europe, it was suggested that Europe was able to get ahead of other regions by relying on external factors based on the use of coercion and collusion³⁰.

At the same time, and more importantly for this study, the use of coal was appreciated as one of the most essential elements in bringing about industrial revolution in Britain, thus the great divergence. Indeed, Britain is commonly recognised as the birthplace of the fossil economy where in 1850 the consumption of coal was more than three times that of the U.S., France, Germany, Belgium, and Austro-Hungary combined, amounting to about 60 % of

²⁸ Malm, Andreas (2013) "The Origins of Fossil Capital: From Water to Steam in the British Cotton Industry," *Historical Materialism*, Vol. 21, No. 1, pp.15-68

²⁹ Pomeranz, Kenneth (2000) "The Great Divergence: China, Europe, and the Making of the Modern World Economy," Princeton University Press

³⁰ *Ibid.*

global CO2 emissions³¹. The turn to coal was in a way desperate attempts to overcome the Malthus constraints assumed in organic economies. Here, Malthus constraints or so-called Ricardian curse is well understood as having adverse impacts in further economic growth. As pointed out by Wrigley, another representative scholar in the study of relationship between coal and industrial revolution, it was inevitable for land-based economies to face serious pressures on the land according to the laws of nature, having limited productive capabilities of the land (i.e., depletion of soils and diminishing returns)³².

With the arrival of coal, however, the course of stagnation could be reversed. Less amount of coal as compared to acres of land was required to generate the same amount of energy³³, thus freeing land to be utilised for other purposes, in particular, in accelerating industrial development. In sum, faced with the strain of resource scarcity, European countries, spearheaded by Britain, launched multifaceted breakthroughs not only technological but also physical ones in search of more efficient energy and resources both inside and outside Europe.

However, it is important to note that it was not simply the use of coal and its cost-effectiveness that enabled technological innovations and successive industrialisation. Instead, it was the integration of coal, steam engine, and iron-making into a general process of growth. In other words, coal only gained its momentum when turned into a source of mechanical energy involved in actual commodity production, rather than used for the purposes of household heating³⁴. Furthermore, this entire process was made possible through domestic technology developed by domestic constituencies, especially artisans with experience and precise understanding and skills required for gadgets and instruments, later to be used in producing steam engines. That said, the correlation between coal and

³¹ Malm (2013)

³² *Ibid.*

³³ *Ibid.*

³⁴ *Ibid.*, p. 18

industrial revolution largely owes to this sort of concentration or borrowed from Pomeranz, the bridging of the social distance between artisans, entrepreneurs, and coal.

In this regard, it can be said that mining and the use of coal are largely home-grown and home-oriented, alluding to both forward and backward linkages coal is apt to form, essential for externalities, local clustering, and overall domestic development possibilities. Relatedly, the formation of a coal township is another point in concern as all socio-economic actors seem to easily convene to work on and further enhance the local expertise. These accounts related to coal's characteristics vis-à-vis economic development shall be re-visited and further developed in part IV.

2.3. Theoretical approaches to economic development; trade and industrialisation

Along with studies on economic development/underdevelopment of resource-rich countries, theories of economic development in general should be taken into consideration mainly for two reasons. Firstly, it is important in a sense that natural resource is one of many, and perhaps, major inputs to achieve economic growth. In the study of economics, natural resource belongs to factors of production along with labour, capital, and land. Likewise, in the study of politics or political economy, the use of natural resources are largely dependent on again many different factors of decision-making in which state and its policies, domestic politics, and international or regional environment all intervene. Thus, how natural resources are used can only be understood on the basis of dynamics among these various aforementioned inputs, be it economic or political factors. Secondly, a large portion of previous studies on resource curse have only tackled trade-related issues, with a small portion assigned to industrialisation aspects of resource abundant countries. Given

that trade and industrialisation are not exclusive, but two main pillars in realising economic development, there remains the need to narrow this division found in resource curse studies, which this research aims to address.

This section can be divided into two parts in trying to investigate relevant theories of economic development, one with regards to the impacts of trade and the other with the process of industrialisation. Although separated for the sake of discussion, trade and industrialisation are closely interrelated in pursuing economic development of a country. But, first of all, it is important to note that development is a slow, structural process that not only embodies changes in economic aspects, but also those in political and cultural aspects.

According to Rostow (1960), there are five stages of growth; the traditional society, the preconditions for take-off, the take-off, the drive to maturity, and the age of high mass consumption³⁵. First, traditional society is firmly rooted in agricultural production and hierarchical social structure, with much emphasis on landed regional interests. Second, preconditions for the take-off are cultivated through the introduction of new production methods both into agriculture and industry, expansion of trade and international competition, and politically the establishment of an effective centralized nation-state. This eventually leads a country to take off in which such changes as rapid expansion of a manufacturing industry, surge of technology, and commercialised agricultural goods are in motion. These economic transformations are accompanied by the emergence of a new political interest, so-called the entrepreneur class as a major driver of modernisation. In about sixty years after the beginning of the take-off, a country reaches the fourth stage of

³⁵ Rostow, W.W. (1960) "The Stages of Economic Growth: A Non-Communist Manifesto," Cambridge: Cambridge University Press, Chapter 2, "The Five Stages of Growth-A Summary," pp. 4-16

maturity (although the exact period is somewhat debatable). If the economy during the take-off was concentrated on a limited scope of industrial sectors, mostly primary and basic ones such as coal, iron, and heavy industries of the railway, this economy ‘matures’ and advances into a wider range of industries that produce machine-tools, chemicals, and electrical equipment, for instance. Lastly, a shift towards consumer durable goods and services is visible in the post-maturity phase and with increased demands and resources, political priorities diversify, thus taking social welfare and security into account.

2.3.1. Comparative Advantages and Trade

First, from the perspective of economics, the concept of comparative advantages is key to understanding the workings of international trade and its positive-sum benefits for those involved. Basically, comparative advantages arise from resource differences between countries, leading to specialisation and specific location of industries. For example, countries abundant in labour would specialise in labour-intensive industries such as agriculture and light manufacturing while those with abundant capital focusing on capital-intensive industries such as heavy manufacturing. However, struck by empirical insufficiency of these traditional trade models, especially in terms of their two core assumptions, say, perfect competition and constant returns to scale, there emerged new trade theories in efforts to better grasp the monopolistic market structure and increasing volume of two-way, intra-industry trade prevalent today. For them, it is not resource differences itself that determine countries’ comparative advantages and location of

production, but rather economies of scale, be it external or internal; large-scale production, cumulative experience and transitory advantages resulting from innovation³⁶.

Against this backdrop, a series of questions can be posed; where does comparative advantage of countries come from? Is it geographically bound or can it be broken away with the help of state intervention? In other words, is it dependent on different factor endowments or differences in either productivity or the scale of production? And lastly, how can each nation-state allocate different factors of production in order to achieve economic growth? Answers to these questions are expected to provide insights into chances of economic development in resource-dependent countries.

From the perspective of traditional trade theories, for example, a country with abundant agricultural or mineral products should engender no harm focusing on countries' comparative advantages, therefore striking no need to transform its industrial structure. That said, location advantages of countries are rather sticky. This, however, is somehow unrealistic considering that comparative advantages of countries do not solely rely on natural endowments of resources. And that is why new takes on trade theories, focusing on economies of scale and imperfect competition, advance the idea that location advantages of countries are flexible, often realised by means of states' strategic industrial policies in such a way to nurture and diversify domestic industries at the expense of foreign competitors. If the latter holds true, another question can be raised on why some countries succeed and others fail. Many studies have struggled to answer this puzzle by identifying conditions that encourage or discourage economic growth of countries. Some focused on incapability or inaptitude of state institutions, while some others stressed systemic and structural constraints, from price fluctuation of resources at international market,

³⁶ Smit, A.J. (2010) "The competitive advantage of nations: is Porter's Diamond Framework a new theory that explains the international competitiveness of countries?," Southern African Business Review, Vol.14, No.1

bargaining power weighted in favour of transnational corporations (*hereafter TNCs*) or sometimes policies of foreign governments, and so on.

Another study this research finds relevant to understand competitiveness of countries is Porter's model of National Diamond (1990). Four pillars of country attributes include factor conditions, demand conditions, related and supporting industries, and company strategy, structure and rivalry³⁷. First, factor conditions refer to the nation's position in factors of production, consisting of basic factors and advanced factors. Second, demand conditions emphasise the continued relevance of home-market demand in determining the industry's product or service. Third, the presence of related and supporting industries is essential in driving external economies of scale, from networks of specialised input providers to appropriate institutions and the spill-over effects of local rivalry. Fourth, firm strategy, structure, and rivalry concerns the importance of national circumstances and context that determine the way in which firms are organised and managed and consequently compete with rivalries with their competitive advantages.

However, it is found that Porter's understanding of factor conditions is not complete with regards to cases of resource-dependent countries. That is, Porter indeed made progress in classifying new sets of factors of production, unlike standard economic theory that only distinguished between labour, land, natural resources, capital, and infrastructure. The idea that those factors of production that involve sustained and heavy investment are most conducive in establishing advanced economies than basic factors is valid. Basic factors

³⁷ Porter, Michael (1990) "The Competitive Advantage of Nations," Harvard Business Review, pp. 73-91; also see Smit (2010); this aforementioned framework is accredited for having extended previous studies on national comparative advantages, having improved explanatory power. But it is limited in its focus at the firm level and thus faced criticisms that it only constitutes a framework that captures better of the competitiveness of firms, instead of a new theory to explain international competitiveness of countries as asserted by Porter and others.

here, for example, low-skilled labour and local raw materials, are conceived as not having strategic linkage to knowledge-based industries.

Moreover, it follows that raw materials are inherited and in little need of new investment so as to be utilised in the production process. However, when it comes to different types of resources, these accounts fail to capture the reality. For instance, as uncovered by history, the use of coal was associated with generating agglomeration economies through railroad transportation and iron-making industries. As for oil, it required a massive amount of prior and post investment in the process of extraction, production, refining, and the like, although its linkage effects in domestic markets remain ambiguous. That said, criticisms can be made against its approach to national competitiveness based on four factors which are placed in horizontal axis, thus rendering possibly different causal links between these factors unnoticed. Hence, it is this paper's contention that there are constraints presupposed by natural resources that hinder fostering favourable environment for the development of advanced factors in the first place and it depends on the type of natural resources. This will be verified and established into a concrete analysis throughout the paper.

2.3.2. Industrialisation and late development

Now that theories of trade from economic perspectives have been reviewed, it is important to turn to theories of industrialisation, another pillar of countries' economic growth. Industrialisation is commonly recognised as synonymous with growth in manufacturing production as a way of high, rapid, and sustained economic growth of

modern states³⁸. Moreover, a number of studies have confirmed the centrality of industrialisation as an engine for growth for developing countries³⁹.

Notably, historical accounts of global capitalism and different reactions of nation-states in due course illustrated by both Frieden (2006) and Schwartz (2010) are highly valued, which will also prove useful in developing an analytical framework of this study later on. As the first step to building a valid analytical framework, this paper takes an intermediate perspective between unit-level and system-level theories of economics. For better understanding, unit-level theories are found in a neoclassical economic tradition, where international market and trade are benign forces that lead to economic growth based on comparative advantages. Inequality is only relative, not relational and any defects in the workings of market are accrued to failure of unit-level institutions. On the other hand, system-level theories follow legacies of world systems theory or dependency theory in which poverty is understood as relational, thus making participation in world market detrimental for economic development of countries, in particular in periphery zones⁴⁰.

In between lies an intermediate explanation, stressing both the role of international structure and that of national or local institutions. Here, the structure of global markets, hierarchical in nature, is similar to that found in the system-level theories, but more emphasis is put on state institutions and policies borne out of internal political struggles, in turn exerting considerable power over the course of national economic development⁴¹. This approach is valid as by examining both structural and institutional forces at work, it acknowledges problems of spatial inequality at global level, but at the same time suggests ways to break away from those systemic constraints. According to Schwartz, there are two

³⁸ Szirmai, Adam (2009) "Industrialisation as an engine of growth in developing countries: 1950-2005," UNU-MERIT Working Papers (February 2009)

³⁹ *Ibid.*

⁴⁰ Schwartz, Herman (2010) "States versus Markets: The Emergence of World Economy," Palgrave Macmillan

⁴¹ *Ibid.*

strategies states can take in times of globalisation, Ricardian and Kaldorian strategies, which this paper finds quite relevant in understanding resource-led economic development.

First, states with Ricardian strategies use agricultural or other primary product exports as well as low-value added industrial products to facilitate economic growth. As it is of maximum gains to allocate factors of production based on comparative advantage, this strategy naturally leads to a spatial division of labour in which states grow more export-oriented. Here, exports of such primary goods are more likely to have positive impacts on overall economy only indirectly in a way that increased volumes of exports allow for the massive infrastructural investments, which in turn makes investment in manufacturing sector a viable option. All these processes are not autonomous, however, and that's why a state often interferes in the market. A state is expected to ensure both external (continued flow of exports) and internal networks (the rest of local economies effectively connected to export-booming sectors) by providing social overhead capital, industrial investment, and labour force.

Economies only pursuing Ricardian strategies, however, are often doomed to stagnate or even fail, if not accompanied with Kaldorian strategies. This is largely because of the absence of creative destruction that can cast away dangers of constant or decreasing returns of raw material exports largely owing to Engel's law⁴². Consequently, here arises the need for industrial diversification, much of which is achieved through industrialisation with manufacturing sector. Kaldorian strategies are in essence models for industrial growth that see investment based on future expectation as a prime factor to enhance productivity. This in turn creates a virtuous cycle of spill-over effects or so-called Verdoorn effects in which an increase in outputs leads to a successive chain of developments, from specialisation of

⁴² *Ibid.*; Engel's law indicates that the increase in income does not lead to increase in demand for necessities such as food and non-food agricultural goods, rather higher income is diverted to consumer luxuries or high-quality goods and services.

inputs in other, related industries to process innovations in attempts to cope with increased throughput, thus an increase in overall productivity⁴³.

Put simply, the first stage of development, through Ricardian strategies, has more to do with whether a state can effectively mobilise resources from primary exports that can in turn be used as investment capital for the manufacturing industry. For sustained economic growth, however, a state should gradually shift to Kaldorian strategies in which productivity comes at the centre. More often than not, these strategies can change when faced with both external and internal intervening variables. The next section deals with this interaction more extensively. At the moment, it suffices to take note of the heightened role imposed on strong and autonomous states.

On similar grounds, Hirschman's unbalanced growth model (1958) points to the importance of making right decisions, which are different from the "*big push*" type of decisions endorsed in the balanced growth model. Here, the big push strategy refers to extremely focused efforts at an initial phase of development by locating optimal combinations of given resources and factors of production. In the eyes of Hirschman, it was inappropriate to employ this strategy of the balanced growth model in underdeveloped countries in a sense that it would be no more than superimposing an entirely new and alien modern industrial economy on the stagnant, traditional one⁴⁴. The unbalanced growth model instead highlights first acknowledging points of disequilibrium, tensions, and bottlenecks where actions are needed the most. Second, based on this finding, it is important to allocate limited resources into effective sequences of investments, which will

⁴³ *Ibid.*

⁴⁴ Hirschman, Alberet O. (1958) "Balanced Growth: A Critique," *The Strategy of Economic Development*, Yale University Press, Chapter 3, pp. 51-52; according to Hirschman, the term '*development*' is defined as the process of change of one type of economy into some other more advanced types. In this light, development presumed in the balanced growth theory is technically not a growth, but just a dualistic pattern of development.

enable economic externalities and complementary effects, mostly through “*backward*” and “*forward linkages*”⁴⁵. Likewise, induced investments by complementarity effects, as opposed to autonomous investments, are expected to act much like a multiplier, one investment decisions leading to subsequent investments in other areas⁴⁶. What’s important to note is the role of state emphasised once again. The relevance of Hirschman’s arguments also applies to cases of existing developed countries in that in fact their development process was not exactly archetypes espoused by ‘big-push’ or balanced growth theories. Rather, states are expected to intervene to catalyse sequential chain reactions through linkages instead of relying on imaginative fission or a coordination of the big push by splitting many atoms at once.

2.4. Types of natural resources

Although studies on resource curse have largely been divided into economic and political spheres, there also have been a few attempts to embrace these two together into the realm of political economy. One strand of these efforts is found in studies that focused on (1) types of resources and (2) their impacts on institutional developments, mostly through the ‘*rents*’ effects. In this regard, Torvik (2009) provides a good overview that there are several dimensions to explore as to differences between resource-abundant winners and losers, one of them being type of resources⁴⁷. It is conceivable that not all types of resources have the same effect on growth, as can be easily assumed in the relative values

⁴⁵ Alacevich, Michele (2007) “Early Development Economics Debates Revisited,” World Bank, Policy Research Working Paper 4441

⁴⁶ Hirschman, Albert O. (1958) “Unbalanced Growth: An Espousal,” *The Strategy of Economic Development*, Yale University Press, Chapter 4, pp. 62-75

⁴⁷ Torvik, Ragnar (2009) “Why do some resource-abundant countries succeed while others do not?,” Oxford Review of Economic Policy, Vol. 25, No. 2, pp. 241-256

attached to different types of resources, for example, highly valuable oil and mineral resources in comparison with less valuable agricultural goods.

Notably, Nankani (1979) proposes to distinguish mineral economies from non-mineral, primary, agricultural-exporting economies due to their structural differences that render mineral-exporting countries faced with a number of development puzzles. That is, the mineral economies have distinctive structural features such as an overwhelming dominance of the fiscal linkage over production and consumption linkages, the presence of large foreign mining companies (*hereafter FMCs*) and the existence of huge rents, vulnerability to fiscal and foreign exchange gaps, overemphasis on mineral-based industrialisation⁴⁸.

Similarly, Isham et al. (2002) looks into the relationship between different types of natural resources and their socio-economic linkages, concluding that countries abundant in point-source natural resources have weaker institutional capacities, which largely determine the course and outcome of countries' economic growth. In doing so, types of natural resources are categorised into four groups, depending on different levels and context of rentier effects that are created in relations to social divisions and institutional capacity⁴⁹.

Furthermore, Boschini et al. (2003) focused on the concept of appropriability, which determines how easily large economic gains are realised, within a short period of time (*technical appropriability*) and from having control over these gains (*institutional*

⁴⁸ Nankani, Gobind (1979) "Development Problems of Mineral-Exporting Countries," World Bank Staff Working Paper, No. 354

⁴⁹ Isham et al. (2002) "The Varieties of Rentier Experience: How Natural Resource Endowments Affect the Political Economy of Economic Growth," UNU/WIDER Project on Resource Abundance and Economic Growth; four types of natural resources include (1) non-resource abundant, manufacturing-based economies, (2) point source economies (i.e. fuels, minerals, and plantation crops), (3) diffuse economies (i.e. animals and agricultural goods produced in small family farms), and lastly (4) coffee and cocoa-reliant economic, having either point source or diffuse source characteristics.

appropriability)⁵⁰. To note again, it is seen that these studies are more or less focused on the effects of rents generated by different types of natural resources on institutional settings that are conducive to economic growth. It is clearly manifested in Torvik's saying that "natural resources strongly influence the inter-sectoral structure of the economy, generate much rent seeking, and have a large effect on political incentives."

2.5. Research Question

2.5.1. Shortcomings of previous studies

All in all, these studies fail to distinguish different types of natural resources and instead regard natural resources as a whole, unitary set of independent variables. Moreover, they have been largely divided into economic and political spheres, thus having limited relevance to fully grasp the essence of resource curse. Economic factors are not as strong enough as to amount to resource curse *per se*, unless aggravated with political factors such as rentier effects, corruption, patronage-beneficiary linkages, and the like. There are a few studies that examined different types of resources, but they are more or less limited in that the focus was on the heterogeneous impacts of different types of natural resources on institutional settings and that a closer look into dynamics at the domestic level are left out.

Indeed, the quality of institutions has been a recurring topic in the study of resource curse. However, these previous studies were more concerned with looking at indicators to measure the institutional quality, for example, the quality of bureaucracy, corruption in government, rule of law, and the risk of expropriation of private investment and repudiation

⁵⁰ Boschini et al. (2003) "Resource curse or not: A question of appropriability," SSE/EFI Working Paper Series in Economics and Finance, No. 534

of contracts by government⁵¹. However, as will be revealed in the following chapters, what this paper more attends to is the dynamics in which state capacities are defined as the outcome of interactions between state and other domestic actors, taking into account external influences.

Against this backdrop, the importance of this research becomes ever more evident, echoing and building upon previous efforts to connect different types of natural resources and their impacts on growth. Still, this research claims the originality in that while acknowledging insights and lessons driven from these prior literatures, it approaches the issue of types of natural resources in three different ways; first, by starting out with fundamental characteristics that distinguish one resource from the other, second, by concentrating on the creation of certain trade patterns and industrial structures afterwards, and lastly, based on these conditions, interpreting political dynamics at both domestic and international level.

2.5.2. Research Question

Based on these shortcomings identified above, this paper will test the validity of the resource curse proposition by expanding geographic scope into Western countries, Britain and the U.S., which best exemplify the history of resource-led development. Also, this paper will compare different types of natural resources, focusing on coal and oil. In distinguishing types of natural resources, this paper expects to investigate how each of them generates certain conditions for existence/non-existence of resource curse. Lastly, this paper also purports to combine separate studies on resource curse into one integral theory of political economy and to analyse the role of natural resources through domestic and international interactions. However, it should not be forgotten that previous studies all

⁵¹ *Ibid.*

provide invaluable insights into understanding of the resource curse, so parts of them will be revisited whenever necessary.

Therefore, the paper poses following research questions:

Are there specific conditions that lead to resource curse/ non-existence of resource curse? Is it related to characteristics embodied in different types of natural resources such as coal and oil?

Having said that, the primary concern of the paper is to identify and compare heterogeneous impacts of different types of natural resources in economic development of countries. In due process, it is assumed that there exist two linkages that lead up to certain outcomes between resource curse and non-existence of resource curse. First of all, this paper looks into how different types of natural resources such as coal and oil resulted in distinctive trade patterns and industrial structure. Second part of the paper turns to examine how natural resources and its impacts on trade patterns and industrial structure influence interactions between state and society by incorporating Schwartz's model of late development.

III. Analytical Framework

3.1. Schwartz's Model of Late Development

Certainly, countries have taken on different paths of economic development and industrialisation. Many studies have focused on varieties of industrialisation, often influenced by international environment or domestic interest formation⁵². In an attempt to interpret these variances, an analytical framework can be drawn with an emphasis on the interactions among three different factors; (1) external forces, such as competition from producers in other countries or pressures from international structural changes, (2) available local state institutions to overcome two kinds of collective problems⁵³, and (3) social interest groups that are either in favour of or against state policies⁵⁴.

This framework has proven useful in explaining different paths of economic development and in particular, industrialisation in different countries. For example, experiences of Germany and the United States in the process of industrialisation were vastly different from those of Italy, Austria-Hungary, Russia, and Japan⁵⁵. To be specific, the two former countries could benefit from productive agricultural and commercial

⁵² Schwartz (2010); see also Frieden, Jeffrey A. (2006) "Global Capitalism: Its Fall and Rise in the Twentieth Century," W.W. Norton & Company

⁵³ Schwartz, Herman (2000) "Three Debt Crises in New Zealand History...and One More?," based on an address given at the New Zealand Historical Association Annual meeting (December 5, 1999); Schwartz identifies two kinds of dilemmas that impede development, one *Gerschenkronian* and the other *Kaldorian* collective action problems. First, *Gerschenkronian* dilemmas concern the accumulation, intermediation, and investment of capital for which states intervene to ensure economies' participation in world market by providing, for example, transportation networks or incentives to export even at a loss. Second, *Kaldorian* dilemmas are related to the effective utilisation of the capital in such a way to increase productivity, for example, by states ensuring job trainings, allowing for the capture of technological rents or increasing returns to scale to those accredited for improvements.

⁵⁴ Schwartz (2010), pp. 83-102

⁵⁵ Frieden (2006)

economies, which enabled them to take smooth transition into modern manufacturing-based economies. Furthermore, in due process, interestingly, however, the latter countries, especially, Japan and Russia, despite their underdeveloped agricultural bases, could develop well-functioning manufacturing sectors. Back in the early twentieth century, these economies were characterised by a large geographic divergence where there existed a few cities with concentrated industrial activities and large rural areas remaining redundant and far less developed. Still, however, there were significant differences within these seemingly alike groupings of rapid industrialisers. Such factors as inefficient agricultural industries and heavy reliance on foreign investment for industrialisation set Russian experience apart from that of Japan in a way creating economic development of distorted face in the former and of balanced in the latter⁵⁶.

Schwartz (2010) further divides this distinction between rapid industrialising countries into early late industrialiser (the U.S.), second-generation late industrialiser (Germany), and late industrialisers (Russia, Japan, and China)⁵⁷. His analysis of late development reveals that late industrialisers had either state or central banks involved in solving the problem of generating capital in the first place and channelling it to emerging industries.

What's noticeable here is that even in the case of the U.S. the major role played by the state and state-supported banks loomed large, especially at initial stages, contrary to common belief that its success was driven by autonomous market forces, mostly private enterprises. In the Midwest, four federal policies were put into practice; land grant railroads, homesteading, the land grant college, and the extension service of the U.S. Department of Agriculture⁵⁸. Even in the North where well-established industries were already in place, state supports amounted to almost 40 % of all railroad capital in the 1830s⁵⁹. In sum, state

⁵⁶ *Ibid.*

⁵⁷ Schwartz (2010)

⁵⁸ *Ibid.*, Chapter 4 and 6

⁵⁹ *Ibid.*, Chapter 4 and 6

intervention was one of the most crucial factors to have moved these economies to Kaldorian track away from Ricardian one, even though the degree of intervention varies depending on the timing that a state embarks on the industrialisation; the later it comes, the more intense the level of intervention becomes.

[Table 1] Cases of Late Development

Country	External pressures towards globalisation	Local state institutions	Social interests
U.S.	Competition from early developer, Britain and its continued interests in sustaining open markets; pushes for industrialization as a response to the threat of displacement	Supports from State/Bank	Interests for open market and raw material exports
Germany		Supports from State/Bank	
Russia		Supports from State/Bank	Vested interests of landowners and farmers
		Foreign aid	
Japan		Supports from State/Bank	Fragmented, small farms
		Effective extraction from agricultural surplus; self-sustaining	

* based on Schwartz's analysis of patterns of late development (2011)

Second point regards to how social interests are entangled with state decision-making processes, often making it easier or harder to avoid influence from abroad. For example, Russia, directing surplus from agriculture to investment was not realised not only because of its natural and geographical disadvantages, but also because of established interests among traditional landowners and peasants who saw no incentives in increasing productivity. This, in turn, led Russian state to rely on foreign capital for industrialisation process. On the contrary, Japan and other East Asian countries such as Taiwan and Korea are often referred to as having effectively extracted surplus from agricultural sectors and coordinated potential struggles between farmers and newly fledging industrialists.

Importantly, the relative dominance of either state or social interests is the key to dictating the involvement of foreign sources of influence. If state policies are effective enough to dissolve social interests, because there is no social interests established in the first place or if there is some, too weak to overthrow decisions made by the state. Put other way around, if social interest are strong and well established, states are more willing to forgo extraction of domestic sources, but rely on foreign sources for industrialisation. In this paper, the former path is recognised as '*intrinsic*' industrialisation and the latter as '*extrinsic*' industrialisation. In Schwartz's analysis, the presence of foreign interventions is most vividly found in the case of Russia and other economies late in coming.

To be specific, foreign interventions refer to a range of influences of 'foreign' origins and thus can come in many different forms, sometimes through foreign direct investments (*hereafter FDI*s), build-up of local subsidiaries of TNCs, foreign loans, change of foreign policies, or international institutions, all of which embed to certain extent pressures towards a more open economy⁶⁰. As Russia had disintegrated, backward agricultural base and was faced with domestic interests reluctant to improve agricultural productivity, from which the state can forge investment capital, it tried to break this stalemate by borrowing heavily from foreign capital. These efforts ended up with mixed results, rendering agricultural industries in impasse while only facilitating heavy industries⁶¹.

This overall picture can also be applied to cases for other developing countries in the post-WWII era. In continuation, Schwartz finds that similar patterns of growth are replicated in much later cases of Latin America, Eastern and Southern Europe, and East Asia⁶². In this respect, the distinction between import substitution industrialisation

⁶⁰ What does the pressure for more open economy signify? It can mean neo-liberal order, globalisation, or structural transformation from agricultural, traditional to industrial, modern society that direct states in certain homogenous ways.

⁶¹ *Ibid.*, Chapter 4

⁶² *Ibid.*, Chapter 11

(*hereafter ISI*) and export-oriented industrialisation (*hereafter EOI*) is rather artificial as most of the countries all started out first with Ricardian exports of labour-intensive and low-value-added manufactured goods and gradually shifting towards the production of high-value-added goods⁶³. Thus, four industrialisation trajectories suggested in the study share this characteristic in common. But at the same time, these trajectories diverged from previous ones in terms of the existence of domestic interests powerful enough to influence state decisions and actual state policies adopted (debt- or TNC-financed investment/ ISI or EOI), which could not avoid connections to bystanders surrounding it⁶⁴.

Also, Richards and Waterbury (1996), in analysing least developed countries (*hereafter LDC*) political economy, relies on the interaction of three variables; (1) economic growth and structural transformation, (2) state structure and policy, and (3) social actors, whether in groups or individuals⁶⁵.

Each variable needs further explanation⁶⁶. First, structural transformation is understood as the process of unbalanced sectoral growth in which agricultural sector weakens with a percentage of national output or employment in agriculture decreasing and the proportion of population moving away from rural to urban areas increasing. Second, state structure and policy are bearers of monopolistic, coercive means to carry out interventions whenever necessary. Lastly, social actors consist of all interests, groups, and

⁶³ *Ibid.*

⁶⁴ *Ibid.*; on further notes, four industrialisation trajectories include; An export-oriented, East Asian model linked to both Japan and the U.S.; a debt- and TNC-financed, ISI-oriented Latin American model linked to the U.S. alone; an export-oriented, TNC-financed southern Europe model linked to Western Europe; and an ISI-oriented, debt-financed Eastern European model linked to Western Europe, shifting over to the southern European and Maghrebian model after the collapse of communist regimes.

⁶⁵ Richards, Alan and Waterbury, John (1996) "A Political Economy of the Middle East," Westview Press

⁶⁶ Based on the definition introduced by Richards and Waterbury (1996)

classes that have mutual relationship with the state, sometimes shaping its policies and other times affected by them⁶⁷.

It recognises massive transformation from predominantly rural, agricultural to urban, industrial political economy within which five specific strategies are again classified into agro-export-led growth, mineral-export-led growth, import-substituting industrialisation, manufactured-export-led growth, and agricultural-development-led growth⁶⁸. Indeed, even within Arab countries, there are ones with relatively large volume of oil reserves, with large or small population, and some others with little oil, yet relatively more fertile land and agriculture. These five strategies to a large extent accord to a classification into five different groups of the Middle East countries⁶⁹. More relevant to this paper are the first two groups that are largely dependent on the export of oil for generating state revenues. The first group of countries are endowed only with oil resources while the second group are with oil as well as relatively big-sized population and industrial and agricultural sectors. This comparison in a way justifies the neutrality of examining Saudi Arabia as a representative case for oil, as it can be said that this country has even preconditions for economic development.

Against this backdrop, it can be shown that this interactive framework, which this paper calls Schwartz's model of late development, is valid and applicable in analysing economic development and industrialisation of both developed and developing countries.

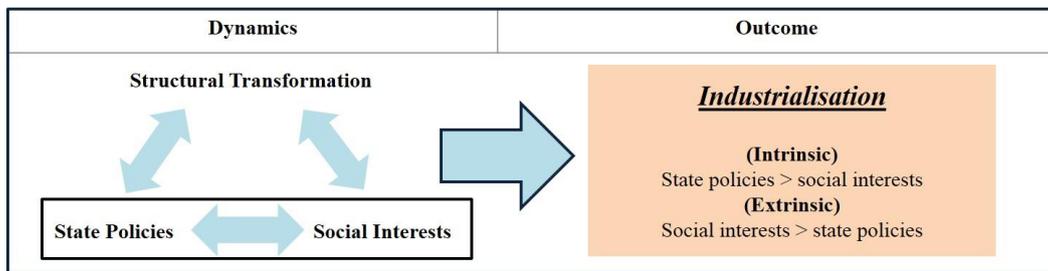
⁶⁷ *Ibid.*

⁶⁸ *Ibid.*

⁶⁹ *Ibid.*; the Middle East countries can be classified into five different groups depending on where their development potentials lie. These groups include; (1) the coupon clippers such as Libya, Kuwait, Oman, the UAE, Bahrain, and Qatar, with extensive dependence on oil and not anything else, (2) the oil industrialisers such as Iraq, Iran, Algeria, and Saudi Arabia, with relatively diversified sources of revenues, from oil exports to industrial and agricultural sectors, yet with serious political disabilities largely owing to rentier effects, (3) the watchmakers such as Israel, Jordan, Tunisia, and Syria, with limited natural resources, thus necessitating the development of human capital and skill-intensive manufacturing sectors, (4) the NICs such as Turkey, Egypt, and Morocco, and lastly (5) the agro-poor such as Sudan and Yemen.

To emphasise again, external forces and structural transformation all relate to structural pressures originating from new international economic order where every nation-state is encouraged to open their market, participate in international trade, and so on. [Figure 1] below illustrates dynamics and outcomes in Schwartz's model of late development outlined above.

[Figure 1] Schwartz's Model of Late Development



3.2. Extended Schwartz's model of resource-led development

In the previous section, it was shown that most of the studies, be it natural resource literature or general economic development theories, haven't paid much attention to disaggregating primary, natural resources (agricultural and mineral goods alike) into different categories, instead taking them as a homogenous entity or factor of production as a whole. This makes them reflected only in the sense of its role in the initial take-off stage as investment capital for other sectors or if failed, its comparative disadvantages in slowing down economic growth. But, as this paper mainly argues, when it comes to analysing countries that rely on raw material exports for a large part of their incomes and government revenues, the analytical tool should be different, with more attention directed to endogenous characteristics of each resource in concern. That said, different characteristics engendered in different types of resources are believed to create different environment for states and social interests to interact, thus resulting in different paths of industrialisation.

As shown earlier, industrialisation achieved in ways that effective and autonomous states overrode social interests and relied mostly on domestic sources of investment capital for its shift into industrialisation was more successful, which this paper refers to as intrinsic industrialisation. On the other hand, when states could not compete with social interests already established beforehand and had to rely on foreign investments and technologies, industrialisation was delayed and less successful, which is referred to as extrinsic industrialisation in this paper.

Every country goes through or at least under the pressure of going through similar processes in adapting to structural transformation, from agricultural to industrial, urban, and modern societies. The review of theories on industrialisation was able to indicate that these processes vary. In other words, these structural forces are felt to varying degrees depending on the interactions between two different variables; (1) the presence of vested

interests prior to industrialisation process, for example, the level of agricultural developments and powers of domestic agricultural interests vis-à-vis burgeoning industrial sectors, (2) the level of a state's capacity in penetrating and implementing its policies in economic development that it sees fit. The interactions between these two variables in turn determine the level of dependence on external resources such as foreign investments and aid, in particular, in times of an impasse when a state, confronted with domestic opposition, cannot push through its visions and policies desirable for successful industrialisation.

On top of that, it should be kept in mind that resource-dependent economies to a large extent deviate from those not. Little attention has been given to the idea that certain endogenous characteristics of natural resources tend to condition an array of policies that can be chosen and implemented by a state.

Put differently, previous studies saw economic development as an outcome of interactions between structure and agent. Indeed, consistent with this finding, this paper argues for the importance of looking closely at such interactions. Building upon that, this paper intends to extend and apply its implication into resource-led development countries.

Having said that, the framework presented above leaves out one more variable needed to explain resource-led economies, that is, characteristics of natural resources that shape one's economy in certain ways, constraining a range of state policies that can be adopted in continued relations with domestic vested interests and external pressures. Thus, it is important to note that state decisions are influenced not only by surrounding socio-economic environments, but also, and presumably even more, by conditions laid out in using a specific natural resource.

This can later be expanded to identify cause and effect relationships between types of natural resources and its heterogeneous impacts on economic development, using quantitative data and analysis. Moreover, this paper argues that is best illustrated when compared with other types of natural resource, coal in this case. There are also other types

of natural resources such as copper, gold, silver, and so on, but this paper focuses on two major ‘fuel’ resources, coal and oil, which generate essential energy for households and industries.

In sum, this thesis sees that natural resources or raw materials cannot be taken as one homogenous factor of production but instead should be differentiated from each other with regards to different characteristics. That said, the central aim of this thesis is to see how different types of raw materials (coal and oil) interact with other factors that influence a country’s path of development such as international system, domestic social interests, and state institutions and policies. More specifically, there are two linkages to clarify, one regarding the relationship between certain characteristics of natural resources and its impacts on the formation of market and industry, the other between these newly construed conditions and its impacts on Schwartz’s interactive model. Only after looking into these two linkages, can there be a new, comprehensive framework that can explain conditions of resource curse more in depth.

First of all, certain characteristics are distinguished on five criteria; (1) geographic concentration, (2) fluidity (and transportation), and lastly (3) technology⁷⁰. These characteristics result in different types of markets and industries. For example, the more geographically concentrated, the more fluid so that the type of transport used is not rigid (i.e. sea-lane shipments, pipeline, etc.), and the more advanced technology adopted, that particular natural resource in concern will more likely to form an overseas-oriented market, where international trade is prevalent and domestic industry is not established as much.

⁷⁰ Characteristics included here were chosen on the basis of endogeneity. In this regard, rents, much discussed in the ‘rentier state’ volume of researches, are excluded in that rents strictly are not characteristics endogenous, but rather exogenous to natural resources. Put simply, rents are not causes, but outcomes obtained from difference between world prices and production prices, which involves much politics in itself.

On the contrary, another type of natural resource, less geographically concentrated, less fluid thus transported through railroads and trucks, and less demanding in terms of technology required, will be more tentative to grow a home-oriented market, where domestic and intra-regional trades at most are more visible and domestic industries are born. For the purpose of clarification, this paper refers to the former type of natural resources as '*Resource B*' and the latter as '*Resource A*'.

Outcomes derived from above in turn interact with actors at domestic level, state and social interests. First, in '*Resource A*' abundant countries, a home-oriented market and industry will be created, rendering domestic actors, be it state or social interest groups, largely alienated and intact from outer circumstances. Here, two conditions are worth noting; first, the construction of nation-wide railroads to transport resources due to the level of fluidity being low (solid); second, and relatedly, the creation of backward and forward linkages to cultivate diversified domestic industries due to the domestic appropriability of technologies.

To emphasise again, the scope of trade is limited and there arises no need to rely on foreign technology and investment to encourage domestic industrialisation. These altogether work to empower autonomy of states in pursuing certain policies or to create new interest groups that will wrestle with other previously established interests and state institutions. Thus, the forward path of industrialisation rests on the interactions between state and diverse social interest groups, yet without interference from external sources. In this case, the number of variables to take into account is small and the probability of intrinsic industrialisation process increases, thereby avoiding effects of resource curse.

On the other hand, an overseas-oriented market created in '*Resource B*' abundant countries is exposed to influences from external sources from the beginning that encompass the extensive engagement of TNCs, foreign policies, and the like. In particular, one specific characteristic of '*Resource B*', that is, relatively advanced level of technology needed plays

a major role in explaining the second linkage. First, the technology required in the process of extraction and processing is advanced, thus making it inevitable to depend to a large extent on knowledge and experience of TNCs and skilled foreign workers. Second, the technology is not closely linked to other industry sectors, having little multiplier effects, because it is too advanced to be appropriated domestically or later to be replicated in other domestic industries.

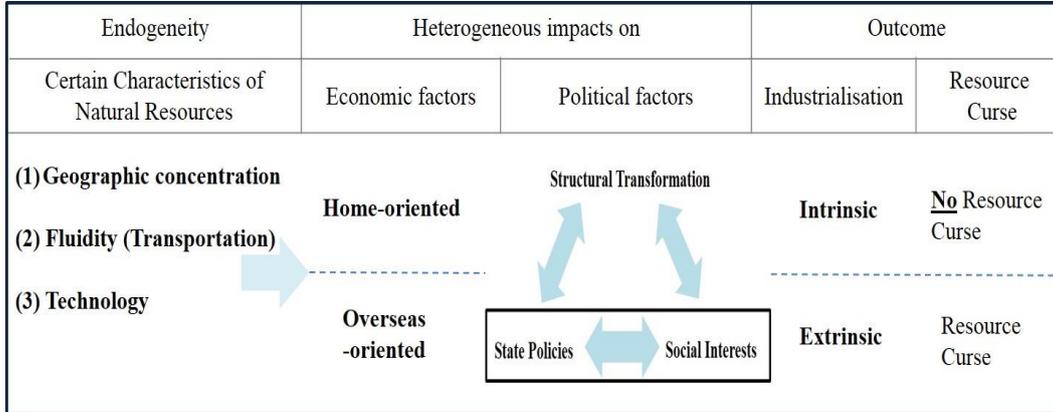
Then it follows that the job creation effects of '*Resource B*' specific industries are largely limited in domestic markets. Therefore, the presence of external influences outweighs that of domestic social actors with little chance to develop their own sphere of influences. As much states are less constrained by domestic interests, however, they are more struck with foreign and international interests, for example, foreign policies, MNCs, and foreign workers. The number of variables that states need to take into consideration is wide and varied, thus making it difficult to take autonomous policy decisions. Those variables include (1) negotiations with foreign actors, most notably, TNCs, and (2) international market circumstances (i.e. price fluctuations of resources in concern, financial crisis and shrinking demands). [Table 2] below is a summary of the logic behind how extended Schwartz's model of resource-led development is driven.

[Table 2] Extended Schwartz's model of resource-led development

Characteristics/ Resource type		Resource A		Resource B	
Geographic concentration		Low		High	
Fluidity (and Transportation)		Not fluid/ Railroad and trucks		Fluid/ Sea-lane shipments and pipelines	
Technology for extraction		Not advanced; domestically appropriable		Advanced; dependent on foreign influence (MNCs)	
					
1) Market formation		Home-oriented; domestic supply and domestic demand		Overseas-oriented; domestic supply and international demand	
Trade patterns	Industrial structure	Domestic and intra-state trade	Domestic industry	International trade	No domestic industry
2) Interaction between state and social interests in relations to external influences		Interaction between state and domestic social interests The role of state rendered autonomous from international influences		Interaction between state and foreign and international interests, (1) foreign and transnational actors (i.e. MNCs, foreign workers) and (2) international market circumstances The role of state closely intertwined with these international economic and political circumstances	
Outcome		Intrinsic industrialisation		Extrinsic industrialisation	

To sum up, this new, extended framework is expected to complement Schwartz’s model of late development, especially with regards to understanding resource-dependent economies. If Schwartz saw that the reliance on foreign aid and investments is determined in the aftermath of the relationships between state and social interests, this paper argues that it is pre-conditioned by different types of natural resources, which in turn condition the interactions between state and social interests. Against this backdrop, incorporating an additional factor, endogeneity of different types of natural resources, into Schwartz’s model of late development is justified in understanding economic development and industrialisation of resource-dependent countries. A graphical representation is seen below in [Figure 2].

[Figure 2] Extended Schwartz’s model of resource-led development



3.3. Proposition

As discussed earlier, phases of development are not drastically different from country to country in a sense that it starts with agricultural, primary economy and develops into manufacture-based, second industrial economy, finally arriving at information and knowledge-based economy. Countries dependent on exports of natural resources for their economic growth are not exceptional in this aspect and indeed are moving in a similar direction. However, it has been long believed that these countries are distinguished from non-resource-based economies in that the former has not been successful in shifting to diversified industrial structures as precipitated. Nonetheless, previous sections illustrate that this belief is not bullet-proof, but can be resisted with careful attention to different types of natural resources. Based on the new framework developed thus far, this section now turns to apply specific cases and examples into the framework. In attempts to test the relevance of the framework, this research compares coal and oil, more specifically, how the path and experience of oil-abundant countries are different from those of coal-abundant countries and how these differences can be interpreted in the new framework.

Although debatable and inconclusive, some have rightly shown that different types of natural resources are likely to breed different conditions for industrial and trade developments. In terms of its use as naval fuel, Maugeri (2006) notes several advantages that oil has over coal, a higher energy efficiency, simpler ways of storage and movement, and less labour-intensity⁷¹. Ross, agreeing that the curse is most strongly associated with petroleum and not with other kinds of hard rock minerals, points to two interconnected reasons⁷². First, being more capital-intensive in nature, oil generates huge rents as

⁷¹ Maugeri, Leonardo (2006) "The Age of Oil: The Mythology, History, and Future of the World's Most Controversial Resource," Praeger Publishers

⁷² Ross (2012)

compared to those in other minerals, and second, these rents accrue directly to governments, whose capabilities are central to the direction and outcomes of the whole economy. The last case in point is addressed by Reznick (1947) who assessed that the remarkable growth of the coal trade constituted one of the main drivers of the U.S. 'domestic' industry as opposed to oil that grew rapidly in terms of foreign sales, ranked at fifth on the export list⁷³. On similar grounds, Gelb (2010) points to distinct challenges mineral exporting countries face, ranging from limited production linkages, rents that are highly concentrated and translated into fiscal revenues, to a modest level of direct employment, whose tendencies are exacerbated when it comes to oil⁷⁴.

[Proposition 1] in general concerns key characteristics of coal and their relatedness to the emergence of certain economic and political conditions.

[Proposition 1-a; trade patterns] Coal is not as much geographically concentrated as oil and does not require advanced technology in the process of extraction and production. It can be produced and consumed in domestic markets, thus creating domestic and intra-state trade.

[Proposition 1-b; industrial structure] Coal is solid and thus transported through railroads and trucks. This nation-wide construction of transport connections as well as the low level of technology that is domestically appropriate provides preferable environments for creating backward and forward linkages, diversifying domestic industrial bases.

⁷³ Reznick, Samuel (1947) "Coal and Oil in the American Economy," The Journal of Economic History, Vol. 7, Supplement: Economic Growth: A Symposium, pp. 55-72

⁷⁴ Gelb, Alan (2010) "Economic Diversification in Resource Rich Countries," an article drawn from a seminar on Natural resources, finance, and development: Confronting Old and New Challenges, organised by the Central Bank of Algeria and the IMF Institute in Algiers (November 4-5, 2010)

[Proposition 1-c; socio-political relations] In coal-abundant countries, less vulnerable to external influences in characteristics, forward paths of industrialisation and further economic development are determined primarily by the interactions between state and domestic social interests. Also, the autonomy of state is relatively high.

[Proposition 2] in general concerns key characteristics of oil and their relatedness to the emergence of certain economic and political conditions.

[Proposition 2-a; trade patterns] Oil is highly concentrated in a few selected areas and requires much advanced technology in the process of extraction and production. Unlike coal, demand markets and supply markets do not match due to rising demands from already industrialised and fast industrialising countries. Thus, oil is produced in domestic country but consumed in foreign countries, thus creating international trade.

[Proposition 2-b; industrial structure] Oil exporting countries are more vulnerable to external market volatility and dependent on foreign intervention, particularly from MNCs. Thus, there are ample possibilities that endogenous industrialization will be hampered in oil producing countries relative to coal producing counterparts. In addition, oil is presumed as incapable of creating forward and backward linkages.

[Proposition 2-c; socio-political relations] The direction and content of domestic policies and institutions in oil-abundant countries are driven in relations to external influences rather than domestic social interests. The autonomy of states is largely constrained, if not completely, in taking into consideration their relationships with transnational actors and international political economic circumstances.

3.4. Methodology

Based on the proposed framework, this research proceeds to the qualitative case study part where coal and oil are compared, specifically focusing on the U.S. for the case of coal and Saudi Arabia for oil. Before turning to the case analysis, the justification for selecting two countries, the U.S. and Saudi Arabia, should be first put forth. Basically, these two countries embody the largest coal and oil reserves in the world, respectively. These two extreme cases, albeit at the risk of undermining other pre-existing, and more detailed socio-economic, political, and cultural conditions, are expected to provide foundations on which stark comparisons are made between coal and oil with regards to their distinctive characteristics and heterogeneous impacts on both economic and political aspects.

And indeed given that this research is more concerned with endogenous characteristics of natural resources *per se* in the first place, the extent to which other socio-economic, political and cultural conditions can interfere and modify the course of relations indicated in the framework is limited. Later, if there still remain gaps to be filled with, other cases can be brought to the comparative testing by adopting the same framework developed in the previous chapter.

In a nutshell, this paper first compares different characteristics of coal and oil, in terms of the geographic concentration, fluidity and transportation, and technology. Then this research purports to explore how different types of resources resulted in distinctive trade patterns and industrial structure. As the next step, these first linkages will be brought to Schwartz's interactive model to further examine heterogeneous impacts of different types of natural resources on political aspects.

However, one needs to take cautions in exploring the case of oil. As for oil, given the previous finding ⁷⁵ that regressive effects of oil in economic development worsened after rounds of nationalisation, it is deemed important to segregate times of study into two parts, before nationalisation (1920-1970) and after it (1970-2008). Still, after the collapse of mega oil TNCs (often referred to as Seven Sisters), external forces maintain its stakes due to largely overseas-oriented characteristics of oil.

Additionally, this thesis acknowledges pitfalls of GDP and other purely economic indicators, and follows the inclusive concept of development as outlined above. the methodology of using GDP as an indicator for economic growth across countries drew several criticisms in that GDP only captures a part of economic activities, if not all, not to mention socio-political and cultural factors that have indirect but fundamental impacts on further development.

Along this line of thought, it is argued that resource curse should be comprehended as an overall phenomenon that encompasses economic stagnation and backwardness in political and human development. In other words, the degree of a state's development should be based not only on economic indicators, but also other socio-political indicators and even countries' incentives in technological developments and increase of productivity⁷⁶. In response, Arab oil states came to realise and stipulate importance of factors other than nominal economic growth in their economic plans. For example, the five-year development plan of Kuwait along with a long-term plan, the State Vision Kuwait 2035 stipulates the need to reform the legislative and institutional structure with emphasis on three major areas,

⁷⁵ See especially Ross (2012)

⁷⁶ Nagi, Mostafa H. (1982) "Development with unlimited supplies of capital: the case of OPEC," *The Developing Economies*

economic development, human and social development, and public administration, planning and information⁷⁷.

All in all, by addressing heterogeneous impacts of different types of natural resources on the course of economic and political developments, this research will emphasise the importance of identifying endogenous characteristics of each type of natural resource, which are expected to explain why some resource-abundant countries fell prey to resource curse while others have effectively avoided it.

⁷⁷ Hvidt, Martin (2013) "States Economic diversification in GCC countries: Past record and future trends, Kuwait Programme on Development, Governance and Globalisation in the Gulf programme," LSE Department of Government, No.27, p.24

IV. Analysis I- Coal and the U.S.

4.1. Overview

Coal has been accredited for its huge contribution to industrialisation and economic development, often referred to as a king of the industrial world in the late nineteenth and early twentieth centuries. Coal has a wide range of uses, ranging from firing the boilers of locomotives, factories, and ships to fuelling the new electric power plants and houses of the urban middle class⁷⁸. Also, when processed into coke, coal was key to manufacturing iron and steel⁷⁹. In particular, coal helped facilitate the U.S.'s industrial drive and the timing of American industrialisation and world economic leadership in manufacturing sector coincided with the exact time when it assumed the status as the world's leading mineral economy⁸⁰.

Looking into the U.S. in more details, the U.S. is known for the world's largest recoverable reserves, with the demonstrated reserve base (DRB) containing 481 billion short tons (\$/ton-mile) in total, which was expected to last more than 200 years, based on production levels with 2013 as a base year⁸¹. Interestingly, the U.S. also has comparative advantages in coal resources in that coal is more abundant than remaining natural gas and oil resources (Btus; total British thermal units). Within the U.S., coal is produced in 25 states across three major coal-producing regions, Western (including Alaska), Interior, and Appalachian regions. At the state level, five states are identified with the most active

⁷⁸ Eller, Ronald D. (1982) "Miners, Millhands, and Mountaineers: Industrialisation of the Appalachian South, 1880-1930," The University of Tennessee Press

⁷⁹ *Ibid.*

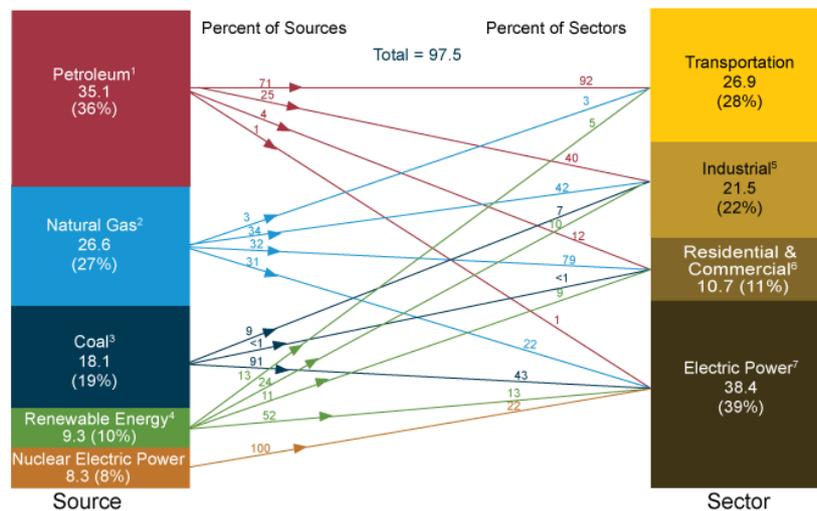
⁸⁰ Wright and Czelusta (2004) "Why Economies Slow: The Myth of the Resource Curse," Challenge, Vol.47, no.2, pp.6-38

⁸¹ EIA official webpage, "What is the role of coal in the United States?," Energy in Brief, http://www.eia.gov/cfapps/energy_in_brief/role_coal_us.cfm (accessed May 22, 2014)

production accounting for about 70% of total production in the U.S. in 2012, including Wyoming, West Virginia, Kentucky, Pennsylvania, and Illinois. Here, it should be noted that geographic concentration in this paper only pertains to the country-level as a whole, in a way dismissing implications from regional divergences found at the state level.

For more than 60 years, the use of coal has been essential in generating electricity in the U.S. Despite a recent decline in the annual share of total net generation in the U.S., which fell from 60% in 2007 to 39%, coal continues to assume the largest source of electricity generation, followed by natural gas(27%) and nuclear energy(19%)⁸². Also interesting is that most of coal and thus electricity produced goes to run power plants, with about 81 % of the total coal production in 2012 spent by industry. This is in contrast to the use of petroleum, more directed to individual consumption, especially for transportation purposes, which in turn is illustrative of different levels of connectedness coal and oil pertain to other production activities.

[Figure 3] Primary Energy Consumption by Source and Sector 2013

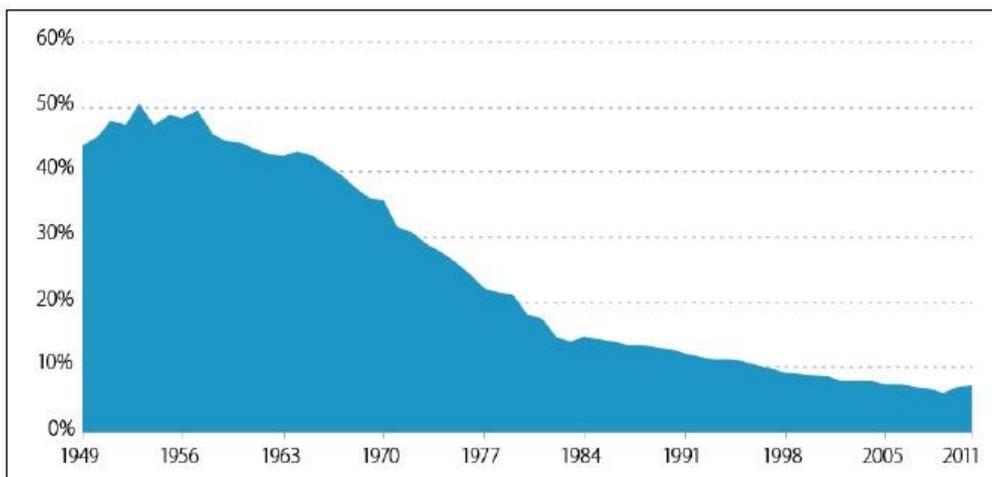


*Retrieved from U.S. EIA (2014), *Monthly Energy Review* (measured in quadrillion Btu)

⁸² *Ibid.*

In 2013, approximately 71% of petroleum was consumed in transportation sector whereas about 91% of coal went to generate electric power. However, one needs to take cautions in reading this figure. At first glance, it can be misleading in that about a quarter of petroleum produced in 2013 was meant for industrial sector, for which coal only made less than 10% of contribution. But given that electric power sector produces electricity not as a primary, but secondary energy source to be used in buildings and industries⁸³, one should not underestimate the level of connectedness of coal to industrial sector, which looms larger than what is shown below.

[Figure 4] Industrial Sector Share of Total U.S. Coal Consumption (1949-2011)



* Retrieved from Campbell et al. (2013), *Prospects for Coal in Electric Power and Industry*

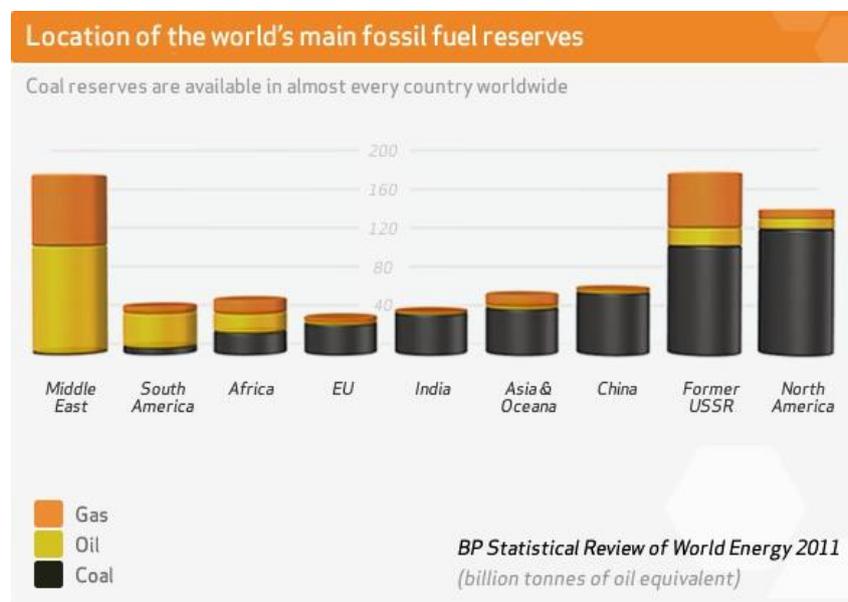
More importantly, the historical use of coal in industries was more pronounced before 1949, the period more suitable for understanding the role of coal in economic development

⁸³ EIA official webpage, “What are the major sources and users of energy in the United States?,” Energy in Brief, http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm (accessed July 18, 2014)

in comparison with that of oil, which only began with the relative demise of coal⁸⁴. [Figure 4] above indicates that the industrial sector's share of coal consumption amounting to about 45% in 1949 has continuously declined since then.

4.2. Basic characteristics of coal

[Figure 5] Location of the world's main fossil fuel reserves (Coal, oil, and gas)



* Retrieved from BP Statistical Review of World Energy (2011)

As shown in [Figure 5], coal is found and distributed all around the world, despite regional differences. North America and Former USSR including Russia are two major regions with the first and second largest coal reserves. On the other hand, it is easily noted

⁸⁴ Campbell, R. et al. (2013) "Prospects for Coal in Electric Power and Industry," Congressional Research Service (CRS) Report for Congress; three developments are ascribed to a decline of coal in industrial sectors, which are (1) reduced use of coal for coke production and steel making, (2) reduced use for industrial process applications, and (3) increased use for electricity generation.

that oil is more concentrated in certain regions, most vividly in the Middle East, followed by South America and Africa. This pattern of distribution of coal and oil confirms in part the first proposition that coal is less geographically concentrated, while oil highly concentrated.

The fluidity of natural resources is another important characteristic to be examined. As suggested earlier, means of transportation are influenced by the degree of fluidity of resources in concern and at the same time influence the patterns of trade (inward and outward; intra-state or regional trade and international trade). Coal is in nature solid organic fuels, encompassing a whole range of combustible sedimentary rock materials⁸⁵. There are two main categories of coal based on the inherent qualities, hard coal (coal of gross calorific value not less than 5,700 kcal/kg) and brown coal (non-agglomerating coal with a gross calorific value less than 5,700 kcal/kg)⁸⁶, but this research does not necessarily segregate these two with regards to means of transport. Also, liquid-type coal (slurry pipeline) transferred through pipelines is excluded given its insignificant volume and times of study when liquefied coal was a rarity. A cursory look at recent data on coal distribution suggests that primary means of transportation of coal have been railroads, amounting to about 69.6%, followed by truck (11.6%) and river (11.6%)⁸⁷.

Third, the level of technology is also taken into account with regards to whether it is domestically appropriable or not and relatedly with regards to whether it has close relationships with creating backward and forward linkages. At a first glance, it is easy to associate coal with such images as people covered with remnants of black coal, moving in and out of coalmines on a rail cart. If one thinks of oil, however, heavy machineries with much advanced technology for extraction and processing come into being, replacing human

⁸⁵ IEA (2013), "Coal Information 2013," OECD/IEA

⁸⁶ *Ibid.*

⁸⁷ EIA official webpage, "Sources & Uses; Coal; Analysis & Projections," www.eia.gov/coal/distribution/annual (accessed May 4, 2014)

resources seen in coal mining. This is only a basic observation and further investigation is expected to provide firm grounds to compare with oil in terms of technology.

On additional notes, the justification for looking into technology as a separate, independent variable along with the other two should be preceded. Apparently, geographical explanation might hold its relevance in that a counter-factual question that assumes geological concentration of coal, not scattered around as is today, would rightly point out chances of turning to advanced foreign technologies rather than developing it locally. On the other hand, another counter-factual question that assumes geographical prevalence of oil doesn't tell much as it was exactly the oil-abundant countries that relied on already existing technologies from TNCs.

Or is it any related to the time when coal and oil were initially being extracted? The answers will be both yes and no. It is true that technologies for oil were developed and in use as early as the 1900s in the U.S. Given the advantages of backwardness with the transfer of advanced technologies from early developers⁸⁸, it might have been cost-efficient to accommodate TNCs in the first place, with no reference to future ramifications. Still, it should be reminded that circumstances were not much different for coal earlier. Britain as a forerunner had comparative advantages in coal mining and related industrial activities, for instance, iron making and steam engine. However, neither did the U.S. operate commercial coal mines until much later this technology was in common use in Britain and European countries, nor it did not rely on technologies borrowed from abroad in launching coal-mining activities.

Going back to the previous discussion, technology used in extracting and producing coal is called mining, a method to reach the coal seam. Methods of mining are diverse depending on the location of coal, say, whether coal is found close to the Earth's crust or

⁸⁸ Schwartz (2010)

in deep layers away from the surface⁸⁹. In the case of the former, surface mining is adopted to remove the top layers of materials and expose the coal. For the latter, however, underground mining is carried out, which is again divided into two main methods, room-and-pillar and longwall mining⁹⁰.

More important than specific methods of technology is the level of technology. However, given the difficulty to measure and compare the level of technology used in coal and oil on the basis of objective indicators, this research instead examines the extent to which technology in concern is domestically appropriable and thus able to create multiplier effects to other related industries. First of all, it is noted that opening a new mine required a small amount of capital investment. This point is best illustrated in a saying that all that was needed was ‘to build houses for the miners, a store to supply them, and a tipple structure to dump the coal into railway cars.’⁹¹

Moreover, historical evidence points to autonomy that the U.S. could enjoy in developing and further utilising coal in other related industrial activities such as steam engine and iron-making. Indeed, the U.S. was not particularly considered a forerunner in mineral production well into the start of the 20th century, whose title came even later with regards to coal production⁹². Coal production in the U.S. surpassed that of Germany only in 1880 and Britain in 1900⁹³. Before then, the U.S. featured heavy reliance on charcoal, wood, or water instead of coal as a prime source of energy generation⁹⁴. Also, prospects

⁸⁹ US Department of Energy, “Coal mining and Transportation in Coal Mining,” http://www.fe.doe.gov/education/energylessons/coal/coal_mining.html (accessed May 22, 2014)

⁹⁰ World Coal Association, “Coal mining,” www.worldcoal.org/coal/coal-mining/ (accessed May 22, 2014)

⁹¹ Eller, Ronald D. (1982), pp. 129-130

⁹² Wright and Czelusta (2007) “Resource-Based Growth Past and Present,” *Natural Resources: Neither Curse nor Destiny*, World Bank/Stanford University Press, pp.183-211

⁹³ *Ibid.*

⁹⁴ Chandler, Alfred D. (1972) “Anthracite Coal and the Beginnings of the Industrial Revolution in the United States,” *The Business History Review*, Vol.46, No.2, pp.141-181

for iron-making industry were not bright as a majority of machinery in the U.S. was still being made of wood until the late 1830s⁹⁵. This was largely due to slow and complicated process of innovation and introduction of technologies in developing and producing coal in the U.S. as compared to Britain that reached the necessary level of technology already in the 16th century⁹⁶. Despite occasional exceptions such as Pittsburgh where the abundance of coal drastically lowered the fuel cost up to the three-quarter of that found in England, the U.S. iron industry in the early 19th century was still operating based on traditional technology⁹⁷. What's striking is that there already existed new proven technology that could be exported from England both in coal-producing and iron-making industries.

In examining reasons for a delay in adopting such technologies, Chandler (1972) saw to the rapid expansion of population and demand starting in the late 1830s and the early 1840s⁹⁸. Accordingly, the building of transportation infrastructures, such as canals and railways followed, creating a number of markets even remote from actual coal producing regions⁹⁹. Put another way, the late arrival of coal mining into the U.S. territory was a matter of choice, thus embarking on producing coal and iron only when it saw the necessity grow, responsive to domestic demands. More importantly, it did not rely on borrowed foreign technologies, but instead managed to develop its own technologies over a century, which was indeed time-consuming, but firmly based on domestically appropriable technologies and domestic employment.

⁹⁵ *Ibid.*

⁹⁶ Reznick, Samuel (1947)

⁹⁷ Chandler, Alfred D. (1972), pp. 147

⁹⁸ *Ibid.*, pp. 149; explanations for a start-up of coal expansion can vary, for example, in exploring coal situations in the Appalachian South, Eller (1982) accredited extraordinary growth of coal mining to the nationwide economic recovery and following increase in demand for coal after the financial crisis in 1893 and the war with Spain.

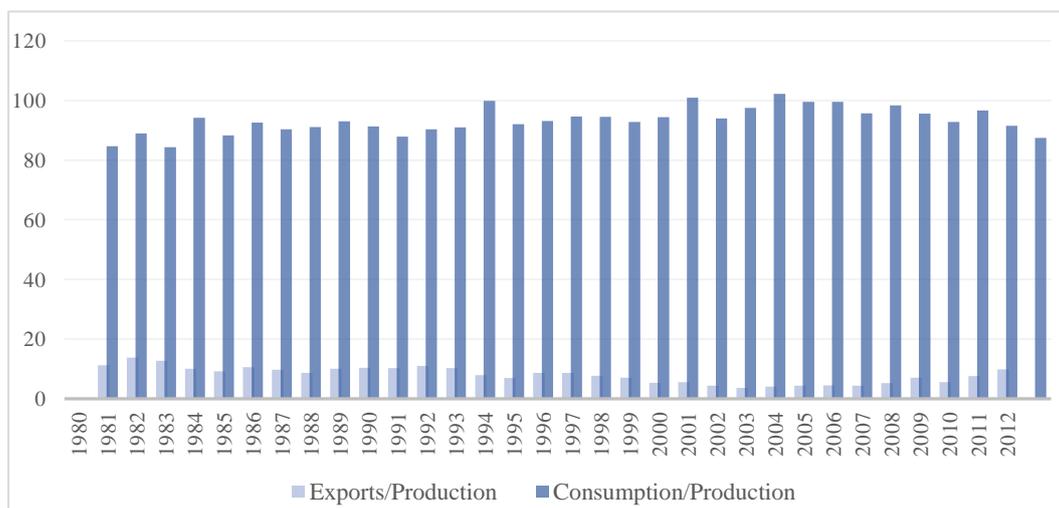
⁹⁹ *Ibid.*; also refer to Chandler (1972)

4.3. Trade patterns and Industrial structure

Unlike oil, most of the global coal production is consumed in the country of origin, thus making only 15% of hard coal production traded in international coal market¹⁰⁰. Turning to the case of the U.S., it is found that for a decade between 2000 and 2010, about 5% on average of the total domestic coal production was destined for other countries for exports. Moreover, it is also shown that in 2012, 877.3 million short tons (mmst) out of a total coal distribution of 1,003.1 mmst were distributed in domestic markets, compared to 125.7 mmst destined for foreign markets. In other words, about 87.45% of coal produced in 2012 headed homeward, while about 12.53% being exported.

This comparison of domestic/foreign distribution needs more detailed examination. [Figure 6] below on coal overview in the U.S. is based on data set provided by EIA.

[Figure 6] Domestic/foreign consumption of Coal production



* Retrieved from International Energy Statistics, EIA

¹⁰⁰ World Coal Association, "Coal mining," www.worldcoal.org/coal/coal-mining/ (accessed May 22, 2014)

As for domestic distribution, data for net consumption is used by subtracting imports from consumption. It is assumed that exports are analogous to the volume of foreign distribution. Although incomplete, it is sufficient enough to illustrate the general pattern of coal distribution in both domestic and foreign markets over the time span of 1980-2012. However, the data set only includes years from 1980 to 2012, which are not exact periods this study aims to examine with regards to the use of coal. Nonetheless, given that similar time intervals (1984-2012) are available for oil in Saudi Arabia, comparison between these two data sets is still worth the attention.

Based on this figure, it becomes evident that coal has been largely distributed around domestic markets rather than for the purpose of exports. For example, in 1980 the relative ration of exports to production was 11.30% while that of consumption to production was about 85%. Put differently, the relative ratio of exports to consumption, which is indicative of how natural resources in concern are used, be it consumed domestically or internationally, ranges from 5-15%, averaging at around 8%.

In historical perspective, the U.S. assumed its status as the world's largest coal producer in the years following World War I (refer to Appendix I)¹⁰¹. This was mainly because of the withdrawal of a large percentage of the British coal from overseas markets that opened up new promising trade channels for American coal. Still, the rapid expansion of coal trade came to a sudden stop in 1917 with the enormous demand for coal and the lucrative profits in the home markets which caused interest in the export trade to lapse. Subsequently the scarcity of ships, high freight and insurance rates, and an increasing number of war restrictions were instrumental in reducing coal exports still more. Here, increase in the total exports of coal from 24,079,209 gross tons in 1916 to 27,929,141 gross

¹⁰¹ Notz, Willian (1918) "The World's Coal Situation During the War I," *Journal of Political Economy*, Vol.26, No.6, pp.567-611

tons in 1917 (16% of increase) is solely attributable to exports to Canada. Excluding coal exports to Canada, the remaining exports of coal from the US to foreign countries show a decrease of 1,955,198 gross tons (26.7%)¹⁰².

Next, pertaining to the industrial structure in coal-abundant economies, a study by Latzko (2011) provides useful insights¹⁰³. Basically, this study finds a positive link between coal mining and regional economic development. Although its implication is limited in specific time (between 1850 and 1950) and location (Pennsylvania), it alludes to the important roles resource abundance plays in the process of industrialisation, which later can be extended over the scope of national economy. First, natural resources nearby are likely to provide local industries with natural cost advantage, for example, cheap coal for energy. Given that manufacturing is more energy-intensive than agriculture or other primitive economic activities, industries could enjoy more benefits by locating their factories in coal-producing areas. This leads to the second advantage resource-rich areas embody, that is, spill-over and agglomeration effects. Agglomeration economies bring together relevant industries in geographically adjacent areas, in which individual industry is offered such benefits as economies of scale, network externalities, large labour pools, and home markets.

Against the backdrop, the study examines Pennsylvania as a leading coal producer in the U.S., both for anthracite and bituminous coal, and compares coal-producing counties and non-coal counties on the grounds of four measures of economic development, agricultural density, literacy rate, manufacturing density, and population density. Key finding is that coal mining was not associated with crowding-out effects of natural resource

¹⁰² *Ibid.*

¹⁰³ Latzko, David A. (2011) "Coal Mining and Regional Economic Development in Pennsylvania, 1810-1980, *Economies et Sociétés*, Vol. 44

abundance, but rather was positively related to economic development. In particular, population density was noticeably higher in coal-producing counties.

It is important, however, that this study also finds, despite occasional positive interactions, extraneous relationship between coal production and manufacturing output. This largely owes to the level of analysis being at county-level, having similar institutional frameworks, yet constrained within a territorial boundary of one state, Pennsylvania. In other words, with country-wide railway system and thus easier and cheaper access to coal, relative disadvantages given to industries in distant markets grew less imminent. Indeed, the price of coal purchased at New York cost, which later was brought down to 2.1 in 1863 from 5.3 in 1840¹⁰⁴.

This trend of decreasing returns to coal-producing regions was later even exacerbated with technological developments that enabled poor quality coals anywhere to be utilised in manufacturing or improved energy efficiency for same amount of coal used. That said, if a specific regional boundary abandoned and extended nation-wide in which railroad is expected to reach manufacturing centres located far from areas producing raw material inputs, the relationship between resource and economic development at nation-state level can be re-constructed.

Above all, coal was able to effectively construct backward and forward linkages with other related industries. Coal served as cheap and efficient fuel with a new method of production through steam power for burgeoning ironworking industries. From that point on, availability of coal and iron made its own way into such industries that basically required heat in the process of manufacturing as specialised metal machinery industries, paper and glass industries and others¹⁰⁵.

¹⁰⁴ *Ibid.*, pp.17

¹⁰⁵ Chandler, Alfred D. (1972); industries dependent on coal heating were indeed various, including those mentioned above, baking, sugar refining, the brewing of malt liquors and the distilling of spirits, earthenware, plated ware, chemicals, rubber products, textiles, etc.

4.4. Extended Schwartz's model of resource-led development

So far it has been found that the U.S and its use of coal in the process of economic development largely accords to propositions laid out earlier, in particular [*proposition 1-a*] and [*proposition 1-b*]. To emphasise again, these propositions are drawn from three endogenous characteristics of natural resources this paper deems crucial in forging specific conditions for a country's path of political economic development. Types of natural resources are distinguished based on three characteristics, which include geographic concentration, fluidity and means of transport, and the level of technology. That said, [*proposition 1-a*] sees to a type of market created in a country dependent on coal, supposedly domestic-oriented market, given the assumption that coal reserves are rather fairly distributed across geographical areas and technology used to extract and produce coal is easily replicated without having to rely on foreign assistance. Likewise, the presence of agglomerate economies through backward and forward linkages is examined in [*proposition 1-b*], in which coal is thought to provide relatively favourable conditions to diversify industrial bases of a country.

In this regard, a case study of the U.S. could confirm these aforementioned characteristics of coal resources, which then led to a domestic-oriented market typical of coal-dependent economies, thus trade scope mostly constrained to intra-state level and industrial structure also rooted in domestic market. Now it is important to turn to the third proposition (*proposition 1-c*) that further completes a general picture of so-called 'extended Schwartz's model of resource-led development.' By shifting the focal point from economic to political side of story, this paper examines interactions between state and social interests in relations to external influences.

First of all, the presence of foreign companies is unseen, but instead monopoly of a few domestic companies is noticeable along with hundreds of independent coal companies. A large proportion of coal was produced by a handful of giant coal companies, with a small fraction shared by a number of small, independent coal operators¹⁰⁶. And this dominance seems to have continued until recent years. According to EIA, four major domestic producers are recognised for consistently increasing their share in total U.S. coal production over the span of 1977 through 2012¹⁰⁷. In particular, production of these top four companies, namely, *Peabody Energy Corporation*, *Arch Coal Inc.*, *Alpha Natural Resources LLC*, and *Cloud Peak Energy*, amounted to 52% of total U.S. coal production in 2011, as compared to 500 other companies supplying the rest 48% altogether¹⁰⁸.

What's important here is that coal-producing companies mostly consisted of domestic entities no matter how big or small they are, not interrupted by British or other European influences except for sparse trade relations. These coal producers also succeeded in expanding coal production sites and railway construction either in cooperation with or without state institutions and policies. In fact, cooperation from a state institution varied from time to time. It is found that federal or state governments often embraced monopolistic business practices such as cartels and merger/acquisition on the grounds that coal industry constituted one of the major driving forces of the U.S. domestic industry¹⁰⁹. But at other times, such liberal policies were condemned as being the mistaken policy that benefited only a few private corporations, not consumers or state governments¹¹⁰.

¹⁰⁶ Eller, Ronald D. (1982)

¹⁰⁷ EIA official webpage, "Top four U.S. coal companies supplied more than half of U.S. coal production in 2011," Today in Energy, <http://www.eia.gov/todayinenergy/detail.cfm?id=13211> (accessed July 18, 2014)

¹⁰⁸ *Ibid.*

¹⁰⁹ Rezneck (1947), pp.60; a finding by a committee of the Pennsylvania Senate in 1834 disapproved charges against coal and railroad companies alleged to have practiced monopolies.

¹¹⁰ *Ibid.*, pp.60

In general, however, state institutions and policies provided not only physical but also ideational foundation for sustainable growth of coal-based economy. For example, David and Wright (1997) acknowledge three elements that propelled the rise of mineral economy in the U.S.; (1) an accommodating legal environments, (2) investment in the infrastructure of public knowledge, and (3) education in mining, minerals, and metallurgy¹¹¹. Indeed, such institutions as the United States Geological Survey (USGS) and Columbia School of Mines were established in attempts to encourage public consensus that resource extraction should be based on the lasting processes of learning, investment, technological progress, and cost reduction¹¹².

Second, employment in coal industry is focused on domestic and local constituencies and therefore towns and cities sprang up surrounding coalmining regions. So-called company towns epitomises the transformation coal mining and industrial expansion introduced into areas abundant with coal¹¹³. This had fundamental impacts on the lives of thousands of people who worked and lived there to make their ends meet, often to the extent that a new set of rules and values of an organised community life were imposed¹¹⁴. That said, the overall influence of those employed in coal mines remained low and redundant, having no significant impacts on the state-society dynamics.

The role of labour unions in coal industry is another interesting topic to discuss, but is beyond the scope of this study given that; first, the relationship between coal workers and companies is more focused on dynamics at the corporate level, not necessarily at the nation-state level; second, the formation of labour unions only came after the coal industry was fully established and integrated into a nation-wide economy at which point labour unions

¹¹¹ Wright and Czelusta (2007)

¹¹² *Ibid.*, pp. 187-188

¹¹³ Eller, Ronald D. (1982), Chapter 5, pp.161-163

¹¹⁴ *Ibid.*, p.162

could not affect the course of national economic development. This is revealed by the fact that effective coal labour unions came into existence only in the second half of the 19th century when the traditional authority of the skilled miner weakened due to corporate reorganisation and the introduction of new machinery¹¹⁵. Before then, throughout the first half of the century, labour relations between mine owners and workers did not arise to pose a threat to coal mining operations. Not only was there a clear line distinguishing ownership, management, and labour in coal mines in early days, but also miners could not organise collective power when located mostly far from urban cores. This made the role of labour unions, if any, largely limited to dealing with the issue of wage and income.

Third, most directly connected to the understanding of state-society dynamics is the stance of traditional land elites. Here, Adam's comparative analysis (2004) between Virginia and Pennsylvania shows that the composition of domestic interests and institutions are key to bringing about divergences at the state level. In essence, Virginia and Pennsylvania, despite their similarity in rich coal endowment, differed in terms of the level of integration the state government and institutions retained towards coal and railroad industries.

First of all, it is noted that legislative and political structure of Virginia was a biennial one, influenced by sectional dissention between Western entrepreneurs and Eastern agricultural landowners¹¹⁶. Struck by the opposition from traditional land elites in east part

¹¹⁵ EH.net website (Economic History Association), "The US Coal Industry in the Nineteenth Century," written by Adams, Sean Patrick, <http://eh.net/encyclopedia/the-us-coal-industry-in-the-nineteenth-century-2/> (accessed May 21, 2014); at the height of such organised unions as the Workingmen's Benevolent Association (WBA), established by united workers in the U.S and U.K., or the United Mine Workers of America (UMWA), a national mining union could win some concessions from coal companies. Although tensions between labour unions and companies amounted to threatening the stable supply of coal at times, they were not significant enough to change the course of economic development driven by coal.

¹¹⁶ Adams, Sean Patrick (1998) "Different Charters, Different Paths: Corporations and Coal in Antebellum Pennsylvania and Virginia," *Business and Economic History*, Vol.27, No.1 (Fall 1998)

of Virginia, further industrial development based on coal trade was hampered, to be only revived after long suffering stagnation in the development of Richmond and other mine areas which were strategically important for Western interests¹¹⁷. On the other hand, Pennsylvania was characterised by political system balancing traditional and industrial interests in a way to facilitate overall regional '*commonwealth*' lying in its dependence on coal. The fact that there were no established interests state-wide added to a growth prospect in iron- and coal-producing industries in the minds of legislatures, in the end making it easier to penetrate the aid and investment of state government into such industries¹¹⁸.

Considering its relevance to this research, Adams' finding, again limited to state level analysis as in Latzo's study introduced earlier, is less to say that state institutions are critical in forging how economic developments occur, but more to emphasise the importance of interest formation that affects state policies and institutions, as a result enabling or frustrating economic expansion. The issue of who captures power in politics remains critical when it comes to designing economic growth strategies and industrial policies in particular, but it should be reminded that both states, Virginia and Pennsylvania alike, faced no external influences and had the future pathways of economic development at hand so that it can be managed and adjusted autonomously whenever necessary.

Moreover, it is found that even in Virginia there existed many different versions of political wrestles. Those who successfully accommodated to benefits derived from selling and developing coal-containing lands, were more susceptible to the dominance of coal companies, while those who chose to remain reliant on agricultural production, were

¹¹⁷ A governmental structure of Virginia was predominantly captured by Eastern counties, which were overrepresented in the legislature and especially elite interests that controlled the county-court system. On the other hand, Pennsylvania's constitution featured three powerful branches of government, keeping each other in check so that no specific interests override development objectives of the state as a whole; based on a review on "Old Dominion, Industrial Commonwealth: Coal, Politics, and Economy in Antebellum America" by Wright, Robert E. (2007), *Journal of Interdisciplinary History*, Vol.37, No.4, pp.636-637

¹¹⁸ Adams (2004), Chapter 2: The Commonwealth's Fuel, The Rise of Pennsylvania Anthracite

opposed to coal development, often postponing the time of entrance to market where it holds comparative advantages¹¹⁹. In any case, Eller (1982) reports that a few capitalists in Virginia, going through hard time at first, came to build massive coal-based industrial complex later along with railroads and canals interconnected to major markets, highlighting that economic development based on coal was a matter of domestic politics and domestic interest configuration¹²⁰.

In conclusion, in the case of coal and the U.S., the path of industrialisation was driven in the dynamic interactions between domestic actors, especially between agricultural interests opposed to open trade system and coal capitalists featuring monopoly by a few gigantic companies, without interference from foreign, external actors. In other words, the U.S. with abundant coal resources took on intrinsic industrialisation, thus resource curse effects disappearing into non-existence.

¹¹⁹ Eller (1982), Chapter 2: A Magnificent Field for Capitalists

¹²⁰ *Ibid.*

[Table 3] Major characteristics of coal

Characteristics	Coal
Geographic concentration	Low
	distributed all around the world
Fluidity (Transportation)	Not fluid (solid); railroads and train
	<ul style="list-style-type: none"> - Solid organic fuel within a range of sedimentary rock materials - Railroads (69.6%), truck (11.6%) and river (11.6%) - Transportation costs take up a large share of the total delivered price of coal, thus leaving international trade in steam coal more focused on intra-regional markets
Technology	Not much advanced; Domestically appropriable
	<ul style="list-style-type: none"> - Two methods of coal mining; (1) surface or opencast mining, (2) underground or deep mining (room-and-pillar and longwall mining) - Small amount of capital investment, late yet endogenous arrival of coal mining in the U.S.

[Table 4] Market formation and state-society interactions in relations to external forces

1) Market formation		Home-oriented; domestic supply and domestic demand	
Trade patterns	Industrial structure	Domestic and intra-state trade <ul style="list-style-type: none"> - Worldwide exports, 18% in 2013 - Domestic consumption > exports (5% on average between 2000-2010) - High freight and insurance rates in 1917 	Domestic Industry <ul style="list-style-type: none"> - The presence of agglomeration economies through backward and forward linkages created around coal mining industries (cheap coal energy)
2) Interactions		between state and domestic social interests	
between state and social interests in relations to external influences		<ul style="list-style-type: none"> * The role of state rendered autonomous from international influences <ul style="list-style-type: none"> i) Monopolies of domestic companies ii) Limited role of domestic employment and labour union iii) Shifting role of traditional land elites * Dynamic interactions between domestic actors, between state and coal companies, without interference of external actors 	
Outcome		Intrinsic industrialisation	

V. Analysis II- Oil and Saudi Arabia

5.1. Overview

In the twentieth century, oil came to replace the role of coal that constituted an essential part of human life in late nineteenth and early twentieth centuries. The title of king once conferred to coal was now transferred to oil, especially in the industrialised world. For one thing, a look into energy consumption among OECD countries indicates that oil has been a primary source of energy; in 1973, oil consumption peaked at around 53.2 % of total energy consumption, followed by gas (18.8 %) and others (28 %). The trend is in place away from the use of oil to gas and other energy resources; for example, the ratio of oil consumption in the total OECD energy consumption decreased from 53.2 % in 1973 to 42.3 % in 1985, again shrinking to 41.1 % in 1999. Nonetheless, it is seen that oil still assumes a dominant position in the whole picture of energy consumption.

As much the increase in the reliance on oil in developed countries, the discovery and development of oil wells grew fast in oil-abundant countries, from which new geographic regions such as the Middle East, Latin America, and Africa were added and gradually integrated to the world economy. Of many, Saudi Arabia, endowed with the largest proven oil reserves along with Venezuela, has been the focus of many studies that explored the role of oil in domestic and international spheres. As of 2013, it was reported that Saudi Arabia holds approximately 265 million barrels of proven oil reserves, which account for almost one-fifth of proven, conventional oil reserves in the world¹²¹. There exist about 100 major oil and gas fields in Saudi Arabia, but the majority of oil reserves and production is made only in eight fields, one of them being Ghawar field situated in the eastern coast.

¹²¹ EIA (2013) "Saudi Arabia: full report"

Moreover, its connection to world economy and politics are aggravated by the fact that Saudi Arabia posits as the largest exporter of petroleum and plays a leading role as a swing producer in OPEC. The impacts of petroleum industry on domestic market also loom large given that almost 80 % of budget revenues, 45 % of GDP, and 90 % of export earnings are derived from this sector¹²².

Interestingly, Saudi Arabia is also one of the largest consumers of primary energy in the world (ranked at thirteenth in 2009), of which petroleum provided almost 60% of total energy consumption while the rest supplied by natural gas¹²³. Still, most of the consumption is directed for personal and residential purposes such as transportation fuels and direct burn for electric power generation. In particular, the demand for electricity is record-high, due to several factors combining population growth, high oil prices, harsh weather, and energy policies with a low fuel pricing and large subsidies¹²⁴. These altogether created wasteful consumption and distortions in the economy, often raising concerns on the prospects of oil exports threatened by rising domestic consumption¹²⁵. Despite such events, however, production of oil has been driven more by international demands than by domestic needs, and Saudi Arabia kept its volume of oil exports steady, overrunning that reserved for domestic consumption by far.

One historical event that marks Saudi Arabia's oil industry took place in 1980 when the nationalisation process of Saudi Aramco was completed. In fact, a move towards nationalisation was a carefully chosen strategy for Saudi Arabia. In undertaking a shift of ownership in the oil industry, Saudi Arabia had in mind the role of the dirigiste state. The

¹²² Forbes, <http://www.forbes.com/places/saudi-arabia/> (accessed May 8, 2014)

¹²³ EIA (2013) "Saudi Arabia: full report"

¹²⁴ Fattouh, Bassam (2013) "Summer Again: The Swing in Oil Demand in Saudi Arabia," in Oxford Energy Comment, The Oxford Institute for Energy Studies

¹²⁵ *Ibid.*; also see Oil and Gas Journal, "Barclays: Saudi Arabia refocusing Aramco's strategy" (June 9, 2013), <http://www.ogj.com/articles/2013/09/barclays-saudi-arabia-refocusing-aramco-strategy0.html> (accessed July 20, 2014)

main objective of the dirigiste state lies in maximising national interests, often in a way to nationalise commanding heights of the economy, oil in this case, allocate resources through public sector and regulate private economic activities¹²⁶. This, combined with the fact that Saudi Arabia is a monarchic country, whose legitimacy derives from providing extensive welfare, exacerbated the need for large social spending¹²⁷. This in turn brought about rather a peculiar system, in which extended welfare programmes continued even in times of declining oil prices by running on foreign borrowing and fiscal deficits.

At this point, it seems that political structure of Saudi Arabia should be addressed. But as already pointed out, the types of political regimes are of little concern in this paper. A series of studies have shown that political stability and institutional quality outweigh a type of political regime itself, be it liberal democracy or authoritarian regime, in bringing about expected outcomes, say economic growth and development. The same logic applies to economic development paths of those relying on the production and export of natural resources. That said, Saudi Arabia, notwithstanding being one of the largest kingdoms remaining in the world, is understood to have substantial control over a country, keeping it in stability with the help of capable technocrats in the government.

5.2. Basic characteristics of oil

The previous chapter observed basic characteristics of coal, focusing on geographic concentration, fluidity, and the level of technology that this research finds worth noting as to lay down certain conditions, both economic and political, for resource curse. Similarly, this sub-chapter attempts to reveal basic characteristics, this time, of oil. First of all, with

¹²⁶ Rodney (1995) "Economic Development in the Middle East," Routledge, p.23

¹²⁷ *Ibid.*; Rodney sees Saudi Arabia as a liberal monarchy, largely responsive to needs of public.

regards to the first characteristic, it was already noted in the previous chapter, that oil is highly concentrated in such regions as the Middle East, Latin America, and Africa, as opposed to coal, rather evenly distributed in various regions (see *Figure 3*). Second, as for fluidity and means of transport, this research limits the scope of products to crude oil only. Crude oil in essence is a mineral oil of natural origin, composed of a mixture of hydrocarbons and associate impurities¹²⁸. Crude oil consists of different hydrocarbon compounds that are processed to produce a wide range of products, for example, fuels, finished non-fuel products, and chemical industry feed stocks¹²⁹. More details about petroleum-processed products are discussed in the footnote below in this page¹³⁰.

More importantly, despite a variety of physical characteristics concerning density, viscosity, and the like, all crude oil inherently exists in the liquid form under normal surface temperature and pressure¹³¹. This in turn makes oil transferred in different means of transport from coal, which are trucks, ships (oil tankers), and pipelines¹³². For domestic distribution, trucks and pipelines are used to transport refined products, whereas oil tankers and pipelines are used for international distribution of crude oil. Supply-end pipelines carry crude oil from well to a loading terminal at a port, from which tankers travel directly to

¹²⁸ OECE (2000), “Oil Information”

¹²⁹ EPA (1998), “EPA Office of Compliance Sector Notebook Project: Profile of the Petroleum Refining Industry”

¹³⁰ *Ibid.*; Three major product categories are identified as petroleum-related products; (1) fuels such as motor gasoline, diesel and distillate fuel oil, liquefied petroleum gas, jet fuel, residual fuel oil, kerosene, and coke; (2) finished non-fuel products such as solvents, lubricating oils, greases, petroleum wax, petroleum jelly, asphalt, and coke; and (3) chemical industry feedstocks such as naphtha, ethane, propane, butane, ethylene, propylene, butylenes, butadiene, benzene, toluene, and xylene.

¹³¹ *Ibid.*

¹³² Saudi Aramco official website, “Distribution” in Our operations, http://www.saudiaramco.com/en/home.html#our_operations%257C%252Fen%252Fhome%252Four-operations%252Fdistribution.baseajax.html; American Petroleum Institute (API) official website, “Transporting Oil and Natural Gas,” <http://www.api.org/oil-and-natural-gas-overview/transporting-oil-and-natural-gas> (both accessed May 23, 2014)

demand-side pipelines in a destined consumer market, then connected to the refineries to process crude oil into a wide range of petroleum products¹³³.

Now turning to the third characteristic, technology adopted in oil production, it is useful to examine how petroleum industry works in general. Petroleum industry is mainly composed of three different, yet interrelated sectors; upstream, midstream, and downstream industrial chains¹³⁴. First, the upstream industry is concerned with exploring and producing crude oil and natural gas. Specifically, four subsequent processes are noted under the oil and gas extraction industry; exploration, well development, production, and site abandonment¹³⁵. Here, well development and production are discussed further in detail as these two processes are generally more related in comparing the levels of technology adopted with those in coal mining. As for well development, a combination of drilling, ceasing, and necessary infrastructure and testing all points to complex and time-consuming tasks of developing oil reserves into productive oil wells. Different methods and technologies should be used depending on types and characteristics of each oil well. Also, petroleum production requires several different steps, from bringing oil to the surface through separating the liquid and gas components to removing impurities.

Second, the midstream industry deals with processing, storing, marketing, and transporting commodities, in due course providing linkages between production and consumption areas located far away from each other. Lastly, there is the downstream industry including oil refineries, petrochemical plants, petroleum products distributors, retail outlets and distribution companies.

¹³³ *Ibid.*

¹³⁴ PSAC (2014) “PSAC Official Webpage; Business; Industry Overview,” www.pfac.ca/business/industry-overview (accessed May 4, 2014)

¹³⁵ EPA (2000) “EPA Office of Compliance Sector Notebook Project: Profile of the Oil and Gas Extraction Industry”

In sum, technology used in extracting and processing oil is complex and advanced as compared to that in coal. These characteristics outlined above are expected to bring about different impacts on trade patterns and industrial structure, which is discussed in the next sub-section.

5.3. Trade patterns and industrial structure

The volume and flow of oil trade are extensive and international. The pattern of coal trade in the U.S., mostly domestic and intra-state trade, is reversed for Saudi Arabia where the production of oil is more directed towards exports than domestic consumption, with an estimated 7.5 million barrels per day (bbl/d) exported as of 2012¹³⁶. Major destinations of Saudi Arabian oil are mostly located in Far East Asia with an estimated 54 % of total Saudi Arabia's crude oil exports. In addition, Saudi Arabia is the second largest oil producer to the U.S. after Canada, accounting for 16 % of total U.S. crude oil imports. The U.S. imports an average of 1.4 million bbl/d of total petroleum liquids from Saudi Arabia, while Japan (1.1 million bbl/d), China (1.1 million bbl/d), South Korea (0.8 million bbl/d), and India (0.7 million bbl/d) also constitute major consumers of Saudi Arabia's crude oil¹³⁷. As [Figure 6] below indicates, a large proportion of total production headed for overseas market rather than domestic market, with the relative ratio of exports to production hovering at 60-75 %, as compared to 15-25 % of consumption relative to production at most.

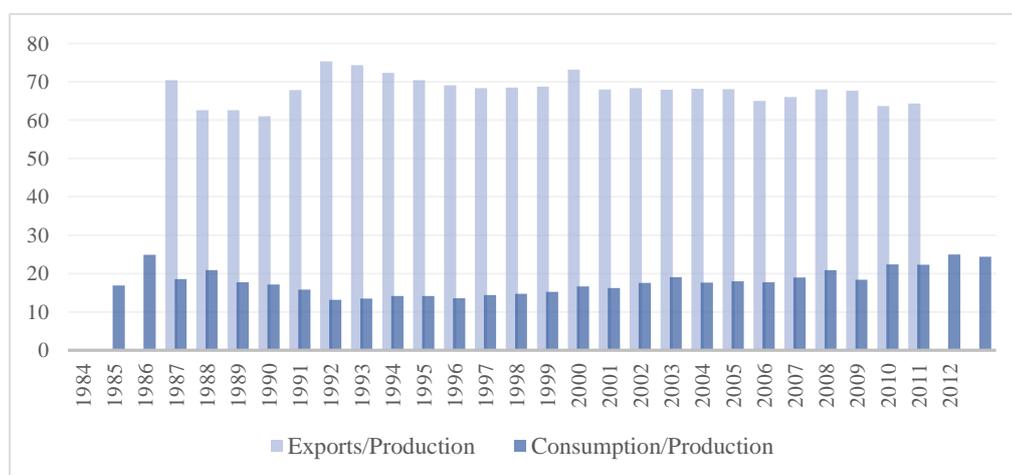
Moreover, the dominance of mining industry in national economic structure is pronounced, with 75.8 % of GDP generated from the mining sector in 1975. After nationalisation, the influence of mining industry seems to have waned with 61.8 % in 1980

¹³⁶ EIA (2013) "Saudi Arabia: full report"

¹³⁷ *Ibid.*, numbers shown in this report are all based in the year 2012

and 34.5 % in 1985, respectively. However, this change was largely due to the expansion of other sectors such as the construction sector (22.2 % in 1975 to 29.3 % in 1985), distribution sector (5.6 % to 18 %) and service sector (6.9 % to 21.3 %). On the other hand, manufacturing sector still maintained negligible stake in the whole economic structure at about 8 % in 1985¹³⁸.

[Figure 7] Domestic/foreign consumption of Oil production



* Retrieved from International Energy Statistics, EIA

The oil industry features reliance on foreign technology and human resources. Oil industry started in the U.S. as early as 1850. From the very beginning, the U.S. and some other early investors had comparative advantages, having established knowledge and technology in extracting and making profits from oil development. Dependence on oil grew only in 1920s with the commercialisation of cars as popular means of transport and of other consumer durables. In the post-WWII era, power and leverage of multinational oil

¹³⁸ Looney, Robert E. (1994) "Industrial Development and Diversification of the Arabian Gulf Economies," Contemporary Studies in Economic and Financial Analysis, Vol. 70

companies, so-called Seven Sisters continued¹³⁹. This was largely because of their monopolistic industrial structure, where these integrated conglomerates controlled every stage from exploration and production to processing and marketing. On the other hand, the role of host countries was limited to granting rights or concessions to explore and produce oil to the seven sisters. Under the circumstances, a few attempts to nationalise oil industry ended up in failure. One representative case is Iran's nationalisation attempts in 1953, which made it even clearer that companies had upper hands having power to cut off the entire chain of oil supply.

Once technology transfers as well as technology improvements made accessible through independent engineers and consultants eroded technical advantages of multinational, western-based oil companies, the wave of nationalisation followed. Saudi Arabia also nationalised Saudi ARAMCO, which was initially founded by the American associate oil companies. Today, Saudi ARAMCO operates extensively across upstream, mid-stream, and downstream industries on its own or in cooperation with other major oil companies while the role of western oil companies shrunk to that of specialist support and marketing¹⁴⁰. Nonetheless, nationalisation did not translate into anticipated economic growth and development and it can be attributed to the nature of oil industry *per se*.

In essence, the oil sector exists in an enclave of its own, with few productive linkages to the rest of the economy¹⁴¹. Only a small proportion of the workforce is employed in the oil industry, and yet most of them are expatriates whose income do not sum up to national income and is often sent back to home countries for remittance. Given that most of the oil

¹³⁹ World's largest oil companies of the 1950s, also known as Seven Sisters, include *Exxon, Royal Dutch Shell, British Petroleum, Mobil, Chevron, Gulf Oil, and Texaco*.

¹⁴⁰ Rodney (1995), Chapter 7, p. 126.

¹⁴¹ *Ibid.*, Chapter 3, p.47

industry output is exported while its inputs are imported, it can be said that the linkages are worldwide rather than local.

Relatedly, the concept of product space espoused by Hausmann and Klinger (2006) illustrates how some products are closely linked to others ('near') while some other products are not ('far')¹⁴². Capabilities that are required for producing each product must vary from one to the other, among which knowledge, physical assets intermediate inputs, labour-training requirements, infrastructure needs, property rights, regulatory requirements and the like are accommodated to varying degrees. Only after acknowledging this product space, can countries proceed to shift to new export basket that is near the current activities. The assets and capabilities necessary for producing one good are imperfect substitutes for those needed to produce another good.

In this regard, when a country has comparative advantages in goods that are in a dense part of the product space, it is more likely to take on the process of export diversification with ease, because the set of acquired capabilities overlap and can be re-deployed to other nearby products. On the other hand, when a country specialises in peripheral products, having little linkages to other nearby products, redeployment and export diversification is struck with much difficulties¹⁴³.

Based on this understanding, it is important to look to where hydrocarbons are located in this product space map. At the outer-left periphery lies hydrocarbons, pointing to the fact that they are poorly connected to the rest of the product space. This is largely due to a specific set of productive capabilities that the hydrocarbon sectors rely on but are hardly redeployed in other sectors, for example, raw natural resource endowment, central authority

¹⁴² Hausmann, Ricarco et al. (2010) "Export Diversification in Algeria," in Trade Competitiveness of the Middle East and North Africa Policies for Export Diversification, The International Bank for Reconstruction and Development / The World Bank, Chapter 4, pp. 63-104

¹⁴³ *Ibid.*

to ensure the extraction site and transmission lines and to grant property rights to extraction firms, as well as the physical capital to extract and ship the oil to ports. Indeed, it is easily found that such infrastructures as oil pipelines are only destined for oil and gas transport, whereas railways as core infrastructure for coal industry can be used for many different purposes. These altogether makes it more difficult to embark on new activities that use a completely different set of capabilities¹⁴⁴.

5.4. Extended Schwartz's model of resource-led development

So far, a case study of Saudi Arabia could identify major characteristics endogenous to oil resources, which are closely linked to the formation of specific type of market, thus trade patterns and industrial structure. Saudi Arabia has faced challenges in designing and implementing fiscal and industrial policies, mostly due to oil, its major source of export and government revenues, being one of the most isolated products from domestic economies, but more interrelated to international economies. That said, findings in the previous sub-section support and confirm the first two propositions, [*Proposition 2-a*] and [*Proposition 2-b*].

Now turning to the third proposition (*Proposition 2-c*), it aims to reveal that oil is more likely to be exposed to influences from external sources, more so than from internal sources. Those external sources of influence include negotiations with other international oil companies and international economic and political circumstances. To investigate whether this proposition holds true or not, this sub-section will address Saudi Arabian state's interaction with domestic interest groups as well as external interests aforementioned such

¹⁴⁴ *Ibid.*

as western oil companies, international markets, and so on. Given that nationalisation was one of the most critical happenings that might have changed the state-society dynamics in relations to external influences, this study explores two separate periods before nationalisation and after nationalisation.

First of all, it is clear that the presence of foreign actors were more pronounced in days preceding nationalisation of Saudi ARAMCO. As already suggested, the oil industry was largely managed by big multinational corporations. In addition, there existed little domestic interests in the oil industry other than a small range of traditional landowners, merchants, royal families, etc. all linked through patronage-client relationships.

After Saudi Arabia fully nationalised Saudi Aramco in 1980, the control of foreign companies waned, but the ongoing inflow of foreign workers since the first oil boom in 1973 continued, composing almost one-third of the total population (7 million out of 23 million) in 2003. In terms of employment, expatriate workers took up around two-thirds of the total workforce and especially 95% of the private sector¹⁴⁵.

More to the point, the oil industry *per se* is capital-intensive, with the number of employment limited to less than a hundred workers per well, most of whom are skilled, managerial expatriates. This often has been claimed as the underlying cause of systemic unemployment of the productive population in Saudi Arabia¹⁴⁶. Moreover, it fails to create new domestic interest groups, instead strengthening already established interests thanks to a large influx of oil windfalls, which translates into what is commonly known as rentier effects. As there is no nation-wide impacts of oil other than financial government spending

¹⁴⁵ Pakkiasamy, Divya “Saudi Arabia’s Plan for Changing its Workforce,” Migration Policy Institute (November 1, 2004), <http://www.migrationpolicy.org/article/saudi-arabias-plan-changing-its-workforce> (accessed July 20, 2014)

¹⁴⁶ Hvidt, Martin (2013) “States Economic diversification in GCC countries: Past record and future trends, Kuwait Programme on Development,” Governance and Globalisation in the Gulf programme, LSE Department of Government, No. 27

on education, health, and other social welfare programmes, no substantial linkages are built between the ruler and the ruled or government and constituency.

From the perspective of its impacts on state-society interactions, the nationalisation has not changed the scene much in that most of the revenues still accrued directly to government. Again, the stake of economic development of Saudi Arabia based on oil all boiled down to how government can effectively manage oil revenues, more so than initiated by private enterprises and other economic sectors. Thus, government agencies dependent on oil revenues are burdened with more extensive tasks, ranging from building social infrastructure, connecting relevant industries, to distributing the wealth, most of which was to be based on deliberate and detailed planning rather than stemming from as natural outcomes. All these aspects are in contrast to what was observed in coal-dependent economies, where railway construction was one of natural and linear process of coal development on the one hand and distribution was made through private industries on the other hand.

One thing to note here is the scale of oil revenues that is positively related to the size of the government, thus making oil-rich government on average two or three times larger than non-oil government at the same income level¹⁴⁷. The role of states is weighted at the level unseen in other countries and if unaccompanied with appropriate, carefully designed government policies, it is easy to appropriate rents not to the benefit of general constituency, but to a small group of interests. On this, Ross and Myers (2012) compared government mechanisms between *Industria* and *Petrolia*, in which the latter can avoid public scrutiny and pressures for more transparency and accountability with ease¹⁴⁸.

¹⁴⁷ Ross, Michael L. and Myers, Joanne J. "The Oil Curse: How Petroleum Wealth Shapes the Development of Nations", CARNEGIE COUNCIL for Ethics in International Affairs (Seminar held at March 1, 2012)

¹⁴⁸ *Ibid.*

Next, price volatility of internationally traded oil also aggravates the difficulties facing oil-based economies. The range of the real exchange rate for oil prices can be as large as 30% of differences a year, thereby increasing uncertainty and instability surrounding government budgetary holdings, which can delay or suspend development projects under consideration¹⁴⁹. The fact that there is one-to-one relationship between international oil prices and the performance of the economies (i.e. export earnings, current accounts, government revenues, and total income and employment) is indicative of such vulnerability of oil economies to international economic conditions¹⁵⁰.

In other words, oil revenues are exhaustible, volatile, uncertain, and largely originate from abroad, posing both long-term and short-term policy challenges¹⁵¹. For instance, government revenues are more cyclical because of the change in oil prices, causing extraordinary fiscal expansion in Saudi Arabia. Since 2000, government expenditure stood at above 30% of GDP, a display of higher level of fiscal spending by the standard of other emerging and developing countries¹⁵². Also, this unpredictability obscures investment decisions, thus making portfolio diversification a more attractive option than industry diversification geared towards domestic economic growth. At its peak, reserves overseas invested from oil revenues reached \$170 billion levels in the 1980s¹⁵³.

In sum, discrepancy between expectation and practice prevails in Saudi Arabia. That is, despite a dominant stake of the government, the volatility and unpredictability of oil prices make it harder to use public finances in more reliable and predictable way, simply

¹⁴⁹ Hausmann (2010), p. 69

¹⁵⁰ UN ESCWA (2001) "Survey of Economic and Social Developments in the ESCWA Region, 2001-2002"; also see Hvidt (2013), p.11

¹⁵¹ Sturm, Michael et al. (2009) "FISCAL POLICY CHALLENGES IN OIL-EXPORTING COUNTRIES: A REVIEW OF KEY ISSUES," European Central Bank (ECB), Occasional Paper, No. 104, June 2009

¹⁵² *Ibid.*

¹⁵³ Ramady, Mohamed A. (2010) "The Saudi Arabian Economy: Policies, Achievements, and Challenges," Springer Science & Business Media

because taking into too many variables into account is beyond the capacity of government. This often unwittingly leads to the implementation of inappropriate policies, if not those, somehow purposeful policies pertaining to rentier state.

Acknowledging these challenges after years of experience, Saudi Arabia along with other oil-exporting countries took initiatives for sustainable development, first by alternating previous allocation state model with production state model¹⁵⁴. In efforts to industrialise and diversify national economy, a series of development plans materialised as early as 1975 with the help of oil price hikes during the first oil shocks. There have been nine successive five-year development plans in Saudi Arabia since 1970. While the first three five-year plans highlighted the importance of providing modern infrastructure and basic government services based on hydrocarbon expansion, it has gradually extended its priorities to include such initiatives as the reconstruction of the economy to embrace more private sector, balanced budget, reduction of foreign labour and *Saudization*, and so on. Moreover, the most recent plans, the Ninth Development Plan (2010-14) and a Long-Term Strategy (2005-24), acknowledge the problems of deteriorating living standards, lack of employment opportunities, uneven regional growth, and lack of international competitiveness of the Saudi economy¹⁵⁵.

One common theme across over 40 years of development plans is the industrial diversification¹⁵⁶. In this regard, investments in large infrastructure followed to serve as the basic facilities for modern diversified industries and in particular the Riyadh government directly financed petrochemical diversification through the Saudi Basic Industries Corporations (*SBIC*)¹⁵⁷.

¹⁵⁴ Hvidt (2013)

¹⁵⁵ *Ibid.*, p.29

¹⁵⁶ Ramady (2010), Chapter 2

¹⁵⁷ Rodney (1995), Chapter 3, p.45

Nonetheless, whether these efforts put Saudi Arabia on a self-sustaining growth path is unsure. On the one hand, Saudi Arabia has succeeded in establishing industrial muscle within petrochemicals, processing crude output into downstream products of oil through forty years of diversification strategies¹⁵⁸. In detail, as of 2009, the manufacturing sector accounted for around 10% of total share of the Saudi GDP, of which petroleum refining and petrochemicals represented almost a half¹⁵⁹. Also, the service sector grew to take up a little less than 30% of the GDP, with most of activities focused on finance, insurance, real estate, and trade¹⁶⁰.

On the other hand, it is found that the impacts of these development plans have not fully taken shape as expected. By comparative yardsticks, despite its size and years of experience, Saudi Arabia lags behind in the level of institutional development and economic development alike, with the lowest GDP per capita among the Gulf cooperation Council (*hereafter GCC*) countries¹⁶¹. As for infrastructure, railway construction has not been pursued until recently, which played critical role in the case of the U.S and coal-based economic development. Investment in railways has been minimal and instead air is largely in place for intra-regional travels along with shipping for international transport, thereby pointing to difficulties involved in connecting and integrating internal, domestic economies¹⁶². Moreover, dependence on crude oil exports continue and much of the diversification is limited to petroleum-related fields. Also, as was in the case of oil industry, the new industries, including construction and petrochemical industries, employ expatriate workers rather than local workers. Therefore, the chain of economic and political developments

¹⁵⁸ Hvidt (2013), p.15

¹⁵⁹ Ramady (2010), p.32

¹⁶⁰ *Ibid.*, p.32

¹⁶¹ Hvidt (2013), pp.29-30

¹⁶² Rodney (1995), p.34

observed above is in accordance with the allegation that efforts to diversify and industrialise Saudi Arabian economy failed or has had mixed results at best.

In conclusion, the case study of Saudi Arabia suggests that the path of industrialisation in oil-producing economies is driven by the interaction between state and external influences. What is peculiar here is that state, which remains strong and autonomous from its domestic interests with concentrated oil revenues, does not maintain the equivalent level of autonomy and independence towards international actors and circumstances. In particular, this case study finds that economic, industrial policies of oil-dependent states are largely influenced by state's relations to foreign companies or expatriate workers, and international economic circumstances. Consequently, this causes Saudi Arabia with abundant oil resources to take on extrinsic industrialisation, thereby having more chances of facing resource curse symptoms.

[Table 5] Major characteristics of oil

Characteristics	Oil
Geographic concentration	High
	More concentrated in certain regions
Fluidity (Transportation)	Fluid; sea-lane and pipelines
	- Global oil trade in 2012 grew by 1.3% at 55.3 million b/d. - Trade accounted for 62 % of global consumption
Technology	Advanced
	- Three major industrial activities; upstream, midstream, and downstream - Four processes of extraction; exploration, well development, production, and abandonment (drilling, ceasing, and necessary infrastructure and testing all point to complex and time-consuming tasks of developing oil reserves into productive oil wells) - Technology transfer from TNCs

[Table 6] Market formation and state-society interactions in relations to external forces

1) Market formation		Overseas-oriented; domestic supply and international demand	
Trade patterns	Industrial structure	International trade - Relative ratio of exports to production (60-75%) vs. consumption relative to production (15-25%)	No Domestic Industry - Reliance on foreign technology and human resources - Saudi ARAMCO - in an enclave; few productive linkages to the rest of the economy; international linkages - Peripheral product space
2) Interaction		between state and foreign/international interests	
between state and social interests in relations to external influences		* The role of state intertwined with international economic circumstances i) Before nationalization; the presence of oil MNCs ii) After nationalisation; the role of government - Capital-intensive; little employment, mainly expatriate - Rentier state iii) Price volatility and fiscal challenges iv) Development planning	
Outcome		Intrinsic industrialisation	

VI. Conclusion

This thesis has focused on exploring how endogenous characteristics of different types of natural resources affect a country's course of economic development and industrialisation. Reflecting on shortcomings found in previous researches on the topic of resource curse, this thesis tried to distinguish types of natural resources and then compare their heterogeneous impacts on political economy of a country, key to determining the existence or absence of resource curse phenomenon.

In doing so, this thesis borrowed insights from Schwartz's analysis of late development, which this thesis named 'Schwartz's Model of Late Development.' The merit of Schwartz's model of late development lies in a finding that developed countries and developing countries alike, or to be more concise, countries adopting as their pursuit liberal democracy and centralised autocracy alike, take a similar path of economic development; first starting off with the help from government or government-funded national banks and then gradually making room for autonomy of economic entities, whose process, however, can vary country-by-country. That said, political structure is of little importance in determining the path a country takes at least at the start-off of the economic development.

Based on this understanding, a new framework, by adding a few more variables, was developed to explain economic growth and industrialisation process of a country dependent on production and sales of natural resources ('Extended Schwartz's Model of Resource-led Development).

First of all, this thesis identified three distinctive characteristics of different types of natural resources. Those characteristics include (1) geographic concentration, (2) fluidity

and means of transport, and (3) the level of technology used to extract and produce natural resources. Second, this thesis noted two linkages connecting these characteristics and outcome of economic development, first between characteristics and market formation, and second between market formation (trade patterns and industrial structure) and state-society interactions vis-à-vis external influences.

More in detail, this thesis first examines how certain characteristics of natural resources interfere to determine conditions for market and industry in ways to create domestic-oriented and closely connected product space on the one hand, and overseas-oriented and remotely connected product space on the other hand. This first linkage renders the presence of external influences attenuated in the former, thus leading to intrinsic industrialisation and non-existence of resource curse, yet augmented in the latter, this time leading to extrinsic industrialisation and accordingly resource curse.

Two types of natural resources, coal and oil, were reviewed to verify this extended model of Schwartz's applied to resource-led economies. For this, two case studies looked at the U.S. and Saudi Arabia, which were considered to represent coal- and oil-abundant economies, respectively.

In summary, it was found that coal had extensive linkages to social, economic, and political developments of a country dependent on coal due to characteristics distinctive from those found in oil. Coal was much associated with productive machines, networks with domestic producers through railroad transport, which altogether enabled consumer durables to be produced in domestic markets. On the other hand, the use and dependence on oil did not have as many linkages as did coal or escalate to developments equivalent to those found in coal.

Moreover, these trade and industrial linkages also had immense impacts on domestic politics and its direction of economic development. In the case of coal, interest formation was restricted to domestic actors, state and domestic interest groups, which made it easier

controls other variables than natural resources, such as different histories, different socio-economic circumstances, different cultures, etc.

However, in reality, there might be other explanations that can altogether constitute a more concrete answer for understanding divergences of economic development between resource-dependent countries. Likewise, the level of analysis is restricted to a macro, country level, not descending down to micro level where states, counties, regions, etc. are included, potentially having vastly differing conditions. Having said that, there should follow in the future more case studies and quantitative analysis to support and verify the new framework introduced in this thesis. Moreover, a further investigation into whether the same new framework can be used to explain various other natural resources beyond coal and oil would be another significant addition to the volume of resource studies.

Nonetheless, the implications of the research are not restricted only to the field of academia, but can be extended to provide policy recommendations in resource dependent economies. Specifically, better understanding of different characteristic borne in different types of natural resources is useful in designing and implementing trade and industrial policies in a resource-based country.

If a country sits on large coal reserves, it can be less worried about integrating coal into overall economy, but instead have to concentrate on other socio-economic and environmental problems derived from coal development. Indeed, coal-producing regions at the micro level, not at the country level, were found to have suffered a lot from deterioration of regional economies along with the collapse of coal-driven economic development; especially after a country as a whole moved upward the ladder of value creation by engaging in diversified manufacturing industries and even post-manufacturing industries. Thus, dealing with such aftermath issues should be the foremost priority in a coal-dependent country. In comparison, oil-dependent economies are faced with a task of

bringing oil closer to domestic economy, in which oil is expected to serve as an investment base for integrated economic development.

All in all, this thesis was able to build up an idea that physical abundance of or reliance on natural resources is not necessarily detrimental for a country's economic development, but the outcome can vary depending on a type of natural resource adopted in due course. That said, the resource-oriented approach of this thesis provides a new take on the discussion of resource curse, hopefully bridging the gap between resource curse and resource blessing arguments. In this regard, this thesis can be recognised as a valuable accumulation to a lengthy line of prior literatures, which can promote diversified versions of resource studies.

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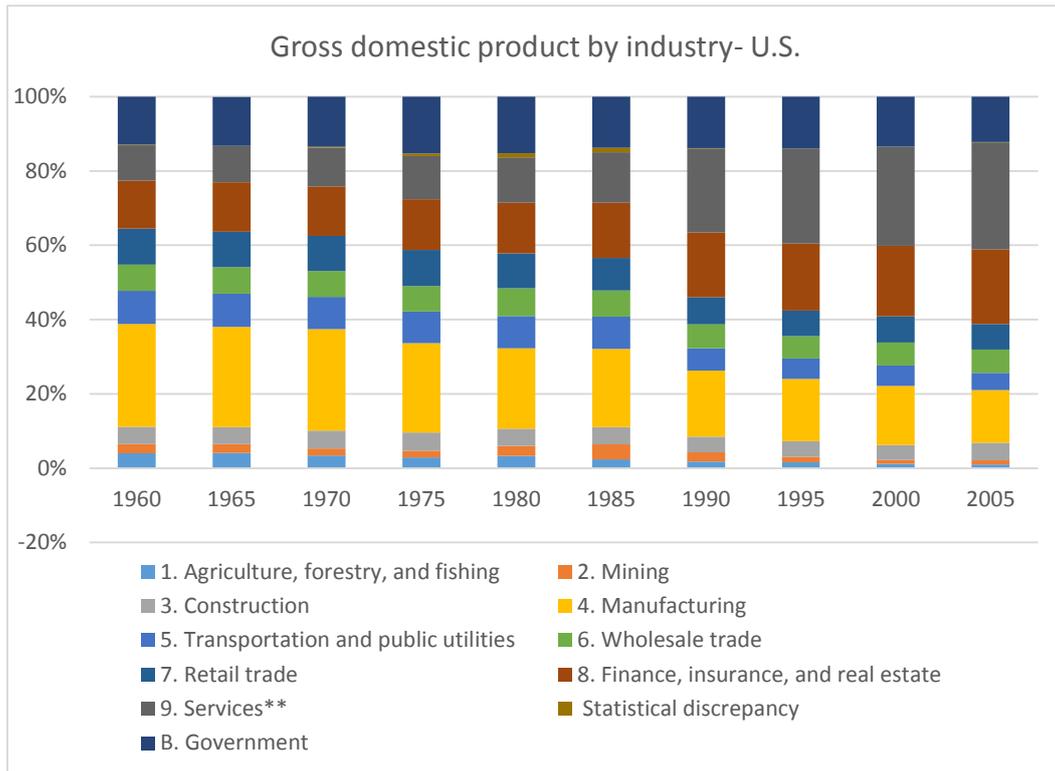
[Appendix 1]

Coal Production in the Leading Coal-Producing Countries of the World

	1913	1914	1915	1916	1917
United States	570,048,125	513,525,477	531,619,487	585,372,568	621,409,629
Great Britain	287,698,617	265,664,393	253,206,081	256,348,351	248,473,119
Germany	278,627,497	245,482,135	235,082,000	.....	.....
Austria-Hungary	59,647,957	.....	.....	30,897,388	28,558,719
France	40,843,618	29,786,505	19,908,000	21,477,000	28,960,000
Russia	35,500,674	.....	27,820,632	13,622,400	13,266,760
Belgium	22,847,000	.....	15,930,000	.....	.....
Japan	21,315,962	21,293,419	20,490,747	22,901,580	.....
India	18,163,856	.....	17,103,932	17,254,309	.....
China	15,432,200	.....	18,000,000	.....	.....
Canada	15,012,178	13,637,529	13,267,023	14,483,395	14,015,588
Spain	4,731,647	4,424,439	4,686,753	5,588,594	.....
Holland	2,064,608	.....	2,333,000	2,656,000	.....

* Re-drawn from Notz, Willian (1918) "The World's Coal Situation During the War I," Journal of Political Economy, Vol.26, No.6, pp.567-611

[Appendix II] GDP by Industry (U.S.)



[Appendix II] - continued

Gross domestic product by industry- U.S.												
YEAR	Gross Domestic Product (GDP)	A. Private industries										B. Government
		1. Agriculture, forestry, and fishing	2. Mining	3. Construction	4. Manufacturing	5. Transportation and public utilities	6. Wholesale trade	7. Retail trade	8. Finance, insurance, and real estate	9. Services**	Statistical discrepancy	
1959	100	4.0	2.5	4.7	27.7	8.9	7.0	9.8	12.9	9.5	0.2	12.9
1960	100	4.1	2.5	4.6	27.0	9.0	7.1	9.6	13.3	9.8	-0.1	13.2
1965	100	3.4	2.0	4.8	27.3	8.7	6.9	9.5	13.3	10.4	0.3	13.5
1970	100	2.9	1.8	4.9	24.0	8.5	6.9	9.7	13.7	11.6	0.7	15.3
1975	100	3.4	2.6	4.6	21.7	8.7	7.4	9.4	13.7	12.2	1.1	15.2
1980	100	2.4	4.0	4.6	21.0	8.7	7.0	8.8	14.9	13.6	1.2	13.8
1985	100	1.8	2.5	4.2	17.8	6.0	6.4	7.3	17.5	22.6	0.1	13.8
1990	100	1.6	1.5	4.2	16.7	5.5	6.0	6.9	18.1	25.6	.	13.9
1995	100	1.2	1.0	4.0	15.9	5.5	6.2	7.1	19.0	26.7	.	13.4
2000	100	1.0	1.1	4.7	14.2	4.7	6.2	6.9	20.1	28.8	0.1	12.2
2005	100	1.0	1.5	4.9	12.4	4.5	5.7	6.6	20.6	30.1	0.1	12.6
2010	100	1.1	1.7	3.6	11.2	4.9	5.5	6.0	20.8	31.5	0.1	13.6
2011	100	1.2	1.9	3.5	11.5	5.0	5.6	6.0	20.3	31.9	-0.1	13.2

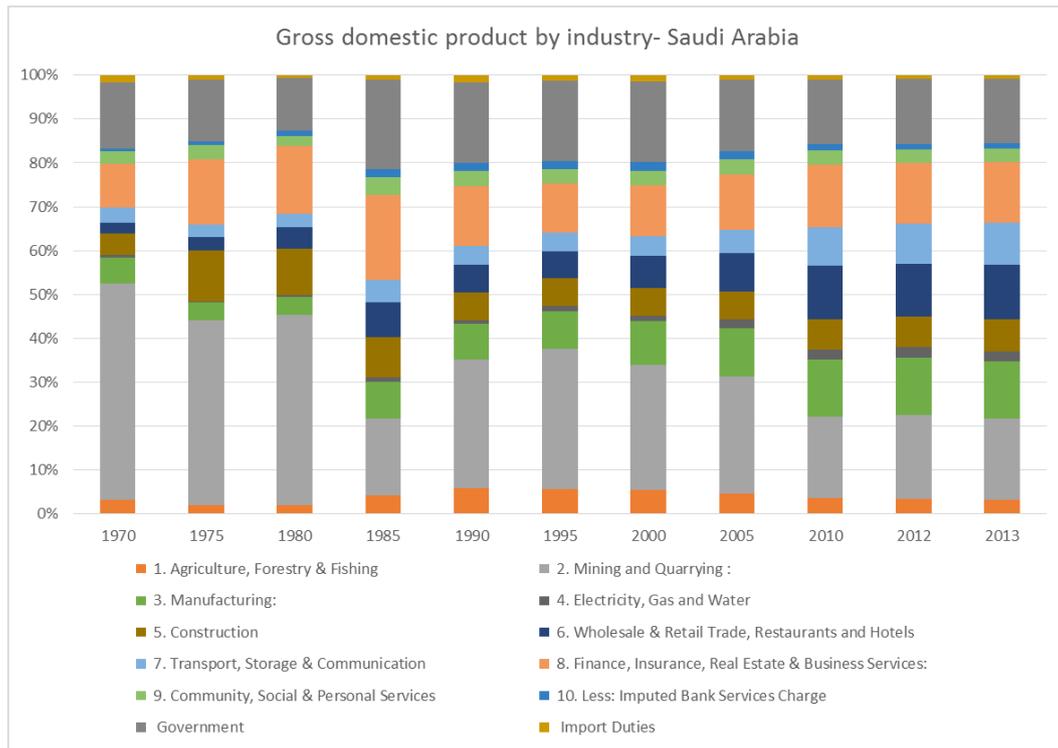
[Billions of dollars]

* (1959-1980) Based on 1972 SIC
(1985-) Industry value added as a percentage of GDP (percent), in current dollars and as a percentage of GDP

** Service from 1985 and onwards consists of information: professional and business services; educational services, health care, and social assistance; arts, entertainment, recreation, accommodation, and food services; and other services, except government.

* Retrieved from Department of Commerce, Bureau of Economic Analysis, US (BEA)

[Appendix III] GDP by Industry (Saudi Arabia)



Although industrial structure has been stabilized over the course of about 40 years since 1970s, the dominance of mining sector remains large and cannot be neglected. In addition, it is shown that government also composes considerable part of GDP.

[Appendix III] - continued

Gross domestic product by industry- Saudi Arabia											
	1970	1975	1980	1985	1990	1995	2000	2005	2010	2012	2013
A - Industries and Other Producers Except											
Producers of Government Services:											
1. Agriculture, Forestry & Fishing	3.1	1.9	2.0	4.4	6.0	5.8	5.7	4.8	3.8	3.4	3
2. Mining and Quarrying :	50.1	42.9	44.3	18.2	30.7	33.3	29.7	27.6	19.1	19.8	19
a) Crude Petroleum & Natural Gas	49.8	42.5	44.0	17.8	30.3	32.9	29.3	27.2	18.5	19.2	18
b) Other	0.2	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.6	0.6	1
3. Manufacturing:	5.9	4.1	4.3	8.7	8.4	8.8	10.4	11.6	13.3	13.4	13
a) Petroleum Refining	4.0	1.8	1.8	3.1	3.6	2.9	2.9	2.8	2.0	1.8	2
b) Other	1.9	2.3	2.5	5.5	4.8	5.9	7.4	8.8	11.3	11.6	12
4. Electricity, Gas and Water	0.5	0.2	0.5	0.9	0.9	1.2	1.4	2.0	2.5	2.4	2
5. Construction	5.1	11.9	10.8	9.7	6.5	6.6	6.6	6.7	7.1	7.1	7
6. Wholesale & Retail Trade,											
Restaurants and Hotels	2.4	3.1	5.0	8.2	6.5	6.3	7.6	9.0	12.5	12.4	13
7. Transport, Storage & Communication	3.5	2.8	3.1	5.3	4.4	4.4	4.6	5.5	9.0	9.5	10
8. Finance, Insurance, Real Estate		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
& Business Services:	10.2	15.1	15.7	19.9	14.1	11.7	12.1	13.2	14.7	14.1	14
a) Ownership of Dwellings	6.8	10.8	11.1	13.1	8.5	6.8	6.8	6.4	6.8	6.9	7
b) Other	3.3	4.3	4.6	6.8	5.6	4.9	5.3	6.8	7.8	7.2	7
9. Community, Social & Personal Services	2.8	3.4	2.4	4.3	3.6	3.4	3.6	3.5	3.3	3.1	3
10. Less: Imputed Bank Services Charge	0.6	0.7	1.1	1.8	2.0	1.9	2.1	1.9	1.5	1.4	1
SUB - TOTAL	83.0	84.7	87.0	77.7	79.2	79.7	79.5	81.9	83.7	83.9	84
B - Producers of Govt. Services:	15.3	14.4	12.2	21.2	19.1	18.9	19.0	17.0	15.3	15.1	15
Total Except Import Duties	98.3	99.0	99.2	99.0	98.4	98.6	98.5	98.9	99.0	99.0	99
Import Duties	1.7	1.0	0.8	1.0	1.6	1.4	1.5	1.1	1.0	1.0	1
Gross Domestic Product (GDP)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100

(Million Riyals)

1999=100

* Retrieved from Central Department of Statistics & Information, Ministry of Economy and Planning, Saudi Arabia (SAMIRAD)

Abstract (Korean)**국문 초록**

성명: 전희주

학과 및 전공: 국제학과 국제협력전공

서울대학교 국제대학원

본 논문은 서로 다른 종류의 자연자원이 국가의 경제발전에 어떤 영향을 가지는지를 정치경제적 관점에서 연구하였다. 기존 자원의 저주(Resource curse) 현상에 대한 많은 연구가 있어왔지만, 이들은 자원에 기반한 효과적인 경제발전의 사례를 설명하지 못하는 점에서 한계가 있다. 따라서 본 연구는 자원의존국가들의 다양한 경제발전의 역학관계와 결과를 이해하기 위한 새로운 틀을 마련하고자 하였다. 특히, 본 연구는 Schwartz의 후기발전모델 (Schwartz's model of late development)에 차용, Schwartz의 자원기반 발전모델(Extended Schwartz's model of resource-led development)을 제시하고 있다.

본 연구는 먼저 인간 생활의 필수적 에너지원인 석탄과 석유의 기본적인 특징을 세 가지 측면 (지리적 집중도, 유동성과 운송수단, 자원추출과 생산에 요구되는 기술력의 정도)에서 비교한다. 나아가 이렇듯 서로 다른 성격의 자원이 두 가지 측면에서 자원의 저주 (Resource curse)와 자원의 저주의 부재(Non-existence of resource curse)라는 상반된 결과로 이어지는 것을 밝히고자 하였다. 이 때, 두 가지 연결고리를 구체화하는 것이 중요한데, 먼저 자원을 사용한 경제발전은

무역패턴과 산업구조적 측면에서 구별된다. 이러한 차이는 나아가 국가와 사회, 외부 요소 간 상호작용에도 영향을 미치는 것으로 보인다.

본 연구는 미국과 사우디아라비아를 비교, 각각 석탄과 석유를 이용한 경제발전 경로의 대표적 사례로써 연구하였다. 또한 경제, 역사, 정치 등 다양한 분야의 연구를 비교 연구에 적용함으로써 어떻게 국내 정치경제의 역학 및 국내와 국제 정치경제의 상호 관계가 한 국가의 경제발전 경로에 영향을 미치는지 설명하고자 하였다.

이러한 과정을 통해 본 논문은 기존 자원 연구와 차별되는 새로운 정치경제적 분석틀을 제공하고, 자원기반 경제발전의 다양한 과정을 체계적으로 분석하는 데 기여하고자 하였다.

핵심어

자원의 저주, 자원의 축복, 자원의 특성, 자원기반 경제발전, 정치경제, 석탄, 석유

학번: 2012-23846 (전희주)