University of Pardubice

Faculty of Economics and Administration

Institute of Economic Sciences

The Transformation of the Public Sector and Its Financing

Ing. Abdeloualid Rouag

Supervisor: Assoc. prof. Jan Stejskal, Ph.D.

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ANOTACE

Disertační práce se zaměřuje na paradoxní situaci zvanou „prokletí zdrojů", která nastává v zemích bohatých na strategické nerostné suroviny. Tyto země získávají do své ekonomiky vysoké příjmy a zcela paradoxně jejich hospodářský rozvoj je menší, než u zemí, které tímto bohatstvím neoplývají.

Disertační práce se zaměřuje na země tzv. skupiny MENA, které se nacházejí na Blízkém Východě. Cílem této práce je navrhnout vhodnou metodu analyzující efektivnost veřejného sektoru, která dokáže vysvětlit rozdíly v ekonomickém růstu jednotlivých zemí, včetně zemí oplývajících přírodním bohatstvím. Analýza je zaměřena zejména na lidské zdroje a další stabilizační opatření, která mají snížit závislost daných ekonomik na nerostném bohatství a příjmech z něj. Cílem je také identifikovat ukazatele, které negativně ovlivňují celkovou výkonnost veřejného sektoru v zemích bohatých na zdroje a vytvořit rámcová doporučení pro veřejnou politiku, jak transformovat veřejný sektor, resp. strukturu veřejných rozpočtů.

KLÍČOVÁ SLOVA

Transformace, veřejný sektor, veřejné finance, teorém „prokletí zdrojů"

TITLE

The Transformation of the Public Sector and Its Financing

ANNOTATION

The dissertation work focuses on paradoxical economic phenomenon called „the Resource Curse". These countries paradoxically benefit from large natural resources windfalls and reach lower economic development comparing to countries less rich with such resources.

This dissertation focuses on MENA (Middle East and North Africa) countries. The thesis aims to propose a suitable analytical method of Public Sector Efficiency that explain divergent economic performances including those rich in natural resources. The analysis focuses on human capital and other stabilization measures to reduce the dependency of such countries on their natural wealth. Another objective is to identify indicators that affect negatively the overall performance of the Public Sector and create a framework to transform their public sector and public budgets.

KEYWORDS

Transformation, Public Sector, Public Sector, resource curse theory

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LIST OF ABBREVIATIONS

COLS	Corrected Ordinary Least Square
DEA	Data Envelopment Analysis
DMU	Decision Making Unit
EIR	Extractive Industries Review
EITI	Extractive Industries Transparency Initiative
FDA	Full Disposal Hull
GCR	Global Competitiveness Report
IBP	International Budget Project
IMF	International Monetary Fund
MBO	Management by Objectives
MENA	Middle East and North Africa
NDRS	Non- Decreasing Return to Scale
NIRS	Non- Increasing Return to Scale
NPA	New Public Management
OBI	Open Budget Initiative
OEC	Oil Exporting Countries
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Square
OSC	Observance of Standard and Codes
PCA	Principal Component Analysis
PSE	Public Sector Efficiency
PSP	Public Sector Performance
PWYP	Publish What You Pay
SWF	Sovereign Wealth Fund
TFA	Thick Frontier Approach
UAE	United Arabic Emirates
UNICOSOC	The United Nations Economic and Social Council
VRS	Variables Return to Scale
WBG	World Bank Group
WDI	World Development Indicators
WDO	World Development Outlook
WEO	World Economic Outlook

INTRODUCTION

The "resource curse" is known as a paradoxical situation in which an abundance of non-renewable resources experience. In other words, it refers to the paradox that countries and regions with an abundance in natural resources, especially point-resource like minerals and hydrocarbon tend to have less economic growth and worse economic outcomes than countries and regions with fewer natural resources, this phenomenon is also known as the "paradox of plenty" is hypothesized to happened via several channels, including the decline of competitiveness in other economic sectors, volatility of revenues from the natural resources due to the exposure to global commodity market swings, government mismanagement of resources, or weak, unstable or corrupt institutions.

To understand the proposed curse, we first need to distinguish how resource wealth differs from other types of wealth. Humphreys et al. (2007) identify two key differences. First, unlike other resources (i.e. oil, gas and minerals) do not need to be produced, but only extracted. Because the generation of natural resources wealth is not a result of production, it can occur relatively independently of other economic processes and does little to create employment. For example, the oil and gas sectors are among the world's most capital-intensive industries. Thus, this sector creates fewer jobs per unit of capital invested, and the skills required for these jobs usually do not fit the profile of a country's unemployed (Karl, 2007). The second key difference of natural resources wealth identified by Humphreys et al. stems from the fact that many are non-renewable, particularly oil and gas. Many scholars point out that from an economic aspect are less of a source of income and likely more as an asset.

In contrast, among natural resources rich countries have observed a good performance record in dealing with resource assets; those are likely to be an opportunity to improve its economic outputs and the standard of living for their people, turning the curse into a blessing. Indeed, reference (Sachs, 2007) such assets should offer three large benefits for poor economies. First, the income steam from resource extraction can boost real living standards by financing higher level of public and private consumption. Second, resource extraction can finance higher levels of investment, both directly out of natural resource income, and indirectly from borrowing made possible by that income. Third, since resource income typically accrues largely to the public sector, and to the public budget, it can obviate a huge barrier to development: the lack of fiscal resources needed to finance core public goods, including infrastructure. However, for some decades it has been observed that the possession of natural resources is neither necessary nor sufficient to confer economic success. Many

countries in Africa and Middle East are rich in oil and gas and other natural resources, and yet their people continue to experience low per capita income and a low quality of life. Angola, Venezuela, Nigeria and some Middle East countries are good instances of resource-based economies that suffer lower negative GDP growth and widespread poverty. In contrast, other countries having fewer exportable natural resources achieved high standards of living.

The first economist who introduced the resource curse thesis was Richard Auty in his book "sustaining development in mineral economies: the resource curse thesis" (1993). Auty defines mineral economies as those developing countries which generate at least 40 percent of their export earnings from the mineral sector. The concept has been tackled by scholars held two different perspectives on the role of natural resources in an economy. The more positive perspective can be traced back to Adam Smith and David Ricardo, they asserted that natural resources are beneficial in the process of economic development, this view continues well into 1970s (Viner 1952; Rostow, 1961). Rostow argued that natural resources endowments would enable developing countries to make the crucial transition from under-development to industrial take-off. The consensus view held that natural resources would facilitate industrial development, create markets and encourage investments.

Although there was some opposition to this conventional wisdom (Singer 1950, Prebisch 1959; Nankani; 1979) the optimistic view prevailed until the early 1980's. At this time, the so called Dutch disease- named after the decline of the Dutch manufacturing after the discovery of natural gas at Groningen in 1959. The Dutch disease represents the traditional approach talking the resource curse and constitutes the combined influence of two main effects; first, the appreciation of the real exchange rate caused by the sharp rise in exports. Second the tendency of a booming resource sector to draw capital and labour away from a country´s manufacturing and agriculture sector. Together these two effects can lead to a decline in exports of agricultural and manufactured goods and inflates the cost of non-tradable goods.

The hydrocarbon impact on an oil economy has been tackled by many economists over years and demonstrates that oil and gas revenues generated by the flow of foreign currencies have many benefits if the countries have utilised them successfully to enhance their development and the welfare of their citizens. However, many of these countries have found out that these windfalls, based on exhaustible (non-renewable) resources, become more a curse than a blessing particularly in the developing countries, which have suffered from a poor institutional system, and this is of great interest to some economists.

Due to their economic exposure, it is important for governments in resource rich countries to feel the need to use the bulk of their revenues, generated by their mineral extraction to invest in a large extent in education, infrastructure and increasing the competitiveness of a country in the way to make their countries dependent on sources different than mineral resources. Such public policies did not occur in several resource-rich countries mainly due to their historical and social context.

To avoid the negative effects of an imminent failure, it is then important to find a way how to address the curse. These include reforms in fiscal systems, public budgets and public policies.

1. THEORETICAL BACKGROUND

In the following chapter of the first part we will focus on the definition of the public sector as a part of the national economy, the focus of this section will be also dedicated to the public-sector reforms and its theoretical background. The following sub sections will define the public sector, types of public sector organizations, and the definitional criteria of public sector organizations.

1.1   Definition and type of public sector organizations

This sub section is intended to clarify what is meant by the term public sector, which can sometimes be ambiguous. The aim here is to identify specific criteria to appropriately classify organizations around the world as being in the public sector.

The expression public sector is often taken as the budget(s) enacted by political assemblies. The accent is on political budgeting when the resources are mobilized at various levels of government. This definition is one among several ones and neglects as well one of the major sources of government impact in society, namely legislation. The most general definitions of public sector (according to Stiglitz, 2015; Atkinson and Stiglitz, 2015; Robbins, 2017 and others) may be rendered formally as:

1. Public sector is the government activity and its consequences - the concept of the public sector implied here involves the traditional approach to the public sector as public administration or public authority. The first definition then may be replaced by,

2. The public sector is the state general decision making and its outcomes – this definition focuses on legislation and authority more than budget and allocation.

(The two first definitions are called the authority interpretation of the public sector focusing in the budget.)

3. The public sector is the government consumption investment and transfers – this definition is reasonable adequate but amorphous since these three elements can vary in relation to each other; the distinction between public consumption and investment in one hand and transfers in the other hand is essential for the solution of public sector size issue. One may argue for some particular size of government consumption and investment according to the principal of consumer choice, while

admitting another size for the transfer part based on consideration about social justice in an equity argument, then this definition should be reduced to,

4. The public sector is the government consumption and investment – this definition is the allocation interpretation of the concept of the public sector. Under this definition, arguments about the proper size of the public sector would then have to be supplemented by a statement regarding the proper size of transfer payments. The fourth definition minus the third one would constitute the distribution interpretation of the public sector. It does not follow from the fact that a government allocates goods and services that it also must produce them. Then the fifth definition of the public sector should be,

5. The public sector is defined as the government production - this is seen as the provision or public ownership of the means.

In general term, the public sector consists of governments and all publicly controlled or publicly funded agencies, enterprises, and the entities that deliver public programs, good or services. It is not however; always clear whether any particular organization should be included under the umbrella. Therefore, it is necessary to identify specific criteria to help define the boundaries.

For the need of this essay the public sector is demarcated as the public, formal, and non-profit sector of the national economy of the national economy financed by the public finance, managed, and administrated by the public administration decisions about it are handled by the public choice based on the concept of collective decisions and subjected to public scrutiny (Strecková, Malý, 1998).

The concept of public sector is broader than simply that of core government and may overlap with the not-for-profit or private sectors. For the purposes of this essay, the public sector consists of an expanding ring of organizations, with core government at the centre, followed by agencies and public enterprises. Around this ring is a grey zone consisting of publicly funded contractors and publicly owned businesses, which may be, but for most parts are not, part of the public sector.

Public sector organizations may include national regional and local levels. At any of these levels, the public sector generally consists of at least three types of organizations such as:

1. Core government consists of the governing body with defined territorial authority. Core government that are integral parts of the structure, and are accountable to report directly to the central authority,

2. Agencies: consists of public organizations that is clearly a part of the government and delivers public programs, goods, or services but that exists as separate organizations in their own right – as legal entities – and operates with a partial degree of operational independence. They often, but not necessarily, are headed by a broad of directors, commission, or other appointed body,

3. Public enterprises are agencies that deliver public programs, goods, or services, but operate independently of government and often have their own sources of revenue in addition to direct public funding. They also may compete in private markets and may make profits. However, in most cases the government is the major shareholder, and these enterprises partly follow the acts and regulations that govern the core government.

Outside this clear public-sector area is a grey zone, or boundary zone with two types of organizations that might or might not be part of the public sector.

4. State businesses are government owned and controlled businesses that sell goods or services for profit in the private market. Although they do not deliver what would be considered public programs, goods, or services, they might be considered part of the public sector,

5. Public contractors are legally independent entities outside government that receive public funding – under contract or agreement – to deliver public programs, goods, or services as their primary business. Due primarily to their limited public control, these organizations usually would be classified as not for-profit or private sector entities.

This conception emphasizes the division of the national economy according to (Pestof and Rektořík, 2001).

1.2   Justifications of the public-sector existence

The existence of the public sector is based on the rational behaviour based on their past experience that individual benefits is higher if they behave as individuals in a structured society, this allow to share costs of consuming indivisible commodities and services, the general cooperation between individuals reduces the whole society costs and minimizes the

negative effects of conflicts as well that may occur within the same society. It is then obvious, that an individual wide consensus on living in a structured society brings every member to a larger benefit (Welfare). This is hypothesized to happen till marginal costs will exceed the marginal benefit of this behaviour.

The State has been created based on a universal agreement, the state fulfils two main functions – protection and production. This ensures the basic attributes of the existence of a given organized society and the basic principles of the economy (for example, via the introduction of the law, ownership right has been established and this allows in turn the exchange of goods). Then following the need of its citizens, the state may ensure other needs that can be reached by the fulfilment of other state functions in economy. These are known as state intervention in the economy.

The public sector according to Mikušová and Stejskal (2014), provides space for the implementation of state interventions in order to allow the fulfilment of its function in the economy. The main cause of the state intervention in the economy is justified by the imbalance of the economic system that cannot be solved by the market.

The public sector, according to Mikušová and Stejskal (2014), provides space for the implementation of state interventions in fulfilling the functions of the state in the economy. The main cause of state intervention in the economy must be seen in the imbalance of the economic system that the market is unable to eliminate itself. There is market failure. According to Apgar and Brown (1987) the role of the state should be based primarily on:

- Supporting competition in areas where there is a prerequisite for efficient allocation of resources through a common market mechanism,

- Regulation of natural monopolies where competition could not ensure effective allocation of resources,

- State interventions in the functioning of market mechanisms in the case of externalities,

- Addressing income inequalities,

- Ensuring the protection of the individual rights of citizens.

Based on the aforementioned reasons, functions of the state in modern advanced economies are: allocation, redistribution and stabilization function. All three functions are implemented through public policies and public finances and therefore belong to the so-called fiscal function of the state (Stiglitz, 2000).

Single functions of the state in the economy result on the cause of market mechanism failure, microeconomic failures are mainly:

- Imperfect competition,

- Collective goods,

- Externalities,

- Asymmetric information

- Non-complex markets.

In all cases, this is due to the failure in the allocation of scarce resources and the inability to achieve Pareto efficiency in the production of collective goods, and socio-economic environment in which individual economic entities interact.

Macroeconomic causes of failure are a natural part of the market and their dynamic development. It is a natural part of market mechanisms that there are fluctuations and different reversals due to the behaviour of economic subjects. These changes are logically reflected in macroeconomic area. The task of the state is to stabilize macroeconomic aggregates and try to make the most efficient use of the factors of production (in optimal competition Pareto optimal). In this group of market failures, the issue of resource curse should also be emphasized, as the government implements its economic policy (especially fiscal and foreign trade) resources obtained from the extraction of mineral resources. The main revenue of the state budget does not stem from tax revenues (as in industrialized countries), but revenues stem from mining and foreign trade in commodities (Ross, 1999). High revenues allow governments to invest higher in infrastructure. However, due to previous experience, governments will not invest in the most efficient use of production factors, especially in human capital, respectively, on human potential, and in particular knowledge-skills, socio-participatory and regulatory components (Malý, Nemec, 2012; Lall, 2017; Robinson et al., 2017).

The non-economic reasons for the existence of the public sector have already been mentioned. These are the principles on which the society is built and are embedded in the social contract. The cause is related mainly to social needs (Mikušová, Stejskal, 2014). This is about:

- Ensuring the existence of an organized society,

- Preserving institutional values,

- Preserving human life,

- Mitigating inequalities between entities.

The latter point may not be typical of all developed countries. Specifically, countries rich in natural resources are should also be engaged to eliminate inequalities between subjects, especially by passive methods (Gamu et al, 2015).

It is necessary to highlight that all state interventions in the economy (in each of these functions) require funds from the public budgets, or the application of measures primarily in the fiscal policy of the state (Farzanegan et al., 2017). Individual market interventions are disturbed by both market mechanisms and an inefficient use of scarce resources (there is a risk of "market failure" in a given intervention), thus secondary degradation of the distribution of wealth in society (expressed in so-called income equity) may occur.

1.3 Efficiency and equity in the public sector

There is also a second approach explaining the existence and justifying the role of the public sector. It can be grouped under the heading of efficiency and equity. Efficiency relates to arguments concerning the aggregate level of economic activity, whereas equity refers to the distribution of economic benefits. Considering these arguments these arguments, it is natural to begin with efficiency since this is essentially the more fundamental concept.

Efficiency: The most basic motivation for the existence of a public sector follows from the observation that entirely unregulated economic activity cannot operate in a very sophisticated way. In short, an economy would not function effectively if there are no property rights (rules defining the ownership) and contract laws (the rule governing the conduct of trade) as a first step away from anarchy of the "state of nature" as established by Hobbes, where contract laws determine the rule of exchange (Stiglitz, 2000). In that way the establishment of property rights and the contract laws is not sufficient because of the need of officers and justice for the respect of the property rights and the contract laws. In addition, more the economic activity is developed more there is a need for the provision of defence for the nation. The enforcement of contracts, property rights, justice and the defence are seen "minimal state" requirements. Their provision needs a source of incomes to pay for them which requires the collection of revenues and provides a service (Van Dooren et al., 2015).

The coordination of the revenues collection and the provision of services to ensure the attainment of efficient functioning of the economic activity provide a natural role for the

public sector. From this follows the first role of the public sector is the attainment of economic efficiency by providing an environment in which economic activities can flourish.

Handling this minimal state requirements should be done at a little cost as possible imposed on the economy. Such costs arise from the distortion in choice that arises from taxation.

Equity: in addition to market failure, government interventions can be also motivated by the observation that the economy may have a large inequality of income, opportunity, or wealth. Then the role of the public sector will be to design policy to alleviate these inequalities. This is the reasoning through which the provisions of the state education, social security program, pension schemes are justified; their outputs will be normative assessment of welfare.

When determining the economic policy in the lens of efficiency and equity, the government faces conflicting aims; because an efficient policy is often highly inequitable, while the equitable policy can introduce significant distortions and disincentives. Given this fact, the challenges for policy design is to reach the correct trade-off between equity and efficiency, so that governments in the formulation and implementation of public policies should consider the trade-off principle between equity and justice.

1.4   The extent of the government

Statistical and empirical studies show that there is a clear substantial growth of the public sector during the past century. There are numerous theories that have been advanced to explain why this has occurred. The most important according to Provazníková (2015) are:

1. **Development models** – based on the assumption that the economy experiences changes in its structures and this needs a growing public sector; the early stage of development is viewed as the period of industrialization during which the population moves from the country side to the urban areas. To meet the needs that results from this change, there is a requirement for significant infrastructural expenditure in the development of cities. The typically rapid growth experiences results in significant increase in expenditure and the dominant role of infrastructure determines the nature of the nature of the expenditure.

2. **Wagner´s law** – Adolph Wagner was a nineteenth century economist who analysed data on public sector expenditure for several European countries, Japan, and the United States. The share of the public sector in GDP has been increasing overtime.

Wagner predicts that this will continue. The Wagner´s analysis provided a theory rather than a description as for development models. Basis of the Wagner theory are three:

o   Growth of the economy results in an increase in complexity and the economic growth require continual introduction of new laws and the development of the legal structure,

o   Increase of urbanization and the increased externalities associated with it,

o   Goods supplied by the public sector have a high income elasticity of demand (education, recreation, and health care).

Given this fact, as economic growth raises incomes, there will be an increase in demand for this product. In fact from a high elasticity it can be inferred that public sector expenditure does rise as a proportion of income.

We should remind that there are two version of the law. The first one stems from various social and demographic complication that accompany the industrialization process, this version state a growing share of national income and greater allocation of public goods (Dollery and Singh, 1998). This version has been validated in almost all developed countries, whereas not so relevant for developing countries. The second version Dollery and Singh (1998), is based on the fact that public goods are characterized by demand income elasticity over the long run that absorbs increasing rate of national income. This version has been validated in various developed countries.

3.   **Baumol´s law** – starts from an observation about the nature of the production technology in the public sector. The basic hypothesis is that the technology in the public sector is labour-intensive relative to that of the private sector which leaves a little scope for the increases in productivity and that makes it difficult to substitute capital for labour. Furthermore, competition on the labour market ensures that labour costs in the public sector are linked to those in the private sector. Since the public sector cannot substitute capital for labour, the wage increases in the private sector feed through into cost increase in the public sector (Dunleavy, 2017). Maintaining a constant level of public sector output must therefore result in public sector expenditure increasing if the public sector expenditure rises as a proportion of total expenditure. This is Baumol´s law, which asserts the increasing proportional size of the public sector (Bates et al., 2015).

4. **The Ratchet Model** – models of the ratchet develop the modelling of political interaction in a different direction. They assume that the preference of the government is to spend money. Explanations of why this should be so can be found in the economics of bureaucracy. This model assumes that the public do not want to pay taxes. Higher spending can only come from taxes, so by implication the public partially resists this; they do get some benefit from the expenditure. The two competing objectives are moderating by the fact that government desire re-election and consequently have to take some account of the public´s preference. The equilibrium level of public sector expenditure is determined by the balance between these competing forces. In the absence of any exogenous changes or of changes in preferences, the level of expenditure will remain relatively constant (Hindriks and Myles, 2013).

Theories of the growth of public sector expenditure described above attempt to explain the facts but do not offer comments on whether the level of expenditure is deficient or excessive. They merely describe processes and do not attempt to evaluate the outcome. There are in fact many economists who argue that public sector expenditure is too large and represents a major burden on the economy. These views of "excessive government" are explained by Hindriks and Myles (2013) in the following section.

1. **Bureaucracy** – the traditional view of bureaucrats is that they are motivated by the desire to serve the common good. They achieve this by conducting the business of government in the most efficient manner possible without political or personal bias. This idealistic image may be corrected by the assumption that bureaucrats are not different than other individuals (Benčo, Kuvíková, 2011). From this perspective it is difficult to accept that they are not subject to the same motivation of self-serving so that bureaucrats are motivated by the maximization of their private utilities. This attitude is justified by the fact that bureaucrats cannot exploit the market to raise income unlike subjects of the private sector. Instead, they resort to obtain utility from perusing pursuing non-gain goals. A complex theory of bureaucrats may include many factors that influence utility such as patronage, power, and reputation which in fact reflects the size of the bureau in order to obtain the greatest no pecuniary benefits. It is as a result of this behaviour that the size of the government becomes excessive and deficient.

2. **Budget-setting** an alternative perspective on excessive bureaucracy can be obtained by considering a different process of budget determination. A motivation for this is the fact that each government department is headed by a politician who obtains satisfaction from the size of the budget. Furthermore, in many government systems, budgets for departments are determined annually by a meeting of cabinet. This meeting takes the budget bids from the individual departments and allocates a central budget on the basis of these. Providing a model incorporating these points then determines how departments´ budgets evolve over time.

3. **Corruption** – corruption does not emerge as a moral aberration but as a general consequence of government officials using their power for personal gain. Corruption distorts the allocation of resources away from productive toward rent-seeking occupations. Corruption is not just redistributive (taking wealth from others to give it to some special interests), it can also have enormous efficiency costs. By discouraging the entrepreneurs on whom they prey, corruptible officials may have the effect of restricted economic growth. One of the most important form of corruption in many countries is predatory regulation which refers to the government intentionally creates regulations that entrepreneurs have to pay bribes to get around. Because it raises the cost of productive activity, this form of corruption reduces efficiency. The damage is particularly large when several government official government officials, acting independently, create distinct obstacles to economic activity so that each can collect a separate bribe in return for removing the obstacle (for more see Volejnikova, 2005).

The role of the public sector as aforementioned is to intervene to deliver an allocative efficiency of scarce resources and an equitable distribution of wealth among the society handled by the public sector. These interventions are mainly designed to correct the market failure and achieve an improvement in economic and social welfare. The government interventions often lead to further inefficiencies especially when the government policies prove to be costly but ineffective in achieving their desired outcomes. This situation is known as the government failure and refers to imperfections in government performance. When the public sector (government) failure occurs this involves a need for the redesign of the public sector, its role, the resources used and the output and incomes to be achieved. Redesigning the public sector is traditionally known as the reforming of the public sector.

1.5   Public sector reforms

Public sector reforms are systematic interventions directed towards the structure, operations and procedures of the public goods and services with the purpose of inducing its transformation as a multi-facetted agent of change as well as an instrument of national cohesion and socio-economic development. It principally involves restructuring of the organisation of the public sector, public personal management and public-sector work-place relations. It also encompasses restructuring of remuneration and conditions of employment/service, as well as management and operational practices.

There has been much debate in trying to define what public sector reform is and how it should be implemented. The United Nations Economic and Social Council (UNECOSOC) in its 2006 paper started that "Public sector reforms consists of deliberate changes to the structures and processes of public sector organizations with the objective of getting them to run better. Structural changes may include merging or splitting public sector organizations while process change may include redesigning systems, setting quality standards and focusing on capacity building".

The public sector may be overextended-attempting to do too much with too few resources. The public sector may be poorly organized; its decision-making processes may be irrational; staff may be mismanaged; accountability may be weak; public programs may be poorly designed and public goods and services poorly delivered. All this create a perquisite to pursuit various reforms or adding certain processes in the public sector. Initiatives for those public-sector reforms may be external or internal; it is hypothesized to happen through various economic, social, and in particular trough political impulses

Public sector reforms are then about strengthening

•   the way that the public sector is managed,

•   how to find new methods that can be applied in the public sector,

•   how to efficiently use public finances,

•   how to divide public finance into a budgetary system,

•   how to build an efficient institutional and organizational public administration,

•   which legal frame to be adopted and others.

In general way, find a specific impulse to think about reforming the public sector and public finance in countries dependant from revenues generated by their natural resource welfare and the main problematic of the resource curse.

1.6   Characteristics of the resource curse

The resource curse refers to the paradox that countries and regions with an abundance in natural resources, especially point-resource like minerals and hydrocarbon tend to have less economic growth and worse economic outcomes than countries and regions with fewer natural resources, this phenomenon is also known as the "paradox of plenty" is hypothesized to happened via several channels, including the decline of competitiveness in other economic sectors, volatility of revenues from the natural resources due to the exposure to global commodity market swings, government mismanagement of resources, or weak, unstable or corrupt institutions.

Countries affected by the resource curse shows the following characteristics stemming from four main approaches:

- •   The Dutch Disease,

- •   The human capital approach,

- •   The volatility of primary resources,

- •   The economic political considerations.

The traditional approach to tackling the resource curse was the "Dutch disease" hypothesis Auty and Gelb (1986), Auty (1984), Benjamin, Devarajan and Weiner (1989). Dutch disease mainly economic, is the combined influence of two effects: the appreciation of a country's real exchange rate caused by the sharp rise in exports (spending effect) and the tendency of a booming resource sector to draw capital and labour away from a country´s manufacturing and agricultural sectors (pulling effect), raising their production costs. Together these effects can lead to a decline in exports of agricultural and manufactured goods and inflate the cost of non-tradable goods. Several studies (Neary and Van Wijnbergen (1986), Fardmanesh (1991), Mikesell (1997) find out that in period of oil prices boom some oil exporters did not show a significant shift of labour and capital away from manufacturing toward resource sectors, although their agricultural sectors often suffered. These studies have also tried to identify alternative channels through which resource revenues could harm economic growth.
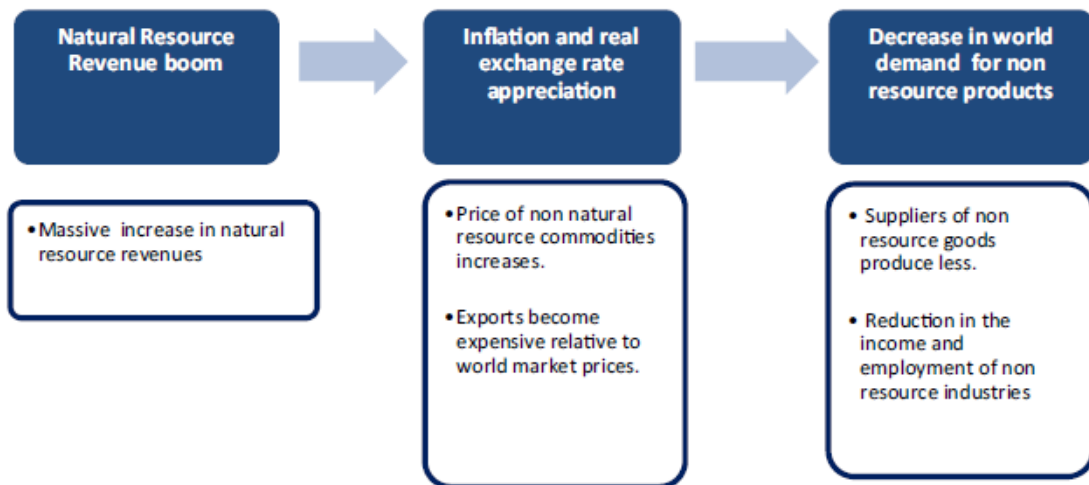
Figure 1 The Dutch Disease Mechanism - spending Effect

Source: Badeeb, Lean, Clark 2017

Figure 2 The Dutch disease Mechanism - pulling effect

Source: Badeeb, Lean, Clark 2017

The second approach is that which argue that resource abundance may reduce the incentives first, to accumulate skills and invest in human resources Birdsall and Jasperson (1997), Auty (2001) and second, to accumulate private capital. The concentration of resources on the public sector Auty (1998a) and (2003) could also delay difficult decisions on economic reforms and thus weaken the economic development. These features tend to reduce investment efficiency, cumulate economic distortions, and retard diversification Auty and Gelb (2001) or Parlee (2015).

The third approach – also economic- is the explanation of the high volatility of resource revenues associated to the dynamic of, for example oil prices. Several studies consider the impact of volatility of public revenues and expenditures on economic growth Lane (2003), Afonso and Furceri (2008) or Robinson (2017). In general, oil exporting countries experience higher volatility in their public sector and external balances. Auty (1998a) and Mikesell (1997) identified higher degrees of trade volatility in regions with high shares of primary export which could be the source of increasing investor uncertainty and could complicate the

implementation of a balanced fiscal policy, thus regarding economic growth. A larger volatility of revenue incomes and the inability of governments to manage efficiently public surpluses, imply a tendency to conduct a pro-cyclical fiscal policies and unproductive use of budgets (Ross, 2015). Auty (2001) also links the larger volatility of revenues incomes to the inability of governments to properly manage public surpluses, implying for example a tendency to conduct pro-cyclical fiscal policies and an unproductive use of funds. Hausseman and Rigobon (2002) take this research further and link the "curse" to the impact of demand volatility on incentives for risk-averse investor.

The last school is guided by the political economy considerations and argue that the resource abundance is the explanation of "resource curse". Natural resource rent can be a source of conflict, political instability, corruption, weak institutions, and inequitable distribution of wealth and policy failure, especially in case of fractional political states that are associated with heterogeneous societies (Easterly and Levine, 1997; Karl, 1997; Cavalcanti et al. 2015 or Robinson et al. 2017). The political economy school argues that governments in oil-exporter countries may prefer non-transparent methods of deploying the rents in expectancy to maximise the scope for political manoeuvring, where interest groups such as state officials, fight to retain oil revenues and create barriers to change. Favourable channels for redeploying rents are trade protection, job creation, job creation in the public sector and over-extended public expenditure. Market discipline may be eroded and government in resource-abundant countries are under less pressure to align their interests with majority. It exists mainly two aspects to the current issue: the impact of resource rents on the quality of institutions and the impact of institutional quality on income. For the first aspect some specialists (Sala-i-Martin and Subramanian 2003) identify a significant negative indirect effect of natural resources on the quality of institutions they used the "rule of law" as and several indexes to measure the institutional quality (Van Der Ploeg and Arezki 2008) conclude that the natural resources curse is particularly severe for economic performance in countries with low openness to international trade the former is highly correlated with bad fiscal policies (Ossowski and Halland, 2016).

Most of the resource curse literature documents a negative effect of natural abundance or dependence on variables of interest, recent scholars' results are summarized in Table 1. Whereas, there some others that find out that the effect of natural resources on growth performance is positive, recent findings are summarized in Table 2.

Table 1 Summary of recent literature on natural resource curse and different economic variables

Authors	Period	Sample	Variable	Natural resource Measure	Findings
Gylfason 2001	1980-1997	65 resource rich countries	Human capital development	Share of natural capital in national wealth	The adverse effects of natural resources abundance on economic growth may in part reflect a negative effect on education
Athkinson and Hamilton 2003	1980-1995	103 countries	Genuine savings	Share of natural resource rent in GDP	Countries where growth has lagged have a combination of natural resources macroeconomic and public expenditure policies have led to a low rate of genuine savings (net savings adjusted for resource depletion)
Gylfacon and Zoega 2006	1965-1998	85 countries	Saving and investments	Share of natural capital in national wealth	Heavy dependence on natural resources may hurt saving and investment indirectly by slowing development in the financial system
Stijns 2006	1970-1999	102 countries	Human capital	Natural resources rent per capita	Resource rent and its correspondent rents make a significant positive difference in allowing countries to invest in human capital
Dietz et al. 2007	1970-2001	115 countries	Genuine savings	Share of fuel and mineral product in total export	Negative effects of natural resources dependence on genuine savings
Papyrakis and Gerlagh 2007	1986-2001	United States	Investment-Human capital and openness fiscal policy	Share of primary sector's production in GDP	Natural resource dependence decreases investment, schooling and openness
Bornhorst et al. 2008	1992-2005	30 oil producing countries	Export structure and investment	Share of hydrocarbon revenue in GDP	There is a statistically significant negative relationship between non-hydrocarbon revenues and hydrocarbon revenues
Bond and Malik 2009	1970-1998	78 developing countries	Export structure and investment	The share of natural capital in total wealth	Finds important differences between fossil fuels and non-fuel resources, significant fuel export tends to increase private and public investment, but there is also a robust negative effect from export concentration
Daniele 2011	1980-2004	Countries grouped by income	Human development	Share of ores and fuel in total merchandise	results show the human development measures are negatively correlated with natural resource dependence, but positively correlated with resource abundance
Blanco and Grier 2012	1975-2004	17 Latin American countries	Investment and human capital	Total export of primary commodities divided by GDP	Overall, resource dependence has no significant direct effect on physical and human capital, when disaggregating, petroleum export dependence has a significant positive effect on physical capital, but negative effect on human capital
Boos and Holm Muller 2013	1970-1990	87 developing countries	Genuine savings	Share of natural resource rents in GDP	The determinants that are responsible for the resource curse also have a negative effect on genuine savings
Apergis et al. 2014	1970-2011	MENA countries	Agriculture value added public capital	Share of oil rent in GDP	Finds a negative relationship between oil rents and agriculture value added
Bhattacharyya and holder 2014	1970-2005	133 countries	Financial development	Share of natural resources rent in total GDP	Resource rents hinder financial development only if institution quality is relatively poor
Apergis et al. 2014	1970-2005	MENA countries	Agriculture value added		Resource rent significantly reduce the public capital stock, but this effect is mitigated by good institutions
Bhattacharyya and Collier 2014	1970-2005	45 countries	Public capital	Share of natural resources rent in total GDP	Resource rents significantly reduce the public capital stock, but this effect is mitigated by good institutions
Ferhadi et al. 2015	1970-2010	99 countries	Productivity growth	Share of natural resource rents in GDP	Negative effects of natural resource rents on productivity growth may turn positive in countries with greater economic freedom
Cocks and Franken 2016	1995-2009	140 countries	Education spending	The share of Natural capital in total national wealth	There is an adverse effect of resource dependence on public education expenditures relative to GDP

Source: (Badeeb, Lean and Clark 2017)

Table 2 Summary of Natural Resource Curse critics

Authors	Sample	Period	Natural resource measure	Findings
Lederman and Maloney 2007	Cross-section and panel	1980- 1999	Primary exports divided by total merchandise export + primary exports divided by GDP	There is no evidence of a negative impact of this variable on growth neither in cross- section nor in the panel systems estimator
Brunnshweiller and bulte 2008	60 countries from five regions: europe, North America, Central and South America, Africa and the Middle east, asia and Oceania	1970-1989	The GDP shares of total natural resource and mineral resource exports+ the logs of total nature capital and mineral resource asets per capita	positively affects growth and institutional quality
Alexeev and Conrad 2009	OPEC members and the major non-OPEC oil producers of more than 2 million barrels of oil per day		Hydrocarbon deposit per capita+ oil/GDP ratio	The effect of a large endowment of oil and other mineral resources on long term economic growth of countries has been on balance positive
Cavalcanti et al. 2011	53 oil exporting countries	1980-2006	Real value of oil production per capita	Oil abundance has a positive effect on both income levels and economic growth
Boyce and Emery 2011	Panel data for US states	1970- 2001	Real natural resource price, natural resource sector employment	The resource curse can only be determined by an investigation of the correlation between resource abundance and income levels, and they found that this relationship is positive.
James 2015	111 resource producing countries	Different growth periods from 1970-2010	Natural resource goods as share of income	In all growth periods, the relationship between resource dependence and economic growth in resource production sectors is non- negative

Source: Badeeb, Lean and Clark (2017)

2. MEASUREMENT OF THE PUBLIC-SECTOR PERFORMANCE

Assessing performance is not a new area of interest in the public sector; large scale organisational management is arguably almost exclusively a public-sector activity for much of history (Lawrie et al., 2005), until the early industrial era. As in the private sector, the nineteenth century saw the introduction of rational models which deeply influenced all walks of life. After the Second World War, performance and quality management schemes were introduced across developed-country public sectors, with "input" aspects, mainly focusing on financial resources. Different methods were developed such as the cost-benefit analysis in the 1960s, output-based budgeting in the in the 1960s and Management by objectives (MBO) in the 1960s and 1970s. Most of these initiatives, however, were regarded as experimental and largely one-off efforts (Wright, Nemec, 2003).

Performance concerns became central to public-sector practice in the 1980s and 1990s (Hailey and Sorgenfrei, 2004). The new public management (NPM) movement arose in response to a number of pressures, especially:

Economic pressure, including budget deficits, structural problems, growing competitiveness and globalisation;

Political and social pressure, including a lack of public confidence in government, growing demands for better and more responsive services, and better accountability for achieving results with taxpayers' money.

New Public Administration (NPA) has consisted in a wave of deliberate reforms to structures and processes of public organizations, with the intention of getting them to perform better (Pollitt and Bouckaert, 2004). The principal element of these reforms was a shift towards more assessment and measurement. This was manifested by performance indicators and standards to ensure that government activities achieved desired results (Pollitt, 2001). Underlying these changes was a broader political shift towards much wider use of market or market-like mechanisms for the delivery of public goods and services, either directly or through the "choice" of state services' clients (Špalek, 2011).

Performance-oriented trends such as "Reinventing government", "doing more with less" and "demonstrating value for money" summarise the approach of these reforms (Van Dooren, Bouckaert and Halligan, 2015). While each country has implemented reforms according to

particular political, institutional, and legislative contexts, there have also been a number of common aspects across countries. These include (OECD, 2000):

- Focus on performance issues, such as efficiency, effectiveness, quality and value of services;

- Devolution of management authority and responsibility;

- Orientation to consumer needs and preferences;

- Participation by stakeholders;

- Reform of budget processes and financial management systems;

- Application of modern management practices.

NPM has involved the growing use of performance approaches, with thousands of performance indicators and frameworks introduced to allow various governments to control costs, increase accountability, demonstrate performance, and improve service delivery Gao, 2015).

2.1 Concepts of the public-sector performance measurement

The concept of public sector performance has become common in both every day and academic discussion as in the profit and non-profit organizations. Views about the public-sector performance are different and had no consensual definitions. For example, politicians often seem to view it as meaning to the reinforcement of their ideological preferences or keeping the electorate happy, whereas service users are usually more concerned about service availability, quality, or price. In other words, the public sector performance is taken to mean how well the public sector meets the expectations of its different stakeholders.

The increasing interest in performance measurement particularly during the second half of the 20th century has been linked to the growth of public sector expenditure, interests has especially focused on systems of performance measurement and management that will support performance improvement in the public sector (Speklé and Verbeeten, 2014). However, most stakeholders give some importance to measures of economy, efficiency, effectiveness and many other stakeholders add elements such as the concept of equity, quality and sustainability. These concepts are generally based on three elements such as input, output and outcomes (Van Dooren, Bouckaert and Halligan, 2015).

Inputs are defined as the resource used to execute a policy or provide a service. Inputs may be monetary or non-monetary. Outcomes intended on unintended are considered as the impact

of a given organization's activities on the welfare of stakeholders. Whereas outputs are seen as being the result of organisation's activities in the public sector, mainly measurable by the level of the provided service. Noticeable is that this level of the provided service is difficult to capture. Then, the level of activity is often used as a proxy.

The aforementioned three elements are then used to define economy, efficiency, effectiveness, equity, quality, and sustainability. Figure 3 explains partly those relations.

Figure 3 The conceptual framework for efficiency and effectiveness
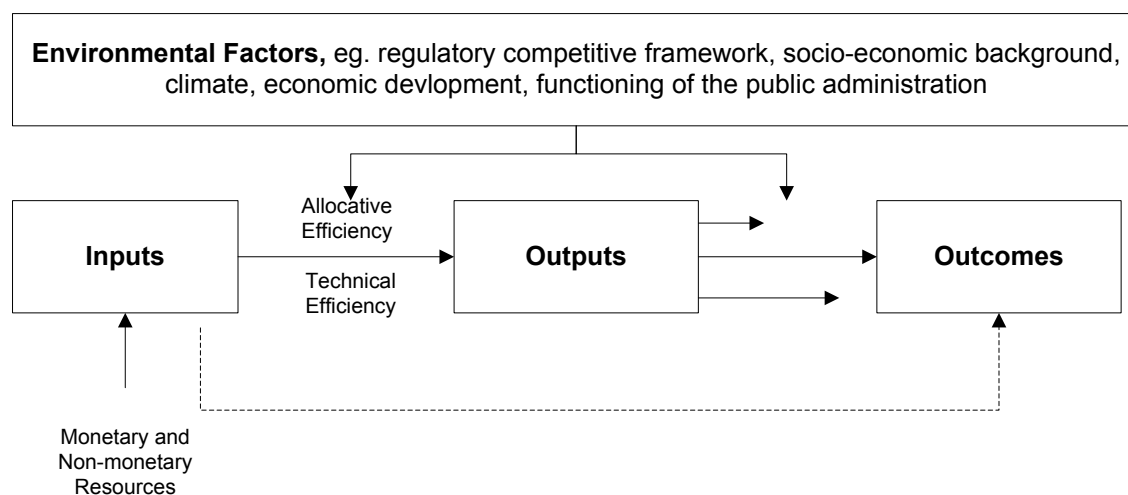
Source: own compilation, according to Mandl, Dierx, and Ilzkovitz (2008)

According to the three aforementioned elements, economy is seen as the provision of outputs at a specific level of quality at the lowest cost. Effectiveness is usually expressed as the extent to which objectives have been achieved, sometimes considered to be the ratio of outputs to outcomes. For example, cost effectiveness is usually conceived as the level of achievement of objectives per monetary unit spent. Efficiency then, is the concepts which explains the relationship between inputs (of a given quality) and outputs (of a given quality) or the rate at which inputs are converted into outputs. Efficiency can be technical or allocative. The technical efficiency implies a relation between inputs and outputs in the frontier production curve. The measurement consists on the extent to which an organization allocates efficiently the physical input and its disposal for a certain level of outputs. Whereas, the allocative efficiency measures the extent to which inefficiency incurs because an organisation is using the wrong combination of inputs in term of purchasing costs. The allocative efficiency captures the deficiency of the technical efficiency (Stejskal at al., 2017).

Equity is the achievement of the desired level of fairness or social justice, sometimes expressed in terms of the level of equality achieved (e. g. in relation to equality of an

opportunity, access, cost, use or outcomes). It is often compared between specific groups in society, such as low income groups, women, and ethnic minorities given the horizontal equity or between people in the same group but in different circumstances given the vertical equity. The equity can be also expressed as fairness in time horizon, this kind of equity is expressed by the sustainability. Sustainability is the extent to which current level of performance are likely to be feasible into the future given known constraints in terms of resources (physical and financial) and expected economic, social environmental and political conditions.

Efficiency and effectiveness are the two mutually exclusive components of the overall performance. Hence, performance that public sector attains is a function of efficiency and effectiveness of undertaken actions and then, performance measurement are defined as the process of qualifying the efficiency and effectiveness of an action. Performance measures can be defined as a metric used to quantify the efficiency and/or the effectiveness of a given organization's action. Performance measure is often expressed as an indicator that meets stringent tests of clarity, relevance, validity, reliability, causality and ability to be aggregated (Mandl, Dierx and Ilzkovitz, 2008).

Performance indicator (PIs) is according to Afonso, Schuknecht and Tanzi (2005) a variable whose value suggests the level of achievement of inputs, outputs, outcomes, equity or sustainability or the level of achievement of the ratio between these concepts such as economy, efficiency or effectiveness. Performance measurement can then fulfil a number of functions (Neely, Marr et al., 2003). Therefore, the following sub-section will address academic literature on the beneficial and perverse effects of performance measurement in the public sector according to four main functions of its performance measurement.

In this context, some scholars reference (Marr, 2007) prefer to use the word "indicator" rather than "measure" because a performance indicator "indicates" a level of performance, but it does not claim to "measure" it. The author also prefers to use the performance assessment rather than "performance measurement". Performance assessment is a broader activity that takes into accounts not only numerals but also other forms of evidence such as written descriptions, observations, symbols, and codes. Performance assessment goes beyond the technical aspects of collecting data and creating tables of numbers. Performance assessment is about using performance indicators to gain understanding and insights. It is about empowering people in the organization to make better-informed decisions that lead to improved organizational performance.

Table 3 Performance indicator design template

The basics – why do we need this indicator?	
1. indicator name	Provide a clear indicator name
2. strategic element being assessed	State which strategic element of objective this indicator relates to.
3. owner of strategic element	Identify the person or function of the organization element or objective
4. key performance question	Provide the key performance question this indicator is helping to answer.
5. decisions supported	List the decision this indicator is helping to answer
How will the data be collected?	
6. data collection method/instrument	Describe the measurement instrument used and how the data is being collected
7. source of data	Identify where the data for this indicator comes from.
8.formula/scale/assessment	Explain the scale or formula used to assess performance
9. frequency	Illustrate how often the indicator is measured
10. who measures/reviews the data	Name the organism who is collecting, updating and/or reviewing the data
11. expiry/revision date	Identify until when this indicator will be collected or when it will be revised
What are the targets?	
12. targets/performance thresholds	Set the target and/or benchmarks for this indicator and provide performance thresholds
How good is the indicator?	
13. confidence level	Provide an evaluation of how well this indicator is measuring what it is supposed to measure (e.g. written comment/evaluation such as good, fair, imperfect)
14. possible dysfunctions	Note any possible ways this indicator could encourage cheating

Source: Marr (2018)

Marr (2018) developed a performance indicator design template that can be completed in conjunction with the performance indicator decision framework. The template can be used to develop completely new indicators or to develop a more comprehensive picture of existing performance indicators. The indicator design template clarifies why we need the indicator, provides information about how the data collection, identifies the targets set for the indicator

and outlines who will see the data and in what format. Table 3 summarizes the performance indicator design template.

Concepts explained in this sub-section will be once again used in the following section in order to explain the taxonomy of public sector performance. Performance is often seen as a span (horizontal performance) and depth (vertical performance). Vertical performance is shared into three main level micro, mezzo and macro performance.

2.2 Taxonomy of public sector performance

In the context of public sector performance dimensions, two important concepts for understanding performance approaches in the public sector are the depth and the span. These two concepts are explained with details in reference (Bouckaert and Halligan, 2008a). The depth of performance relates to the different levels at which performance might be assessed. This includes the micro-level of projects and programmes; the meso-level of particular policy fields, specific sectors, or specific service or delivery chain; and finally the macro-level of entire governance systems or cross sector-wide approaches.

Figure 4 Typical linear progress
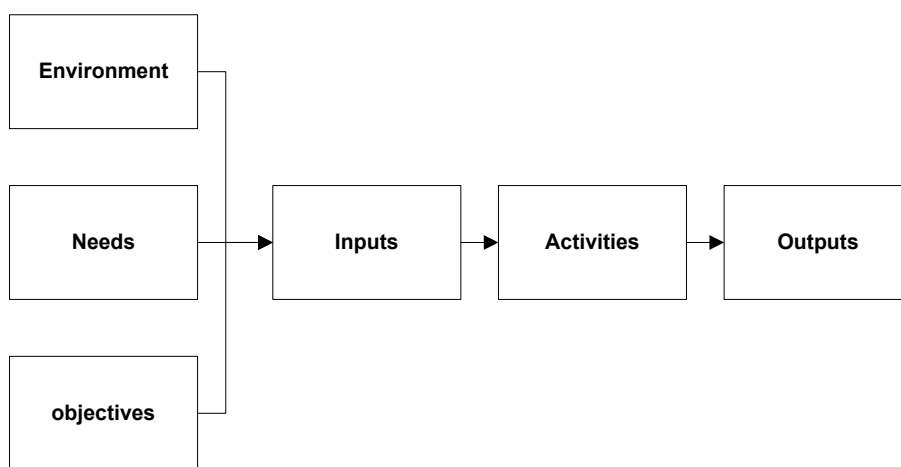
Source: own processing according to Bouckaert and Halligan (2008a)

Also important is the span of performance (vertical performance) in the public sector. This is typically illustrated with reference to external needs and environmental tigger, to which the public sector responds through setting objectives, mobilising inputs that are processed in activities, results are outputs. This is typically represented as a linear process, or chain as shown below in Figure 4 (Spano, 2014).

Internal performance can focus on any of these areas individually, or in relation to each other, e. g. assessing inputs in relation to needs can identify the relevance and appropriateness of an intervention; or assessing outputs in relation to inputs gives an indicator of efficiency.

Such analyses tend to assume and rely on a direct link between inputs, activities and outputs, and can be taken as a linear, machine-based approach akin to scientific management. However, in the public sector, this chain is full of disconnections, disruptions and disjunctions, all of which are potential sources of inefficiency and performance problems.

Outputs are not seen as an end in themselves in public sector performance. Outcomes or impacts are those changes which take place as a result of outputs, and they are influenced by many external factors, often beyond the control of any single organization.

If outcomes and impacts can be assessed, a comparison with output can give an indication of the effectiveness of a programme or project. It has been argued by leading public sector performance analysts that effectiveness defines in these terms, should be the primary dimension of performance. This situation is depicted in the following Figure 5.

Figure 5 Primary dimension of performance
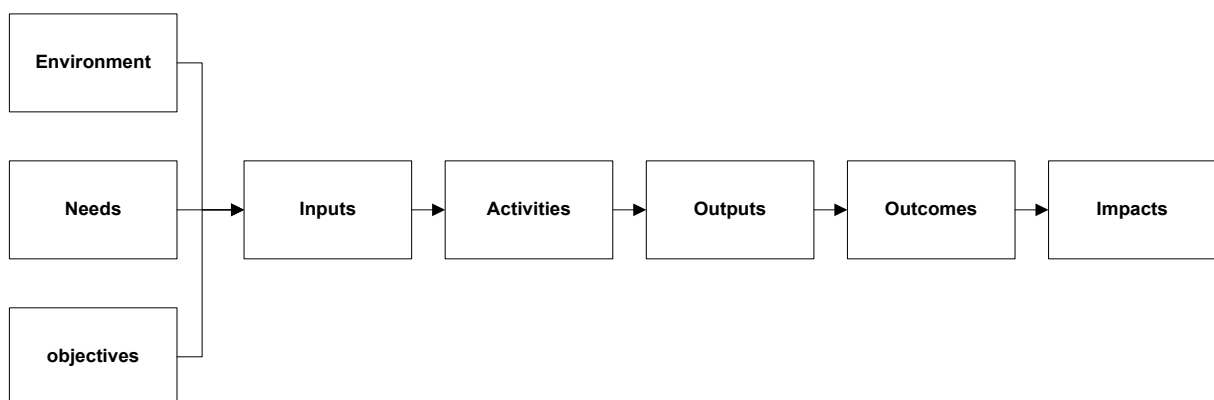
Source: own processing according to Bouckaert and Halligan (2008a)

However, this is not unproblematic. This is presented as a "Grand canyon" that exists between "*outputs on one side, and a disrupted and distant, almost unreachable, but visible sequence of outcomes and inputs on the other side...*" (Bouckhaert and Halligan, 2008a) this issue can be addressed by a careful definition of outcomes and impacts, and determine the underlying programmes logic enabling them to be achieved.

It may be possible that even assessing the impacts may not be sufficient. The ultimate objective of performance in the public sector is to strengthen learning and accountability, and thereby establish trust among a variety of Stakeholders. This is embodied in approaches such

as performance based budgeting, where allocation of resources according to performance is underpinned by the idea that some programmes can be trusted more than others. However, there are increasing numbers of arguments against the idea that improving effectiveness necessarily increase trust as illustrated in Figure 6 below.

Figure 6 Improving effectiveness necessarily increase trust
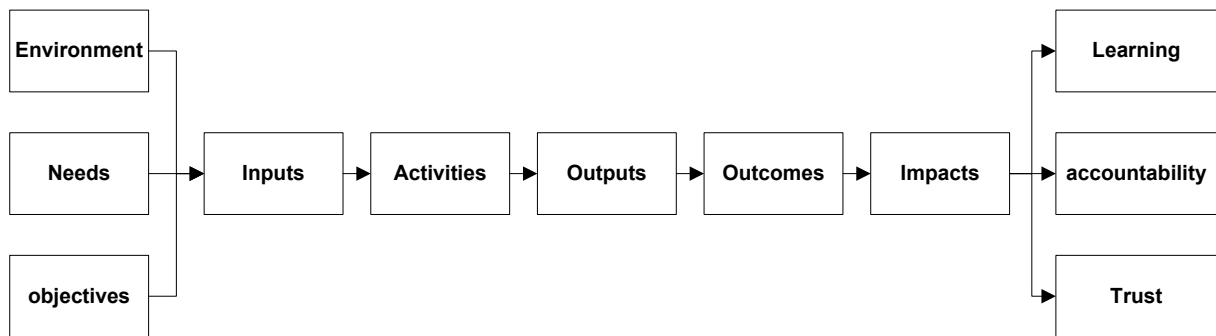
Source: own processing according to Bouckaert and Halligan (2008a)

This is known under Ref (Bouckaert and Halligan, 2008b) as the second Grand Canyon of public sector performance and can only be crossed through the engagement of all stakeholders, and serious reflections on the role and purpose of the public sector. However, scholars suggest that approaches to performance that have been implemented in the past decades may have reduced trust in, and accountability of, public goods and services.

Analysing the depth and the span of the public sector performance is pertinent because needed for different purposes; combining the span and the depth means matching environmental triggers, needs and objectives, with input, activities, outputs, outcomes and impacts at different depths. This can be done for a set of strategic purposes, which contributes at greater scope of trust within and across the public sector.

In the context of public sector performance models, reference (Bouckaert and Halligan, 2008) define four types of models (Table 4), including performance administration, management of performance, performance management, and performance governance. The first type (performance administration) implies a commitment to measurement and performance, but the focus on measurement is more technically oriented rather than actually using the results for decision-making. In this context, measurement is more of an administrative procedure, which may be a part of the legal setting rather than a component of the managerial context.

The second type (management of performance) implies a focus on different and disconnected performance sub-systems (e.g. personal, finance, strategy, customer, and communication). The difference from the first to the second type also involves how legal, political, and cultural systems interact with performance management systems.

The third type consists on the performance management; it implies that a solid performance management system is adopted, according to the principles of coherence, integration, consistency, convergence, and comprehensiveness. In contrast,

Table 4 Four ideal types of managing performance

	Traditional/ pre-performance	Performance administration	Management of performance	Performance management	Performance governance
Measuring	Intuitive, subjective	Administrative data registration, objective, mostly input and process	Specialised performance measurement systems	Hierarchical performance measurement systems	Consolidate performance measurement system
Incorporating	None	Some	Within different systems for specific management functions	Systemically internal integration	Systematically internal and external integration
Using	None	Limited: reporting, internal, single loop	Disconnected	Coherent, comprehensive, consistent	Societal use
limitations	Functional unawareness	Ad hoc, selective, rule based	Incoherence	Complex, perhaps not sustainable as a stable system	Uncontrolled, unmanageable

Source: Boukaert and Halligan (2008a)

The fourth type which is called performance governance implies that different decision-makers, not only on managerial but also on a political level, make decisions that impact performance.

2.3 Function and impacts of performance measurement

Performance measurement can fulfil a number of functions. Those mentioned most frequently are (De Bruijn, 2007):

- Creating transparency – performance measurement leads to transparency and can those play a role in accountability process; an organization can make clear what products it provides and by means of an input – output analysis what costs are involved.

- Learning – an organization takes a step further when it uses performance measurement to learn. Thanks to the transparency created, an organization can learn what it does well and where improvements are possible.

- Appraising – a performance-based appraisal may now be given (by the management of the organisation, by third parties) about an organization's performance

- Sanctioning – finally, appraisal may be followed by a positive sanction when performance is good or by a negative sanction when performance is insufficient. The sanction may be a financial one, but other types of sanctions are possible.

Bernard Marr (2018) adds to the original division other functions:

- Controlling Behaviour – measures are used to set goals or rules, to objectively access the achievement of these goals and to provide feedback on any unwanted variance and to provide feedback on any unwanted variance between achievements and goals so that the aim of measurement is to eliminate variance and improve conformity. In this context, measures are often tightly linked to reward and recognition structure.

- External reporting and compliance – measures are used to inform external stakeholders and to comply with external reporting regulation and information request s. When measuring for external reporting and compliance purposes, any reports and associated indicators can either be produced on a compulsory basis, such as environmental impact reports.

- Learning and empowerment – measures are used to empower employees and to equip them with the information they need to learn and make decisions that lead to improvements. In this context, measures are used as the evidence base to inform

management decisions, to challenge strategic assumptions and for continuous learning and improvement.

These three additional functions could be presented graphically in the context (Figure 7).

Figure 7 Reasons for measuring performance
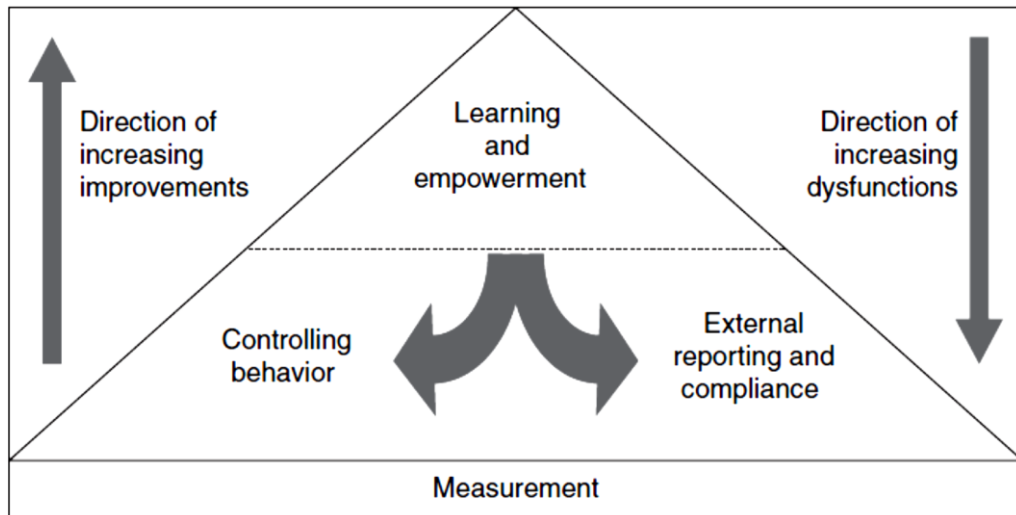
Source: Marr (2018)

Each of these functions can apply to an organization, but also facilitate comparison a benchmark of these organizations.

In the literature, a great deal of research is available about performance measurement. A first impression is that measurement has a beneficial effect; (Johnsen, 2005; De Bruijn 2007, Spekle and Verbeeten, 2009). Both for organizations of the public sector their selves as well as external stakeholders can benefit from the information and transparency that performance measure provide. In the first place, performance measurement can serve for purposes of accountability and legitimization of the organizations' performance and then stimulate competition. From this perspective, performance measurement provides the organization with an incentive to improve their performance relative to its competitors. On the other hand, this external transparency can be used for purposes of accountability and regulation. In the second place, performance measurement can be used to standardize the production process, which can benefit the organization's efficiency. This internal transparency allows the organization to detect flaws of inefficiencies in the production process. Hereby performance measurement can improve the organizational learning process and stimulate innovation when flaws or inefficiencies are detected.

The beneficial effects of public sector performance measurement are summarized in the following points (De Bruijn, 2007):

- Performance leads to transparency and is therefore an incentive for innovation as external and internal,

- Performance measurement rewards performance at input and throughput and prevents bureaucracy,

- Performance measurement promotes learning between and within organizations,

- Performance measurement enhances intelligence.

Besides the beneficial effects of performance measurement, academic literature also reports on a variety of unintended and perverse effects of performance measurement (Smith, 1995, 2002, Goddard et al, 2000, Johnsen, 2005, De Bruijn, 2007, Van Dooren and Van de Walle, 2016). Some of these perverse effects of performance measurement might interfere with the beneficial effects or even outweigh them (Pidd, 2005). For example, as a result of these perverse effects, systems of performance measurement are at risk of providing distorted or incomprehensible information that actually creates intransparency of performance (Smith, 1990). Related to this, performance measurement might lead to misrepresentation of reported performance (Smith, 1995. Goddard et al, 2000). Smith (1995) defines misrepresentation as the "deliberate manipulation of data so that reported behaviour differs from actual behaviour". This form of strategic behaviour is also referred to as "gaming the numbers" (Osborne and Gaeler, 1992. De Bruijn, 2007). This perverse effect of performance measurement is especially likely to occur in professional organizations. Professionals are working in highly specialized fields, which give them a relatively autonomous position (Smith, 1995; Goddard et al, 2000; Dahler-Larsen, 2014). In line with this tension between professional autonomy and performance measurement, the standardization and product definition that follows from performance measurement might conflict with professional values on different service delivery. As a result, performance measurement is often claimed to make less professional public-sector organizations (Noordegraaf, 2006; Head and Alford, 2015) and could potentially drive out the professional attitude towards public goods and services delivery. De Bruijn (2007) argues that the uniform and unambiguous product definitions associated with performance measurement can be at odds with the professional's multiple values reality. Hereby, performance measurement can take the trade-offs between conflicting values (e. g. efficiency and quality) out of the hands of the professional. Finally, performance measurement can also inhibit innovation and lead to "ossification" or organizational paralysis (Bawole and Ibrahim, 2016). The process of product definition implies that systems of performance measurement are static and conservative in nature. Also, when linked to a

financial rewards performance reward performance measurement can be an incentive for organizations to focus production on "cash cows" and thereby provide a disincentive for innovation (De Bruijn, 2007).

The perverse effects of public sector performance measurement are summarized as well in the following points (De Bruijn, 2007):

• Performance measurement are an incentive for strategic behaviour,

• Performance measurement blocks innovations,

• Performance measurement blocks ambitions,

• Performance measurement veils actual performance,

• They also drive out the professional attitude: no quality, no system responsibility and more bureaucracy,

• They lead to copy not to learn, and

• It leads to punishment of performance.

2.4 Methods Assessing the Public-Sector Efficiency

One of the partial measurements of the overall public-sector performance is the measurement of its productive efficiency so that the productive efficiency is just a part of an overall performance analysis. According to this measurement approach, the public sector is considered as a set of more or less aggregated production units (the bureaucracy, health care, education, national security, national defence, justice ext.). Each unit is supposed to use a number of resources, within a particular setting to produce a number of outputs. Those outputs are related to the objective that has been assigned to the production unit by the principal, the authority in charge. So that the approach in measuring the productive efficiency are those used to capture the efficiency frontier techniques.

Methods for measuring efficiency and effectiveness of the public sector and then the overall performance have a common point how to calculate and measure the sharp of the efficiency frontier (Keh, 2006; Daouia et al., 2017) and this may be possible by using both parametric and non-parametric methods.

Parametric methods are based on parametric frontier functions (Cobb- Douglas, Translog, ext.) which require the ex-ante definition of the functional form of the efficiency frontier also named "regression-based estimators." Its parameters are estimated by statistical or other methods in such a way that a graph of the function enveloping the data from above. Then, the

efficiency of each observation is computed in terms of the distance between the observation and the graph of the estimated function. Under parametrical methods we can meet the Corrected Ordinary Least square (COLS) where the production function is first estimated using ordinary least square (OLS), the OLS intercept parameter is then shifted up by the value of the largest positive residual in order to establish the frontier. (COLS) was applied by (Metha, Giertz, 1996) to measure the performance of the property tax assess process. The second method consists on the Thick Frontier Approach (TFA) developed by (Berger, Humphrey, 1991). The method begins with sorting the data on the average costs then it proceeds with the estimation of the two think frontiers one for the lowest and one for the highest average costs quartile. Average inefficiency of the highest quartile is then computed by comparison of the two thick frontiers. The TFA method was used by (Akhavein, Swamy and Taubman, 1994) to evaluate the financial services industry. This method was applied in many other case studies (for example Cetin and Bahce , 2016; Sopko, Gavurová and Kočišová, 2017).

In the other hand, under the non-parametric models we order the Stochastic Frontier Estimation (SFE) the most widely used method based on statistical and econometrical methods and on a specific functional form for the relationship between input and output. The approach is in sum laudable because is able to cover the effects of exogenous shocks, i.e. non-discretionary factors (Mandl, 2008). The method was applied by several scholars to assess first, the economic efficiency of the public-sector education organisations (Emre, 2013). Second, for estimating public library efficiency (Hemmeter, 2006) and to measure and explain the efficiency in improving health and education indicators (Ruwan, Quentin, 2003). The second known method is the Full Disposal Hull (FDH) initially used by (Deprins et al. 1984) the FDH is a non-parametric approach for efficiency frontier´s construction using data input/output for the whole simple following mathematical programming methods (Aristovnik, 2009) then the efficiency provides a benchmark. The FDH is primary data-driven and follow a stepwise approach to construct the efficiency frontier one can observe the highest possible level of output/outcome for a given level of output. The method was also used by (Ebejer, Mandl, 2009) to measure the public expenditure efficiency in Malta. Finally, the last method is the Data Envelopment Analysis (DEA) which is recently used to measure the efficiency of the public spending based on linear combination of input and output to specify the efficiency frontier. The convexity of the set of input/output combination is assumed since the method constructs an envelope around the observed combination. This method was used by (Afonso,

2006) for the measurement of the public spending efficiency across a sample of emergent and new EU members Data Envelopment Analysis (DEA).

3. OBJECTIVES AND METHOD OF THE DISSERTATION

The dissertation thesis will be conducted in order to create a comprehensive diagram for the measurement of the public-sector performance with emphasis on measuring this performance in countries rich in natural resources. The actual international literature, these focusing on the resource curse overlooks the performance of the public sector as an important channel addressing the negative effects of the resource curse by enhancing the level of their human capital, infrastructure, institutions, and their Musgravean functions such as the stabilization, distribution, and the overall economic performance. The dissertation aims to fulfil this gap and try at the same time to measure and then compare the performance of public sector in developing countries with and without natural resources. Before establishing the main and partial aims of the dissertation, a small presentation of the main characteristics of the so called resource curse will follow in this section

3.1 Elaborated objectives of the dissertation thesis

The main aims of the dissertation work are two:

A. to analyse and evaluate the performance of the public sector as an important channel for enhancing outputs; infrastructure the human capital and the overall stabilization of the economy by decreasing the dependence of such countries on their primary commodities.

Partial aims within aim A are:

1. Selection of a set of countries their public-sector performance (efficiency and effectiveness) will be assessed according to the outputs of the first reached objective.

2. Definition and analysis of the data relevant for the selected set of countries.

B. to identify of indicators which affect negatively the overall public-sector performance in resource rich countries and establish reform framework and policy recommendation in order to best off their public-sector outputs and outcomes.

Partial aims within aim B are:

3. Identification of the indicators which negatively affect the performance of the public sector in resource rich countries and analysis of their public-sector performance impediments

4. Proposal of deliberate changes to the structure and process of public sector organizations with the objective of getting them to run better. These changes may be structural or process change including the redesigning of public sector systems, setting quality standards and focusing on capacity building.

According to the first part of this essay and the established objective of our dissertation work, we state the following assumptions:

H1: the fact that public sector outputs and outcomes are low comparing to the bulk of their resource wealth dedicated to the functioning of their respective public sector, suggests that there is a gap in the efficiency and the effectiveness of the public sector in resource rich countries.

H2: we assume that the institutional quality and the management of their public finance are the most influential variables which impact negatively on the overall performance of the public sector in resource rich countries.

The dissertation thesis will be processed using recent international literature and scientific studies. The thesis is based on primary methods of scientific investigation such as clustering, analysis, comparison, and abstraction in dealing with positive theoretical approach of the problematic. Then, synthesis and induction methods will be applied in the discussion of the final results and building of policy recommendation in its normative approach in relation with reformatting the public sector and public finance relevant for our sample of resource rich countries.

When processing the dissertation, methods of data analysis such as the description and subsequent processing of data using statistical methods and graphical visualization will be applied. The data set flows from the publicly available database and statistical yearbooks. The primary data flows from three sources; the Global Competitiveness Report (GCR) and the World Development Outlook (WDO), some additional data are collected from the public finance report collected from the International Monetary Fund (IMF).

Our dissertation work is constructed with references based on mathematical, econometrical and the aforementioned statistical methods through the use of appropriate software like STATISTICA 10.0 and DEAFRONTIER Microsoft add-In.

3.2 Method for the dissertation research realization

For the need of the dissertation, standard scientific methods and approaches were applied. Empirical scientific practices were used, such as observation (the description and the

interpretation of problematic) and measurement (applying a quantitative comparison of properties between comparable objects). Furthermore, theoretical scientific techniques were applied such as induction which is an examination of different facts that allows general conclusion to be drawn, and deduction when a new premise raised when using specific rules leads to a new result (conclusion) or, for example a given comparison, when similarities and differences appears from investigated phenomena (Ochrana, 2009). In this dissertation, two different statistical methods will be applied – Data Envelopment Analysis (DEA) and Principal Component Analysis. DEA was used first to Analyse and assess Public sector efficiency and performance in MENA countries, results from the aforementioned method will allow us to rank a sample of MENA countries from the most to the least performer. Our aim is to identify from the whole sample, countries rich in natural resources with less performant public sector. DEA is then followed by the so called Principal Component Analysis that allow to identify which from the selected indicator impact most the performance and the efficiency of the public sector.

3.2.1 Data Envelopment Analysis

Data Envelopment Analysis (DEA) is generally used as a specialized model tool for evaluating the effectiveness, performance or productivity of a group of comparable production units (homogeneous units) based on the size of inputs and outputs. Homogeneous Production Units (DMUs) means a set of units that produce identical or equivalent effects, which are the outputs of these units (Staníčková and Melecký, 2011). This is basically a method of linear programming optimization, applied in both private and public sectors, the main advantage is of this method is the analysis of a large number of inputs and outputs without specifying the optimal value of a required given indicator, as it is the case of multi-criterial evaluation models (Borůvková and Kuncová, 2012). DEA is suitable to detect the technical efficiency of compared units, meaning that they use the same inputs to produce the same outputs, with different performance. The model then identifies which DMUs are effective and which one are less. In the case of less efficient units, the method informs as well how much units inefficient DMU should reduce or how much units should be produced to make them less inefficient (Prokop, 2017).

DEA is a non-parametric approach; therefore, it includes an alternative way of obtaining information about observed units. In turn, parametric approaches (which aim to optimize a single regression through data), DEA optimizes each single observation to calculate the discrete, from bounded points (Figure 8) boundary are set by the Pareto efficient production

units. Parametric and nonparametric tests use all the information contained in the data, however, parametric analyses use only one optimized regression equation for all production units, while Data Envelopment Analysis (nonparametric approach) optimizes the measurement of each production unit's output separately, resulting in an understanding of each individual production excluding those working with "average" production units. DEA analysis therefore focuses on individual observations represented by n optimizations (one for each observation), unlike models based on averages and estimation of parameters, that are linked with models based on simple optimization (Charnes et al., 2013).

Figure 8 Comparison of DEA and Regression
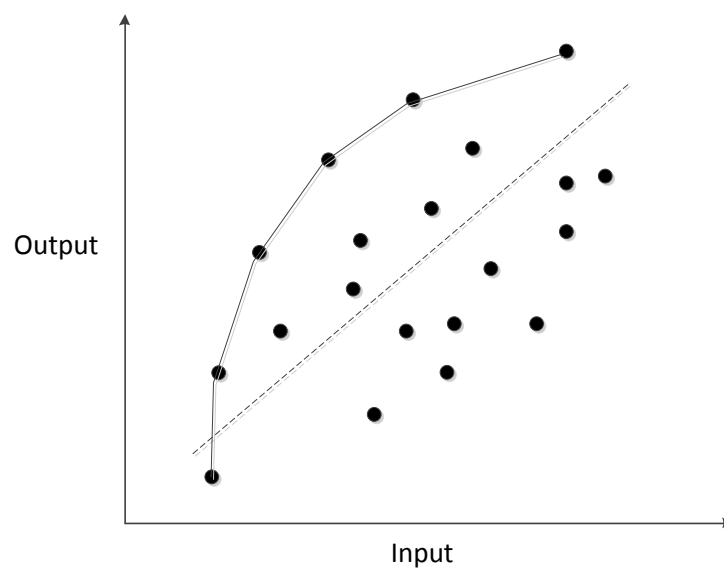
Source: Charnes et al. (2013)

It illustrates a comparison between DEA analysis and regression. The solid line represents a boundary derived from the DEA analysis examining data on selected production units (all points in Figure 8), in this case using different amounts of one input to produce various amounts of one output. It is important to note that DEA calculations, because they are generated from actual observed date for each DMU, produce only relative efficiency measures. DEA produces a composite production area (solid line, Figure 8), which from the economic point of view represents the best production boundary – the line represents the largest output that can be obtained from any production unit relative to its input level. For each inefficient production unit (below the efficiency threshold), the DEA subsequently identifies the sources and the inefficiency rate for each combination of inputs and outputs. The inefficiency rate is then determined by comparing a single production unit or a convex combination of other production units located at the efficiency rate that uses the amount of

input producing the same or greater output. Calculated improvements (for each of the inputs and outputs) for an inefficient production unit indicate possible improvements that can be achieved because these projections are based on the best proven process of a comparable production unit located at the effective boundary (Charnes et al., 2013)

Various models of DEA analysis are based on Farrell's model developed in 1957, which measures the efficiency of single-input and single-output unit. This model has been expanded by 1978 to multiple inputs and outputs, with constant return to scale, Charnes, Cooper and Rhodes (CCR Model), and Banker, Charnes, and Cooper (BCC). Then the model expanded in 1984 to include variable return to scale. Actual DEA models include CRR DEA models are sometimes referred to as CRS models (constant returns to scale) and BCC DEA models (modification of the CCR model with variable return to scale). The BCC model can then be identified in three forms (Klieštik, 2009):

- VRS – variable returns to scale;

- NIRS – non-increasing returns to scale;

- NDRS – non-decreasing returns to scale.

DEA has become the most prominent non-parametric method for performance measurement. Nowadays it is used by different scholars such as (např. Sin a Hwang, 2016; Chang et al., 2016; Wanke a Barros, 2016; Rakhshan et al., 2016).

DEA is a "Data-oriented" approach for evaluating a set of peer entities called decision making units (DMUs), which convert multiple inputs into outputs. This method was used to measure the performance in many different activities in many different contexts and in many different countries. For example, Hudec and Procházdková (2013) analysed efficiency of Knowledge Innovation Processes in selected EU Countries; Krishna and Sai (2016) analysed the financial efficiency of commercial banks in India; Prokop and Stejskal (2017) analysed efficiency of Knowledge Economy determinants within EU28 countries; Chen and Gong (2017) analysed efficiency of Energy Consumption in China's Manufacturing Sectors.

In their originate article Charnes et al. (1979) described DEA as a *"Mathematical programming model applied to observational data [that] provides a new way of obtaining empirical estimation of relations- such as the production function and/or efficient production possibility surfaces."*

The CCR model assumes that there are n DMUs to be evaluated. Each DMU consumes varying amount of *m* different inputs to produce s different outputs. Specifically, DMUj

consumes amount x_{ij} if input i and produces amount y_{rj} for output r the model assumes that x_{ij} ≥ 0 and $y_{rj} \geq 0$ and further assume that each DMU has at least one positive input and one positive output value. The ratio of outputs to inputs is used to measure the relative efficiency of the DMUj= DMU0 to be evaluated relative to ratios of all j=1,2,...,n. The CCR construction is interpreted as the reduction of the multiple-output/multiple input situation (for each DMU) to that of a single "virtual" output and "virtual" input that provides a measure of efficiency that is the function of the multiplier (Guan and Chen, 2012).

Mathematically the ratio, which is to be maximized, forms the objective function for the particular DMU being evaluated, so that symbolically.

$$\max h_0(u, v) = \frac{\sum_r u_r\, y_{rj}}{v_i x_{io}} \tag{1}$$

where u_r, v_i, y_{r0}, x_{i0} are the observed output and input values respectively of DMU0, DMU to be evaluated the relation (1) is unbounded.

A set of normalizing constraints (one for each DMU) reflects the condition that the virtual output to virtual input ratio of every DMU including DMUj= DMU0 must be less than or equal to unity, the relation (1) will be subjected to:

$$\frac{\sum_r u_r\, y_{rj}}{v_i x_{io}} \leq 1 \; for \; j = 1, \dots, n \tag{2}$$

$$u_r, v_i \geq 0 \; for \; all \; i \; and \; r$$

This ratio generalizes the engineering science definition of efficiency from a single output to a single input and does so without requiring the use of a priori weights. A fully rigorous development would replace:

$$u_r, v_i \geq 0$$

with

$$\frac{u_r}{\sum_{i=1}^m v_i x_i}, \frac{u_r}{\sum_{i=1}^m v_i x_i} \geq \varepsilon > 0 \tag{3}$$

where ε is a non-Archimedean element smaller than any positive real number. This condition guarantees that solutions will be positive in these variables. It also leads to the $\varepsilon > 0$ which in turn leads to the second stage optimization of the slacks.

The above ratio form yields an infinite number of solution if (u^*, v^*) is optimal, the $(\alpha u^*, \alpha v^*)$ is also optimal for all $\alpha > 0$. However, the transformation developed by Charnes and Cooper for linear fractional programming selects a solution [i.e. the solution (u, v) for which $\sum v_i x_{i0} = 1$] and yields to equivalent linear programming problem in which the change of variable from (u, v) to (U, v) is the result of the "Charnes-Cooper) transformation (Ahn et al., 1988; Charnes et al., 1997; Guan et al., 2006; Guo & Zhu, 2017):

$$\max z = \sum_{r=1}^{s} u_r \, y_{ro} \tag{4}$$

Subject to

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0 \tag{5}$$

$$\sum_{i=1}^{m} v_i x_{io} = 1 \tag{6}$$

$$u_r, v_i \geq 0$$

For which the LP dual problem is

$$\theta^* = \min \theta$$

Subject to

$$\sum_{j=1}^{n} x_{ij} \lambda_j \leq \theta_{x_{io}} \tag{7}$$

$$\sum_{j=1}^{n} y_{rj} \lambda_j \geq y_{ro} \tag{8}$$

$$\lambda_j \geq 0$$

This last model refers to the "Farell Model" in the economic portion of DEA, it is said to conform to the assumption of strong disposal but the efficiency evaluation it makes ignores the presence of nonzero slacks. In the operations research portion of DEA literature, this is referred to as "weak efficiency". Farell used the literature of activity analysis for reference – Farell also failed to exploit the very powerful dual theorem of linear programming, we have

$z^* = \theta^*$ which can solve the last relation (number of the relation), to obtain can efficiency score because we can set $\theta = 1$ and $\lambda_j^* = 1$. This solution implies $\theta^* \leq 1$. The optimal solution θ^* yields an efficiency score for a particular DMU. The process is repeated for each DMU$_j$, i.e. solve the relation (1.4) with $(X_0, Y_0) = (X_k, Y_k)$, where (X_k, Y_k) represent vectors with components x_{ik}, y_{rk} and similarly (X_0, Y_0) has components x_{0k}, y_{0k}. DMUs for which $\theta^* < 1$ are inefficient, while DMUs for which $\theta^* = 1$ are boundary points (Charnes et al., 1990; Jablonský, 2002; Dlouhý et al., 2007; Staníčková and Melecký, 2011).

Some boundary points may be "weakly efficient" because we have nonzero slacks. This may appear to be worrisome because alternate optima may have nonzero slacks in some solutions, but not in others. However, we can avoid such situation by invoking the following linear programs in which the slacks are taken to their maximal values.

$$max \sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \tag{9}$$

Subjected to

$$\sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- = \theta_{x_{io}}^* \tag{10}$$

$$\sum_{j=1}^{n} y_{rj}\lambda_j - s_r^+ = y_{ro} \tag{11}$$

$$\lambda_j, s_i^-, s_r^+ \geq 0 \; \forall i, j, r$$

where we note the choice of s_i^+ and s_r^- do not affect the optimal θ^* determined from (10).

These developments now lead to the following definition based upon the relative efficiency.

Definition (DEA efficiency) - performance of (DMU$_0$) is at 100 percent fully efficient if and only if both $\theta^* = 1$ and all slacks $s_i^+ = s_r^- = 0$

Definition (weakly DEA efficient) – The performance of DMU$_0$ is weakly efficient if and only if $s_i^+ \neq 0$ and/or $s_r^- \neq 0$ for some i and r in some alternate optima.

It is to be noted that the proceeding development amounts the solving the following problem in two steps:

$$\min \theta - \varepsilon \left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \right) \tag{12}$$

Subjected to

$$\sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- = \theta_{x_{io}}$$ (13)

$$\sum_{j=1}^{n} y_{rj} - s_i^+ = y_{ro}$$ (14)

$$\lambda_j, s_i^-, s_r^+ \geq 0 \ \forall i, j, r$$

where the s_i^+, s_r^- are slack variables used to convert the inequalities in the relation (10) to equivalent equations.

Here $\varepsilon > o$ is a so called non-Archimedean element defined to be smaller than any positive real number. This is equivalent to solving (10) in two stages; first, by minimizing θ, then fixing $\theta = \theta^*$ as in (7), where the slacks are to be maximized without altering the previously determined value of $\theta = \theta^*$. Formally, this is equivalent to granting "pre-emptive priority" to the determination of θ^* in (8). In this matter, the fact that the non- Archimedean element ε is defined is defined to be smaller than any positive real number is accommodated without having to specify the value of ε.

Alternately, one could have started with the output side and considered instead the ratio of virtual input to output. This would reorient the objective from max to min, as in (2) to obtain (Charnes et al., 1997; Dlouhý et al., 2007; Cooper et al., 2011; Chen & Jia, 2017; Guo & Zhu, 2017):

$$min \ \frac{\sum_i v_i x_{io}}{\sum_r u_r y_{ro}}$$ (15)

Subjected to

$$\frac{\sum_i v_i x_{ij}}{\sum_r u_r y_{rj}} \geq 1 \ j = 1, \dots, n$$ (16)

$$u_r, v_i \geq \varepsilon > 0 \ for \ all \ i \ and \ r$$

where $\varepsilon > 0$ is the previously defined non-Archimedean element.

The Charnes and Cooper transformation for linear fractional programming yields model (8) given the multiplier model below with associated dual problem (9) (envelopment model), as in the following pair:

$$min \ q = \sum_{i=1}^{m} v_i x_{io}$$ (17)

Subjected to

$$\sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} \geq 0 \tag{18}$$

$$\sum_{r=1}^{s} u_r y_{ro} = 1 \tag{19}$$

$$u_r, v_i \geq \varepsilon, \forall r, i$$

$$max\varphi + \varepsilon \left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \right) \tag{20}$$

Subject to

$$\sum_{j=1}^{n} x_{ij} \lambda_j + s_i^- = x_{io} \ i = 1,2 \dots, m \tag{21}$$

$$\sum_{j=1}^{n} y_{rj} \lambda_j - s_r^+ = \varphi y_{ro} \ r = 1,2 \dots, s \tag{22}$$

$$\lambda_j \geq 0 \ j = 1,2 \dots, n$$

Here the model used is an output-oriented objective as contrasted with input orientation in (6). However, as before, model (9) is calculated in a two stage process. First, we calculate φ^* by ignoring the slacks. Then we optimize the slacks by fixing φ^* in the following linear programming problem,

$$max \sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \tag{23}$$

Subject to

$$\sum_{j=1}^{n} x_{ij} \lambda_j + s_i^- = x_{io} \ i = 1,2 \dots, m \tag{24}$$

$$\sum_{j=1}^{n} y_{rj} \lambda_j - s_r^+ = \varphi^* y_{ro} \ r = 1,2 \dots s \tag{25}$$

$$\lambda_j \geq 0 \ j=1,2\dots,n$$

Then, the previous input-oriented definition of DEA efficiency is modified to the following output-oriented version.

Definition DMU$_0$ is efficient if only if $\varphi^*=1$ and $s_i^+ = s_r^- = 0$ for all i and r. DMU$_0$ is weakly efficient if $\varphi^*=1$ and $s_i^+ \neq 0$ and/or $s_r^- \neq 0$ for some i and r in some alternate optima.

These are known as the CCR model. If the constraint $\sum\lambda_j = 1$ is adjoined, they are known as BCC models. This added constraint introduces an additional variable, u_0 into the (dual) multiplier problems. This extra variable makes it possible to effect returns-to-scale evaluations (increasing, constant, and decreasing). Thus, the BCC model is also referred to as the VRS (Variable Returns to Scale) model and distinguished from the CCR model which is referred to as the CRS (Constant Returns to Scale) model. The key advantages and disadvantages of DEA method are summarized in the following Table 5.

Table 5 Advantage and Drawbacks of DEA Method

Advantages	Drawbacks
DEA efficiency scores for each DMU can be seen as integral measure of their performance	DEA efficiency scores can be strongly biased by statistical noise and outlier DMUs.
No need for predetermined offsetting of the functional form of transformation of resources (input variables) into results (output variables)	DEA efficiency scores can be seriously influenced by content of the DMU sample (when adding each new object of analysis, it is necessary to recalculate the entire system)
DEA method evaluates changes in input and output variables needed for reaching the efficiency frontier	DEA efficiency scores by DEA can't be cleared from statistical noise.
DEA method can be used for forecasting the efficiency scores of DMUs	Small sample size and overly large set of input and output variables seriously bias the efficiency scores

Source: Kotsemir (2013)

The analysis will be carried out using Microsoft Excel program, extended to a tools of this analysis developed by Professor Joe Zhu, who, along with other authors, has been engaged in the measurement of the the efficiency of several input and output units (for example Chen and Zhu, 2004; Zhu, 2014). Various other methods and models can be used to perform input and output variables analysis, such as (i) EE-IOA: Environmentally extended input-output analysis; (ii) SRIO: Single-region (or single-country) input-output model; (iii) MRIO: International multi-region input-output model (Bendat, 1976; Wiedmann, 2009). The possible limitation of the DEA analysis is that when examining a small number of units compared and a large number of criteria, all units could be considered effective (Staničková and Melecký, 2011). This problem has been solved by the selected sample of 16 Middle East and North African countries surveyed.

3.2.2 Principal Component Analysis

The second method used in the analysis is the Principal Component Analysis PCA. This method has been applied to for the purpose here is to define typical variables in order to propose generalized improvement for public sector performance. Among the fifteen variables, some should be interrelated with different correlation factors. Thus, using the principal components as a new variable and describing the data in this new coordinate system should be more meaningful to point out the typical variables. This method has been combined with DEA by several scholars (Poladru, Roots, 2013) to measure the life quality in Estonian counties, (Stoica et al., 2015) to assess the performance of Romanian banks and (Annapoorni1and Prakash, 2016) to measure the efficiency of Indian hospitals.

Principal component analysis is performed in order to simplify the description of a set of interrelated variables by reducing the dimensionality of the multivariate problem. The technique can be summarized as a method for linearly transforming the original variables into a number of new uncorrelated variables called principal components (Alberto, 2000).

Each principal component (PC) is a linear combination of the original variables and one measure of the amount of information conveyed by each PC is its variance. All the principal components are orthogonal to each other, so there is no redundant information. The principal components as a whole form an orthogonal basis for the space of the data. And will be arranged in order of decreasing variance; thus, the most informative PC is the first, and the least informative is the last.

Practically, principal component analysis is used to reduce the number of variables without losing much information. This can be achieved by analysing only the first principal component; the number of components selected may be determined by examining the proportion of total variance explained by each component. The un-analysed PCs convey only a small amount of information, since their variance is small.

Given multiple observations of a (px_1) data vector x, the goal is to specify (kx_1) vectors z whose dimensionality k is less than p ($k<p$). Elements of new vectors will be functions of the elements of the x values (Wilks, 2005) that sustain most of the information in the original collection of x values. These new vectors z are known as principal components (PCs). The purpose of PCA is to extract the maximum amount of variance from the data set with each component.

Assuming x is a vector of p random variables, say x_1 stands for corruption and x_2 stands for red tape, etc., a linear function of the p variables will have the formula (Bro and Smilde, 2014):

$$z_1 = e'_{1x} = e_{11}x_1 + e_{12}x_2 + \ldots + e_{1p}x_p \qquad (25)$$

where e'_{1x} is an eigenvector of p constant $e_{11}, e_{12}, \ldots, e_{1p}$ and $'$ denotes transpose. By changing $e_{11}, e_{12}, \ldots, e_{1p}$, different linear functions are derived and the variance of any such linear function can be calculated (Jolliffe and Cadima, 2016), such as:

$$z_2 = e'_{2x} = e_{21}x_1 + e_{22}x_2 + \ldots + e_{2p}x_p \qquad (26)$$

$$z_3 = e'_{3x} = e_{31}x_1 + e_{32}x_2 + \ldots + e_{3p}x_p \qquad (27)$$

$$\ldots$$

$$z_k = e'_{kx} = e_{k1}x_1 + e_{k2}x_2 + \ldots + e_{kp}x_p \qquad (28)$$

$$\ldots$$

$$z_p = e'_{px} = e_{p1}x_1 + e_{p2}x_2 + \ldots + e_{pp}x_p \qquad (29)$$

The first linear function (z_1) represents the PC1 with the maximum possible variance; the next linear function (z_2) is the second PC2 with maximum possible variance subject to be uncorrelated with the first PC1, etc. The full set of PCs is as large as the original set of variables. Although PCA produces up to p PCs, the k linear function of $x_1, x_2, \ldots, x_k, \ldots, x_p$, is defined to account for the maximum possible proportion of the original variation (Jolliffe, 1990).

Each principal component (PC) is a linear combination of the original variables and one measure of the amount of information conveyed by each PC is its variance (Du and Swamy, 2014). In other words, PC1 is the linear combination with the largest variance uncorrelated with PC_2 and PC_3, etc. The variances PC_i are the eigenvalues. The set of coefficients of the linear combination for i-th principal component is called i-th eigenvector (also known as the characteristic or latent vector; Jolliffe and Cadima, 2016).

The principal components are arranged in order of decreasing variance so that the most informative PC is the first and the least informative is the last. Each country in our data set

can be represented as a point in multidimensional space defined by a set of parameters describing the country (Bro and Smilde, 2014).

The purpose here is to define typical variables in order to propose generalized improvement for public sector performance. Among the fifteen variables, some should be interrelated with different correlation factors. Thus, using the principal components as a new variable and describing the data in this new coordinate system should be more meaningful to point out the typical variables.

There are some limitations of this PCA method. Jolliffe and Cadima (2016) highlighted (a) relies on linear assumptions, (b) relies on orthogonal transformations, (c) large variance = low covariance = high importance, (d) mean and covariance doesn't describe some distributions and (e) scale variant. PCA don't normalize the data – if you change the scale of some variables, your results will be different. These weaknesses of the PCA method have to be taken into account and if they have an effect on the result, another method should be chosen.

4. THE ANALYSIS OF PUBLIC SECTOR PERFORMANCE USING DEA AND PRINCIPAL COMPONENT METHOD

4.1 Performance analysis by DEA

Methods explained in the third part were applied for assessing the performance (efficiency and effectiveness) of the public sector in a sample of Middle East and North African countries (MENA). MENA countries are an interesting sample because regrouping countries with and without natural resource. It is noticeable that countries with natural resources represent respectively 60 percent and 40 percent (Nabli and Arezki, 2012) of the world share in oil and gas reserves, countries with natural resources are also clustered under their revenues (GDP per capita) into two main groups; the first one includes countries with higher incomes mainly Bahrain, Kuwait, UAE, Libya, Qatar, Saudi Arabia. The second group is known to be upper middle income and contains Algeria Iran, Iraq, and Azerbaijan (Figure 9).

Figure 9 The size of the government and GDP per capita
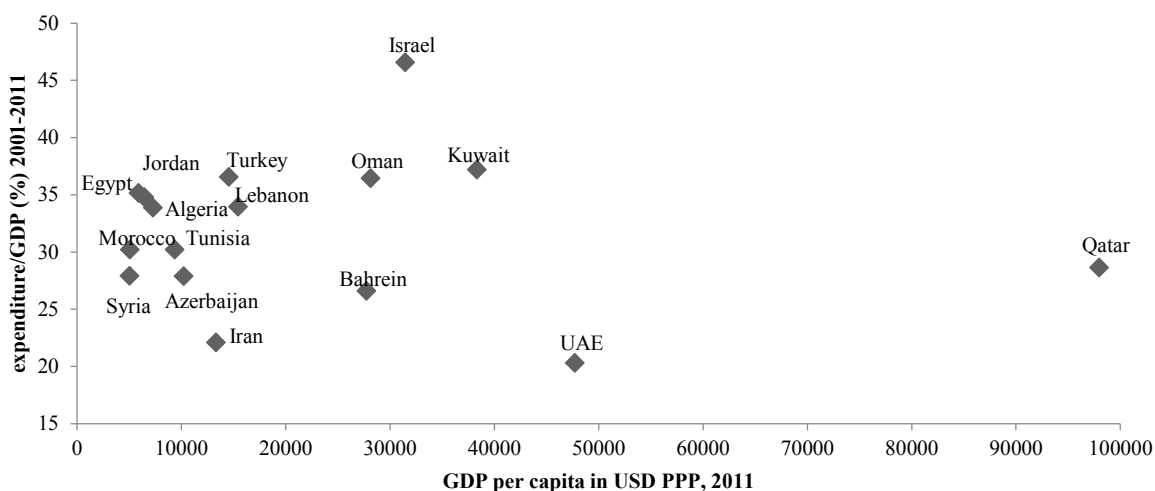
Source: own compilation according to WDI database

According to this clustering we developed our assumption that countries rich in natural resources will have best performance in their respective public sector because the bulk of their revenues generated by the export of their natural resources make easy the financing of their public projects and impact positively in their public-sector performance. However, countries without natural resources have hurdles to finance growing needs for public sector goods and services. Although this the MENA region represent an interesting case study because regrouping countries with different level of potentialities. One of the characteristics of the public sector in MENA countries is the relative small size of government as shown in Figure

39

9; although the economic ease of almost all countries their expenditure falls under the line of 40 percent of their total GDP. At the same time, it is noticeable that the public sector in MENA countries is the first employer; in 2005 it contributes to 29 percent of the total employment much higher than in Japan 7.7 percent the USA 14.6 percent and the UK 18.9 percent public sector employment is as high as 93 percent in Kuwait, 79 percent in Saudi Arabia, 66 percent in Libya (Al Masah, 2011).

4.1.1 Composite indicators used in DEA

The method for collecting the data set is borrowed from the work of (Afonso and St Aubyn, 2006) for the measurement of the performance and the efficiency of the public sector in new EU members and emerging markets. In its first step, the method measures the performance of the public sector using two clusters of indicators named first, opportunity indicators and second, Musgravian indicators.

Opportunity indicators cluster aggregates four main indicators which are: Administrative, education, health, and infrastructure. Each indicator is the result at least of one sub indicator, for administrative (corruption, red tape, quality of judiciary, shadow economy). Education performance is captured through the quality of math and science and the second school enrolment. Health system performance is captured through the infant survival at birth and life expectancy and finally the performance of infrastructure expressed by the quality of communication and infrastructure. Then, a good public administration and high human capital enhanced by a good level of health care and educational systems and a sound infrastructure can be a perquisite for a well-functioning market where the rule of law is applied and opportunities are open for all citizens.

For the **Musgravian indicators** capture the basic functions of the public sector are expressed on the ability of the latter for distributing, stabilizing, and improvement of the overall economy. The distribution is captured by the Gini coefficient, stability through two main sub-indicators respectively the ten-years´ average of the overall inflation and the stability of the GDP growth through its coefficient of variation. Then the overall economic performance is captured via two sub-indicators which are the ten-years´ average of unemployment and the GDP real growth. It is important to mention that this group of indicators illustrate the achievement of the stabilization objectives and the allocative efficiency by economic performance.

Sub-indicators will be averaged and aggregated into the relevant indicator. Finally, all sub-indicators are used to compute a composite public-sector performance by given them an equal weight. The values are normalized, and the average is set equal to one.

The data stems from different sources (see table 6). the main challenge in this field was to find a consistent data set for whole MENA countries who are known in their majority to lack transparency about their public-sector performances. Furthermore, almost all countries in MENA region are backsliding on open data, with ranking and scores down, this is hypothesised to happen due to a lack of civil society engagement with open data as there is a little pressure for governments to make data public particularly in relation to social issues. Lack of recent data does not help us to provide newer performance outputs of the of MENA public sector. Indeed, it was really challenging to complete the study in a context of civil war and social unrest that characterized the region from last decade till now. The challenge has been accepted as we believe that the economic stability of MENA region will bring welfare to the region itself but also to surrounding regions such as Europe, Asia and Africa. For those reasons, we mainly relay to reliable international sources rather from national data. Those are listed in the below table.

The data set includes 16 MENA countries including resource exporting and importing countries, high income oil exporter countries are UAE, Qatar, Kuwait, Bahrein, Middle income exporter countries such as Algeria, Azerbaijan, Iran and oil importer countries as Tunisia, Morocco, Egypt, Israel, Jordan, Lebanon, Syria and Turkey. Our interest slot into this region as it is the unique region that gather countries that have slightly the same historical and social structure with different country-based economies allowing to make a comparison between resource and non-resource. Similarly, the sample offer the possibility to compare public sector performance within resource-based countries, thus with high and middle incomes.

Then the PSP of each country is related to this average and derivations from this average provide an indication of the public-sector performance for each country. The measurement of the overall public-sector performance is based on the improvement of economic and social indicators. And because the level of public sector performance explained above do not take into consideration the level of the public spending dedicated for their realization. Then, the *PSP* will be weighted by the relevant category of public spending *PEX$_i$*.

Input measure for opportunity indicators are:

1. Public consumption as proxy for input to administrative outcomes;

2. Expenditure on health for health care system performance;

3. Education expenditure for education performance;

4. Public investment for infrastructure.

Similar indicators have been used in a number of studies (see Table 6).

Table 6 Indicators and relevant data sources

Indicator	Source	Explanation	Previous use
Corruption	GCR 2010-2011	consists on the irregular payments and bribes (1 very common, 7 never occurs)	(Curtis, Rhoades and Griffin 2014) (Bai, Wei 2013) (Wei, 2000) (Bergsteiner, 2018)
Red Tape	GCR 2010-2011	measured as the burden of government regulation (1 extremely burdensome, 7 not burdensome at all)	(Mohammadi, Peltonen, wincent, 2017) (Qureshi, Sanchez, 2015) (Lulhifiano, Priyarsono, 2016)
Quality of judiciary	GCR 2010-2011	measured by the judicial independence (1, heavily influenced by government, 7 entirely independent)	(Papageorgiadis, Cross, Alexiou, 2015) (Miletkov Poulsen, Wintoki, 2017) (Larry, Knezevic and Tania 2014)
Shadow Economy	GCR 2011		(Afonso, et al. 2006)
Secondary school enrolment	WBG 2010-2011	Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.	Van Stel, Storey and Thurik 2007) (Olanrewaju, Jeffrey and Crossland, 2015)
Education achievement/ the quality of math and science education index	GCR 2010-2011	the quality of math and science education index	(Shwabe, Nygal-Lukaszewska, 2017) (Lozano, Sattigeri and Mojsilovic 2010)
Infant survival at birth	IMR- WBG 2010-2011	calculated as (1000-IMR)/1000 (IMR infant mortality at Birth)	(Afonso et al. 2006)
Life expectancy at birth	WBG 2011	Life expectancy at birth indicates the average number of years a new-born infant would live	(Laroseliere, Meske et Carter, 2015) (Nouinou, Rzzafimampianina, 2015)
Quality of infrastructure	WEF 2011	1 extremely undeveloped 7 extremely developed	(Ismail, Mahyideen, 2015) Stafford, Griggs and Goffrey, 2017)
Income share of 40 percent of poorest households	WBG 2010-2011	100- Gini coefficient	(Wooland and Metz, 2015) (Davisd, 2017)
Inverse of Stability of GDP growth	GCR 2010-2011	the inverse of the GDP coefficient of variation the GDP consists on the annual percentages of constant price GDP are year-on-year changes.	(Afonso et al. 2006)
GDP Per capita	WBG/WDI 2011	Expressed in GDP in PPP dollars per person. Data are derived by dividing GDP in PPP dollars by total population	(Laporta and Shleifer, 2014) (Blanchard and Giavazzi, 2016)
Inverse of Inflation	WBG 2011	the average of inflation from 2001 to 2011 expressed as inverse (1/x)	(Fantom and Serajuddin, 2016) (Soumare and Tchana, 2015)
GDP Growth	WBG 2011	Annual percentages of constant price GDP are year-on-year changes	(Jorgensen and Vu, 2016) (Jorgansenjevic and Getzen, 2016)
Unemployment	WBG 2011	Unemployment, total (percent of total labour force) (modelled ILO estimate)	(Liaos, 2015) (assad, Ghazouani and Krafft, 2017)

Source: own processing

And the inputs for the Musgravian indicators are:

1. Transfer and subsidies as a proxy for the income distribution;

2. Total spending for the overall economic stabilization;

3. Total expenditure for economic efficiency.

Finally, the last step will assess the distance between the possibility frontier created by the most performer countries and the distance between this frontier and the rest of the sample of MENA countries which are above the curve using DEA method.

The overview of all public-sector performance indicators is in Figure 10.

Figure 10 Total public-sector performance (PSP) indicators
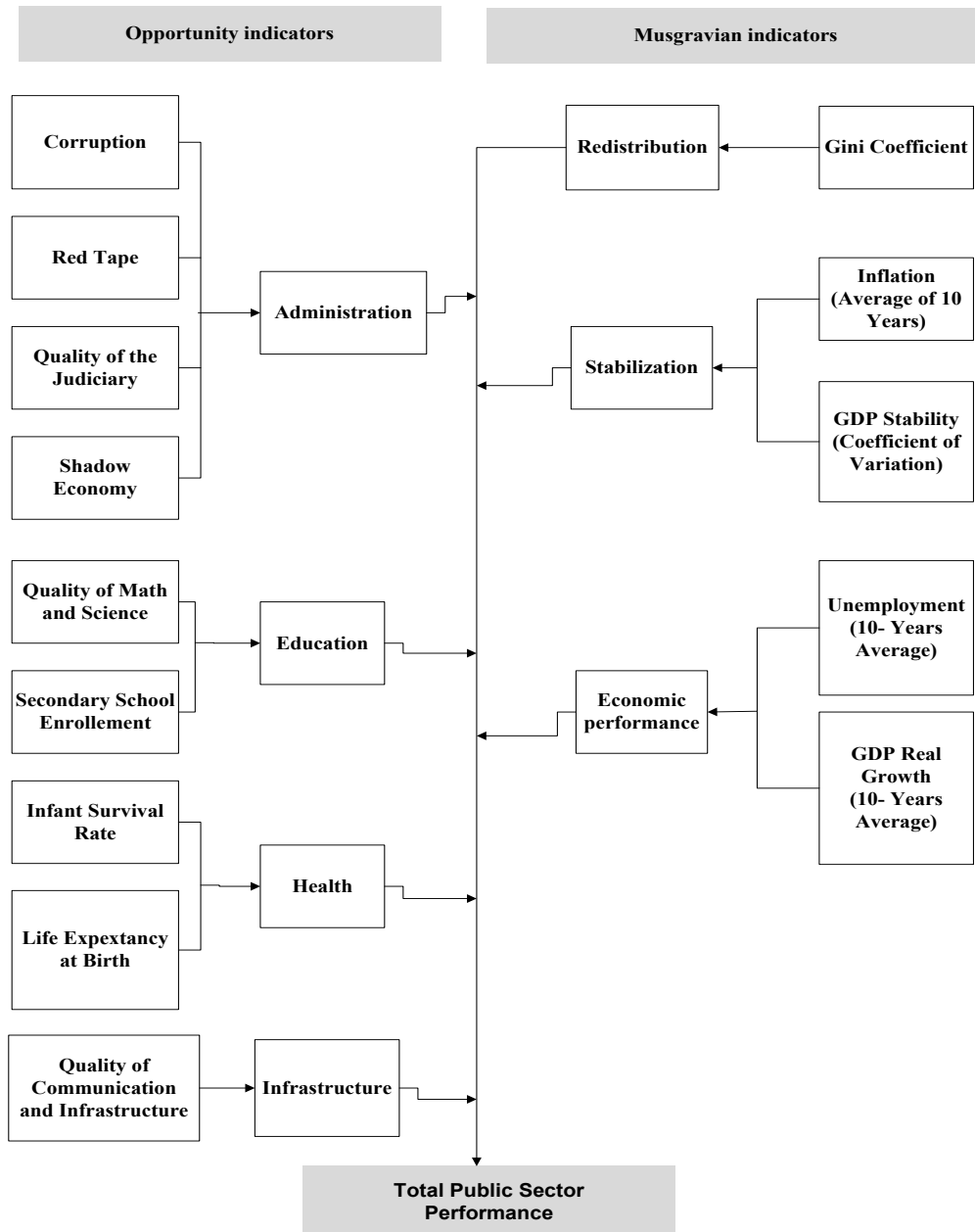
Source: own compilation according to Afonso, Schuknecht and Tanzi (2010).

4.1.2 DEA Results

The calculation of the PSP using the composite indicators and sub indicators of our sample gives the following results where the primary data and its calculation are explained in Appendix A. Summarization of the results is in Table 7.

Table 7 Public sector Performance (PSP) indicators (2001-2011)

countries	Opportunity indicators				Musgravian indicators			Total public sector performance
	Administration	Education	Health	Infrastructure	Distribution	Stability	Economic performance	
Algeria	0.71	0.91	0.98	0.81	1.00	1.07	0.86	0.91
Azerbaijan	0.91	1.01	0.98	0.94	1.03	0.60	1.11	0.94
Bahrain	1.16	1.04	1.03	1.19	1.00	1.95	0.98	1.19**
Egypt	0.89	0.79	0.98	0.92	1.08	0.96	0.69	0.90
Iran	0.87	1.01	1.00	0.85	1.12	0.76	0.88	0.93
Israel	1.20	0.94	1.07	1.05	1.01	1.20	0.93	1.06
Jordan	1.09	1.04	1.00	1.11	1.01	1.19	0.89	1.05
Kuwait	1.03	0.94	1.01	1.05	1.00	0.75	0.90	0.95
Lebanon	0.77	1.14	0.83	0.53	1.00	1.00	1.52	0.97
Morocco	0.88	0.80	0.98	0.87	0.92	1.86	0.70	1.00
Oman	1.19	1.01	1.03	1.24	1.00	1.02	0.97	1.07
Qatar	1.28	1.25	1.04	1.09	0.92	0.91	2.22	1.24***
Syria	0.75	0.90	1.01	0.77	1.00	0.77	0.62	0.83
Tunisia	1.12	1.20	1.01	1.17	1.00	1.01	0.80	1.04
Turkey	0.88	0.88	1.01	1.09	0.93	0.34	0.82	0.85
UAE	1.27	1.13	1.03	1.32	1.00	0.62	1.12	1.07*
Average	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Each sub- indicator contributes 1/7 to total indicator [1] and [2] results from the study of (Afonso and St Aubyn, 2006) same method for the period of (2001-2003).

Source: own processing

When ordering MENA countries from the most to the least performer the result is somehow different from our first assumption which tell that countries with natural resources will be ranked as the best performer. When comparing our results with those obtained by (Afonso and St Aubyn, 2006), ten MENA countries fall upper the average of new EU member and only one (Qatar) upper the average of Asian NIC. Countries ranking is summarized in the Table 8.

The First group refers to countries rich in natural resources considered as high incomes countries according to the measure of their income per capita such as Qatar, Bahrain, UAE and Oman. This result can be explained by two facts; countries belonging to this group are extremely comfortable because of the high volatility of hydrocarbon commodities in the previous decade and this created a strong macroeconomic stability. It is noticeable their

revenues from oil and gas are respectively 88 percent, 81 percent, 41 percent and 73 percent [1] and this fact counterbalanced some inverse effects of the other indicators. Furthermore, some reforms were observed concerning their institutions and the level of corruption is the lowest in all MENA´s region. The second fact is connected to their respective population does not cross 10 million and the extent of their territory is not that large to weight down the provision of public goods and services.

Table 8 MENA's ranking under performance indicators

Countries	PSP	Ranking
Qatar	1.242609464	1
Bahrain	1.193403551	2
UAE	1.07003145	3
Oman	1.065422213	4
Israel	1.055659708	5
Jordan	1.045188715	6
Tunisia	1.04427186	7
Morocco	1.002456514	8
Lebanon	0.970771659	9
Kuwait	0.95297495	10
Azerbaijan	0.938698167	11
Iran	0.929026898	12
Algeria	0.905599554	13
Egypt	0.90058848	14
Turkey	0.850953029	15
Syria	0.832343788	16

Source: own processing

The second cluster regroups Israel, Jordan, Tunisia, Morocco, and Lebanon. Group of countries without natural resources and abundant labour force and may be considered as the most performer because their public sector is exclusively not financed by rent emanating from the export of primary commodities. This group of countries assesses positively their institutional framework and the quality of their human capital (education and health) these positive results were unfortunately counterbalanced by the world economic crisis and the high price of hydrocarbons which affects their macroeconomic stability.

The third stratification is composed exclusively from countries rich in natural resources and instead of Kuwait having abundant labour force. The latter belong to the third group

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[1] Data provided from the International Monetary Fund.

because of lack results in the educational system and the stability of the economy as for Azerbaijan where the stability of the economy is the second less reliable in our entire sample after Turkey. In the other side, results for Iran are questionable about the economic performance, the stability of the economy, infrastructure, and administration quality certainly due to an international context of sanctions. Algeria in term of its public sector performance is ranked in the least position in all countries rich in natural resources this result are mainly influenced by the quality of the administration about what is noticeable the high degree of corruption registered in the last decade (the Arab world economic competitiveness report) public institutions in Algeria remain ridden with corruption and excessive red tape, all the indicators are less than one only those concerning distribution and the stability of the economy enhanced by high oil and gas prices in the previous decade.

Table 9 Total public expenditure and relevant expenditure for PSP indicators (percent of GDP)

Countries/ variables	Total Expenditure	Good and services	Social transfer	Health	Education	Public investment
Algeria	33.86	2.51	11.08	2.92	4.34	34.63
Azerbaijan	27.88	1.94	7.24	4.77	2.94	30.48
Bahrain	26.60	4.08	5.57	2.72	3.10	25.46
Egypt	34.79	2.21	10.41	2.12	4.31	18.68
Iran	22.09	2.39	6.97	2.29	4.71	34.10
Israel	46.57	11.32	13.28	4.76	6.18	18.91
Jordan	35.14	3.47	7.69	5.14	4.95	26.17
Kuwait	37.20	6.61	11.76	2.30	5.62	17.41
Lebanon	33.95	0.87	8.36	3.13	2.29	25.84
Morocco	30.21	3.19	9.01	1.71	5.57	31.27
Oman	36.43	16.58	2.29	2.73	4.00	23.37
Qatar	28.64	5.90	3.30	2.17	2.30	36.75
Syria	27.90	1.18	3.42	6.21	5.15	20.95
Tunisia	30.21	1.75	10.57	3.15	6.39	24.29
Turkey	36.56	3.91	17.56	4.16	2.89	19.36
UAE	20.28	1.28	0.92	1.77	1.11	22.62
min	20.28	0.87	0.92	1.71	1.11	17.41
max	46.57	16.58	17.56	6.21	6.39	36.75
average	31.77	4.33	8.09	3.25	4.12	25.64

Note: All the column is the average from 2001 to 2011 data source are from the column 1-5 from the World Bank WDI and the last column is from the International monetary fund WEO.

Source: own processing

The last group of countries is composed by countries poor in natural resources and rich in labour force and includes Egypt, Turkey, and Syria. For Egypt all the indicator is under one

only for distribution, the weaker points concern education and the economic performance for Turkey the stability of the economy is relevant to enhance its position among MENA countries. The less reliable points for Syria are the economy performance, the stability of the economy the quality of infrastructure and the administration which is not possible to enhance in term of civil unrest.

When looking at the public expenditure in Table 9, the main observation is the huge amount of public investment for our entire sample.

For the total expenditure two countries attract the attention, Israel and Oman with respectively 46.57 percent and 36.43 percent. We should notice that from 2001 to 2011, these two countries dedicated respectively 7.8 percent and 10.32 percent (WBG, 2014[2]) as a share of their GDP to military expenses, in order to satisfy their military needs the same countries have a large part of their GDP dedicated to the government consumption in goods and services to insure the functioning of their public sector. From the other side, we can predict that these two facts will impact negatively in their public-sector efficiency. Once again, the amount of Israel in GDP share is high in social transfers. High level of transfers is also seen in Algeria, Egypt, Kuwait, and the highest level of social transfers is observable in Turkey. Not much share of GDP is dedicated for health and education.

As expected and looking at the results of public sector efficiency (Table 10) the result is less ordered comparing to those obtained in public sector performance; countries considered as the best **performer** such as UAE, Qatar, Bahrain and Oman are also considered as the best **efficient** with another order; UAE (2.7) is ranked in the first position followed by Qatar (1.7) then Bahrain (1.12).The other countries are spread to other positions as expected, Israel according to its military expenditure is ranked as the least efficient public sector. In the second group of performers only Lebanon and Morocco keep their position. Iran gains six places in term of efficiency, Azerbaijan two places Algeria one place when Kuwait lost four places.

Finally, it is important to mention the ordering of sectors from the less to the most efficient according to their average are: infrastructure (0.04) Administration (0.39) economic stabilization (1.02), economic performance (1.06) health (1.15) education (1.27) and distribution (1.73) which order priorities for an alternative core reforms tending to enhance the efficiency of MENA´s public sector.

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[2] Data from database on http://www.worldbank.org/en/region/mena

The relative efficiency analysis via DEA approach for input oriented allow us to measure the distance between the DMU and the envelope created by the most performers countries (see Figure 11). In other mean, how much countries which are under the envelope have to decrease their public spending in order to meet the efficiency frontier envelope.

Table 10 Public sector efficiency (PSE) indicators (2001-2011)

Countries	Opportunity indicators				Musgravian indicators			Total public-sector efficiency
	Administration	Education	Health	Infrastructure	Distribution	Stability	Economic performance	
Algeria	0.28	0.87	1.09	0.02	0.73	1.00	0.80	0.69
Azerbaijan	0.47	1.41	0.66	0.03	1.15	0.68	1.27	0.81
Bahrain	0.28	1.38	1.23	0.05	1.45	2.33	1.17	1.13*
Egypt	0.40	0.75	1.51	0.05	0.84	0.88	0.63	0.72
Iran	0.37	0.88	1.43	0.03	1.30	1.09	1.27	0.91
Israel	0.11	0.63	0.73	0.06	0.61	0.82	0.63	0.51
Jordan	0.31	0.86	0.63	0.04	1.06	1.07	0.80	0.68
Kuwait	0.16	0.69	1.43	0.06	0.69	0.64	0.76	0.63
Lebanon	0.89	2.05	0.87	0.02	0.97	0.93	1.42	1.02
Morocco	0.28	0.59	1.86	0.03	0.83	1.96	0.73	0.90
Oman	0.07	1.04	1.22	0.05	3.52	0.89	0.85	1.09
Qatar	0.22	2.23	1.56	0.03	2.25	1.01	2.46	1.39**
Syria	0.64	0.72	0.53	0.04	2.36	0.88	0.71	0.84
Tunisia	0.64	0.77	1.05	0.05	0.76	1.06	0.84	0.74
Turkey	0.23	1.26	0.79	0.06	0.43	0.29	0.71	0.54
UAE	0.99	4.19	1.89	0.06	8.80	0.97	1.75	2.67***
Average	0.40	1.27	1.16	0.04	1.73	1.03	1.05	0.95

These indicators are the expenditure weighted to capture the indicator of table (9), each sub indicator contributed equally to the total indicator.

Source: own compilation

As depicted in the figure above the data envelope is constituted by two main countries, UAE (the smallest public sector and the third in term of performance in the entire sample of MENA countries) and Qatar (the best performer in term of public sector and the second in term of efficiency) then the input-oriented are captured via the variable return to scale (VRS TE) and the constant return to scale (CRS TE) and the results are summarized in the following Table 10.

Figure 11 Theoretical production possibility frontier, one input one output
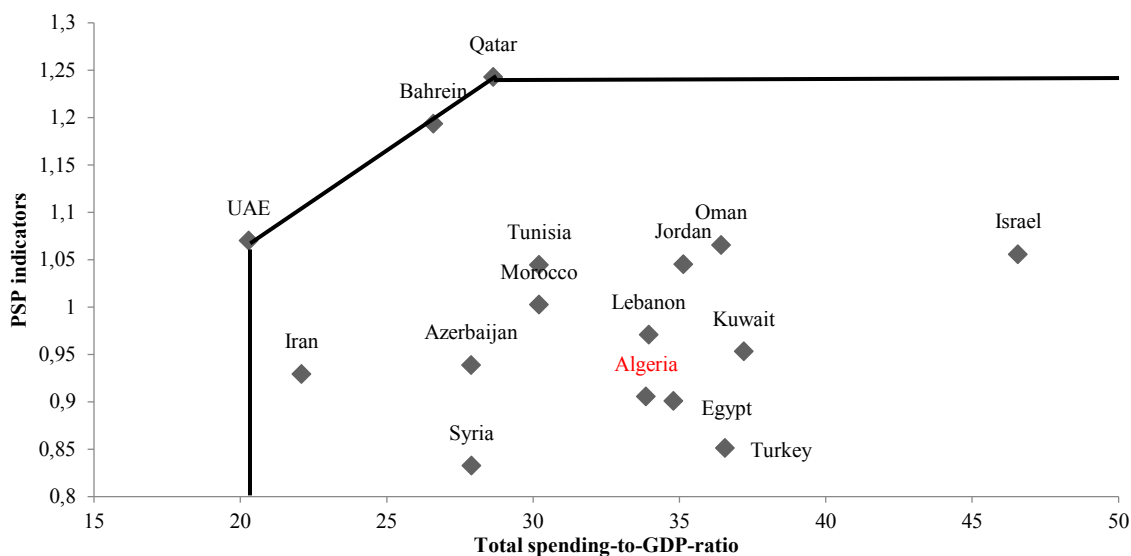
Source: own compilation

These results in turn confirm partially the first hypothesis. Partial confirmation of the hypothesis is due to the fact that high income countries such as (UAE, Bahrein and Qatar) rich in natural resources are laying in efficiency curve. This in turn clearly confirms that the resource curse is not a fatality, the Public sector in countries rich in natural resources may perform if resource windfalls are used efficiently. The other part of the result shows that countries rich in natural resources such as Algeria continues to inefficiently spend higher public means.

At the same time, we should not ignore two facts. First, Qatar, UAE and Bahrein still highly dependent on their primary commodities (data used for this study was in a period when oil prices were very high) and second, their labour market is highly dependent from abroad for example 90 percent for Qatar and 60 percent for Bahrein (Callen et al, 2014).

It is noticeable that Qatar, UAE and Bahrein belong to a MENA integrated sub-region called GCC (Gulf Countries Council). GCC countries is the most advanced example of sub regional integration of MENA and its objectives are the most ambitious in developing world.

Indeed, The Gulf Cooperation Council (GCC) growth model has delivered strong economic and social outcomes over several decades. Nevertheless, GCC economies rely on oil as the main source of export and fiscal revenues. Over years, GCC governments have increased public sector employment and spending on infrastructure, health, and education. This has helped raise standards of living and support private sector activity, particularly in the non-tradable sector.

The current growth model has weaknesses; however, an increasing economic diversification is a priority. Greater diversification would reduce exposure to volatility and uncertainty in the global oil market, helps create private sector jobs, increase productivity and sustainable growth, and establish the non-oil economy that will be needed in the future when oil revenues start to decline. Answering this purpose, several policies have been adopted to diversify the GCC economies and reduce their reliance on oil. A stable, low-inflation economic environment has been achieved, the business climate has been strengthened, education has been expanded, trade and foreign direct investment (FDI) has been liberalized, and the financial sector deepened. National development plans are being implemented with a view toward boosting the human capital of nationals and developing new industries and services that can employ high-skilled labour. Nevertheless, the share of non-hydrocarbons output in GDP has increased steadily but is highly correlated with oil prices, and progress with export diversification, a key ingredient to sustainable growth, has been more limited. International experience shows that diversifying away from oil is very difficult. Success or failure appears to depend on the implementation of appropriate policies ahead of the decline in oil revenues.

The example can be North African countries such as Algeria, Tunisia and Morocco, the average of the total natural resources rent from 2001 to 2012 (Algeria – 20 percent, Tunisia 4.50 percent and Morocco 0.70 percent) whereas it is clearly seen on the graph that Tunisia and Morocco dedicated less public means with better performance comparing to Algeria. Tunisia and Morocco are an example of a diversified economies, their public spending is dedicated to better education, knowledge, health care and sectors that bring value added to their economy. For example, Tunisia has become a middle-income country with relatively diversified economy, this is related to macroeconomic policies and structural reforms designed to transform the country into a market driven economy with liberalized trade regime. Despite the scarcity of natural resource, Tunisia has relied largely on good business climate, infrastructure, highly skilled human capital to drive sustainable growth and economic diversification. The country used its proximity with Europe to respond to short order from EU in sectors such as textile and other sophisticated automotive, electrical engineering, ICT and aeronautic sectors. Tunisia with that, is ranked as the most performer African countries in term of competitiveness. The role of the government is crucial in Tunisia trough programs initiated by public agencies to reduce regional disparities, increase the production in agriculture and promote private initiatives to reduce unemployment especially among youth and promote the human capital. The same economic path is visible in Morocco. Whereas, the

situation is different in Algeria the country continues to be highly dependent from hydrocarbon and in a context of oil prices collapse, Algerian government will find it hard to support high level of spending a recent (IMF survey in Coady et al., 2017) point out that Algeria during the oil ease allow the country to build infrastructure, achieve social stability and make significant progress to achieve development goals. Nevertheless, a large share of new job creations has been in the public-sector which remains very high or in construction sector that depends on public investments. Now that oil prices are down, the government has no longer sufficient resources to sustain high level of public spending to create jobs for young and respond to a growing population needs.

Table 11 presents both the input and the output-oriented efficiency coefficients of the variable returns to scale analysis while the constant returns to scale coefficient are also reported for completeness clearly, the Public sector in both North African countries is performing better in VRS TE (input oriented) for Tunisia and Morocco respectively 0.671 and 0.672 and in CRS TE 0.655 and 0.564. the CRS TE confirms the first efficiency finding Qatar, UAE and Bahrein are the best performer. Morocco and Tunisia are largely above the average of 0.62 and are ranked respectively in the 8th and 5th position further from Algeria who is ranked in the 12th position. From an input perspective, the average is 0.69 which means that countries less than 1 should use less input (here in public means) to reach the most efficient countries. Algeria, for example should use less 0.4 of public means to attempt the input efficiency reached by the best performers such as Qatar and UAE.

Then Qatar and UAE are the most efficient in term of technical efficiency followed by Iran and Azerbaijan. Observable is that UAE is using almost the ½ of its inputs to realize the same level of public sector performance as Israel. In the other side, Oman lost many places comparing to the first rankings (performance and efficiency) and this enhance the high level of Oman´s spending dedicated to their militarization needs, the same observation can be done about Israel.

DEA analysis has been applied in the above analysis to test public sector indicators and determine which of the selected countries perform most or least, DEA analysis doesn't show clearly with indicator drive the whole performance of the public sector in MENA countries.

Table 11 DEA results: one input, one output

DMU	VRS TE (input oriented)	Ranking	CRS TE (Technical efficiency)	Ranking
Qatar	1.000	1	0.822	3
UAE	1.000	2	1.000	1
Bahrain	0.987	3	0.850	2
Iran	0.918	4	0.797	4
Azerbaijan	0.727	5	0.638	6
Syria	0.727	6	0.566	7
Morocco	0.672	7	0.564	8
Tunisia	0.671	8	0.655	5
Algeria	0.599	9	0.507	12
Lebanon	0.597	10	0.542	11
Egypt	0.583	11	0.491	13
Jordan	0.577	12	0.564	9
Oman	0.557	13	0.554	10
Turkey	0.555	14	0.441	15
Kuwait	0.545	15	0.486	14
Israel	0.436	16	0.430	16
average	*0.697*		*0.619*	
min	*0.436*		*0.430*	
standard div	*0.182*		*0.165*	

Source: own compilation

For that reason, we applied Principal component analysis to fulfil this aim. It is noticeable that DEA has been combined with PCA in several studies, most recently we can cite: Jothimani and Shankar (2018) used to assess the portfolio selection in Indian stock markets, Annapoorni and Prakash (2017) DEA-PCA was applied to measure the performance of hospitals in the state of Tamil in India, and Gong, Shao and Zhu (2017) to measure energy efficiency

4.2 Performance analysis by PCA

In another publication and using the same dataset, the principal component analysis (PCA) was conducted in order to reduce the number of variables and to find hidden patterns describing the performance of the public sector in MENA countries. Partial calculations are explained in Appendix A

Results obtained from the aforementioned method were five principal components summarized in the following Table 12.

Table 12 The principal component of unrotated factor loading

	PC 1	PC 2	PC 3	PC 4	PC 5
Corruption	- .911*	- .264	-.170	-.074	.216
Red Tape	- .736*	- .228	.261	.347	.218
Quality of the Judiciary	- .908*	- .168	-.133	-.043	.120
Shadow Economy	- .667	.265	-.021	-.288	-.096
Secondary School Enrolment	- .559	.508	.370	-.050	.307
Education Achievement	- .324	- .527	.648	-.033	.172
Infant Mortality Rate	- .505	- .301	.116	-.718*	.027
Life Expectancy	- .675	.210	-.595	.087	-.058
Infrastructure	- .850*	.063	-.306	.031	.103
Income Distribution	.288	.398	- .152	- .143	.786*
Stability of GDP Growth	.233	- .517	- .326	.548	.374
Inverse of Average Inflation	- .125	-.753*	- .298	.098	- .109
GDP per Capita	- .782*	-.080	.361	.023	- .211
GDP Growth	- .339	.321	.512	.671	- .076
Unemployment	.708*	-.382	.358	- .265	.243
Expl. VAR	5.877	2.147	1.877	1.591	1.137
PRP. Total	.391	.143	.125	.106	.075

Source: own compilation

Table 12 shows that the first principal component is strongly correlated with six of the original variables. Three of them are administrative (institutional); the first component is decreasing with increasing corruption (-.911), red tape (-.736), the quality of the judiciary (-0.908), the quality of infrastructure (-.850) and GDP per capita (-.782). However, the first principal component increases with unemployment (.708). This suggests that these six criteria vary together; if one increases, the other remaining variables also increase and/or decrease. Furthermore, we see that the first principal component correlates most strongly to corruption. In fact, we could state that based on the correlation of (-.911), the first principal component is primarily a measure of the corruption variable. This fact demonstrates some impediments to the functioning of the public sector in MENA countries. For example, a more burdened bureaucracy leads to more corruption and vice versa; corruption also corresponds highly to the quality of the judiciary, which, in simple words, means that the higher the level of

corruption, the better the judicial system. It is the same for corruption and red tape. On the other hand, all the significant variables are negatively correlated with unemployment.

Table 13 Factor scoring in unrotated principal component extraction

Countries	PC 1	PC 2	PC 3	PC 4	PC 5
Algeria	1.24343	.01528	- .27547	- .09305	- .27873
Azerbaijan	.25086	2.27556	.92775	1.92333	.12619
Bahrain	- .71556	- 1.41460	- .81816	.55079	.81217
Egypt	.82935	.60744	- .96642	.48567	1.14967
Iran	.72159	.50975	- .09388	- .05192	1.72774
Israel	- .86047	- .21563	- 1.11102	- 1.31315	- .01883
Jordan	- .11337	- .09046	- .26591	.30287	.85983
Kuwait	- .46667	- 1.27595	- .39372	- 1.07528	- 1.08760
Lebanon	1.55971	- 1.67783	2.57052	- 1.21133	.22407
Morocco	.91317	- .28285	- 1.05356	1.71145	- 1.60793
Oman	- .81529	- .28285	- .31365	- .17426	.46945
Qatar	- 1.85965	- .48879	1.68597	1.27841	- .84643
Syria	.95290	.46676	- .39476	- .64293	- 1.00589
Tunisia	- .41191	- .65485	.29398	- .10353	1.00155
Turkey	.24563	.79575	- .08119	- .66448	- 1.55851
UAE	- 1.47371	.52553	.28952	- .92259	.03325

Source: own compilation

Furthermore, we also run the data to determinate which of the country in the MENA sample fits better the most significant component. Results in Table 13 shows rank countries to how closely they fit the pattern of the Principal component; countries **with negative numbers are those which least fit the respective principal component**, whereas, those with positive numbers are closer to the respective principal component. According to Table 13 countries are classified by their distance to the first principal component pattern; countries more driven by corruption include Lebanon (1.55971) and Algeria (1.24343), Iran with (.25086) followed by Azerbaijan with (.25086). Qatar and the United Arab Emirates being the furthest from the principal first component with (-1.85965) and (-1.47371). Countries such as Qatar, Bahrain, the UAE and Oman have gained financial well-being because of their natural resources and have demonstrated some institutional reforms relating to their institutions and anti-corruption measures (World Economic Forum, 2013).

Above mentioned results confirm the second hypothesis which states that the institutional quality and the management of their public finance are the most influential variables which impact negatively on the overall performance of the public sector in MENA countries in general and MENA middle resource rich countries, in particular.

Corruption driven the data has been also confirmed by different studies such as Ali (2017). Who found out that corruption in MENA resource rich countries have a positive relationship with oil and gas prices.

This finding is also enhanced by several surveys, most recently, 07 key findings were presented in the report of (International transparency, People and corruption: MENA 2016[3]) five of them attract our attention:

1. Increasing levels of corruption perceived across the region. Most people (61 %) across the region think that the level of corruption has gone up. In Lebanon, people are particularly likely to think that corruption has risen: nine in ten people (92 %) say that they think corruption has increased. This view is supported in Algeria at 51 % of the total respondents.

2. All Governments are rated badly in their efforts to fight corruption All governments are rated either very or badly at fighting corruption by most of their citizens (between 58 and 91 %) in the eight places where we asked this question. This view is supported by per cent of all respondents in Algeria.

3. Politicians and key public-sector institutions are seen the most corrupt: Government officials, tax officials and Members of Parliament are seen as the most corrupt groups in the region.

4. Bribery is very common in public services: Almost one in three people (30 %) who accessed public services in the past 12 months paid a bribe, or around 50 million people. Yemen has the highest bribery rate, with nearly four in five public service users paying a bribe (77 %). It is also very common in Egypt, Morocco and Sudan, however, where around a half have bribed (48 to 50 %).

5. Bribery particularly affects law and order institutions: Courts (31 %) have the highest bribery rate of the six key public services that we asked about in our survey, followed by the police (27 %).

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[3] For more see link:
https://www.transparency.org/whatwedo/publication/people_and_corruption_mena_survey_2016

4.3 Results discussion and main recommendations from economic perspective

Fiscal policy in resource rich countries should have the same broad objectives as fiscal policy in other countries. It should contribute to the achievement of macroeconomic stability and sustainable and inclusive growth and poverty reduction, within a framework of fiscal sustainability, but while the objectives of fiscal policy in resource rich countries are similar to those in other countries, dependence on fiscal resources revenues raises a number of specific issues for fiscal policy that require the adaptation of fiscal frameworks to incorporate the special the special characteristics of these revenues. Thus, create specific challenges in the short medium and long fiscal terms.

First, resource revenue is volatile and uncertain, this is mainly because resource prices are highly volatile. Perhaps even more important, resource prices are highly unpredictable, other source of uncertainty include the size of resource reserves, future production volumes and costs, possible changes in future fiscal regimes, and the volatility of the real Exchange rate. This leads to uncertainty government cash flow and government net wealth and complicates by the way budget planning, fiscal management, and the efficient use of the public resources, particularly when resource revenue makes up a large share of total government revenues.

Second, resource revenues arise from the exploitation of resources that are exhaustible and run the risk of technological obsolescence. This in turn, raises complex questions regarding intergenerational equity, long term fiscal sustainability and asset allocation.

According to the high level of oil revenue especially during the last decade and the huge bill of public investments, resource rich MENA countries, more specifically Algeria is in the crossroads between harnessed the opportunity to sustain long term economic and employment growth and continues social development or will be squandered through inefficiency, waste and corruption. With regards to the important points developed across the dissertation, we established according to the resource chart the following steps which in term will make the Algerian economy less cursed by its natural resources.

If the economic policy (mainly the fiscal one) is considered as the key feature addressing the "Resource curse", the institutions providing this policy should be able to formulate and implement it. Because of the importance of the fiscal policy, the government may be the centre point of our analysis, but this cannot hide the importance of the other institutions such as those providing control under the executive, like the legislative and judicial power and other public audit controlling the veracity of the state accounts.

Below is a full analysis of policy recommendation to overcome the negative effects of being dependant on natural resources. Thus, include how the Public sector should behave in MENA resource rich countries, some of them are exclusively economic, some other include economic political policies. Nine specific policy prescriptions and institutional changes have been identified from the resource curse literature. There are:

1. The natural resources, particularly minerals and hydrocarbons should be left in the ground;

2. Revenues diversification;

3. Revenue sterilization;

4. Saving and sovereign fund;

5. Good investment policy;

6. Encouraging open trade;

7. Establishing good institutions;

8. Transparency and good governance;

9. Political reforms.

The first six mainly connected to the fiscal policy will be discussed in this current chapter, while we consider as important to analyse first the fiscal policy in rich-resource countries. Then in the following chapter we will develop the economic-political policy prescriptions addressing the "Resource curse".

4.3.1 Fiscal policy in resource rich countries

Fiscal policy in oil-exporting countries faces a number of specific challenges, these challenges mainly stem from the fact that oil revenues, which constitute the bulk of government revenues in oil-centered economies are exhaustible (non-renewable), volatile, uncertain and largely originate from external demand. In particular, as oil revenues, are large and in the most countries accrue to governments, so the fiscal policy choices have a significant impact on economic performance (economic growth, inflation and current account balance.

Fiscal policy in resource rich countries should have the same broad objectives as fiscal policy in other countries. It should contribute to the achievement of macroeconomic stability and sustainable and inclusive growth and poverty reduction, within a framework of fiscal

sustainability, but while the objectives of fiscal policy in resource rich countries are similar to those in other countries, dependence on fiscal resources revenues raises a number of specific issues for fiscal policy that require the adaptation of fiscal frameworks to incorporate the special the special characteristics of these revenues. Thus, create specific challenges in the short medium and long fiscal terms.

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Second, resource revenues arise from the exploitation of resources that are **exhaustible and run the risk of technological obsolescence**. This in turn, raises complex questions regarding intergenerational equity, long term fiscal sustainability and asset allocation. Resource windfalls are publicly seen as a honey pot for development and government in resource rich countries are then under pressure to increase expenditure on physical and social infrastructure or to save them for future generations. The first policy leads to an expansionary policy leads to inflationary pressure that can be constrained only through the fiscal policy on the view of prevailing fixed Exchange rate pegs or tightly managed floats. Whereas the second policy aims to create a fiscal sustainability to maintain the same amount of public goods in both oil age and post oil age without resorting to deficit financing of public expenditure. In other words, how actual and future generations will enjoy the same amount of public goods without bearing a higher fiscal burden in the form of taxation.

Third, **resource revenue largely originates from abroad**, this has a direct implication for the domestic economy, competitiveness and macroeconomic stabilization. The effects of an external resource price boom in developing resource exporters are typically transmitted through fiscal policy, which appreciate domestic currency in real terms – and volatility – and this crowd-out investment in the non-resource tradable sector.

Finally, the exploitation of non – renewable resources can give rise to **large rents, with associated political economy complications. In a number of resource** – rich countries, resource revenue is associated with poor quality spending and rent seeking. Many oil producers that saw a rapid increase in public spending during the period of rising prices in the 2000s are characterized by law indices of government effectiveness and poor indicators of public investment efficiency.

Table 14 highlights as well challenges that may underpin the fiscal policy in resource rich countries.

Table 14 Competing fiscal policies in resource rich countries

	Short term-consideration	Long term -consideration
Calling for expenditure restraint (retrenchment policy)	• Cyclical Curbing inflationary pressure	• Intergenerational equity (Accumulating financial assets) • Fiscal sustainability (Accumulating financial assets)
VERSUS	VERSUS	VERSUS
Calling for expenditure increase Expansionary policy	• Distribution (sharing windfall revenues) • Development (tackling underdevelopment) • Global imbalances (recycling oil revenues)	• Economic Diversification (investing in physical and social infrastructure)

Source: Sturm, Gurtner and Alegre (2009)

As previously explained, four fiscal policies are contradictory in the short run, in one side, distribution considerations due to high oil windfalls that follows public expenditure pressure from public segments, interest group and lobbies) does not allow government to resist to additional expenditure that leads to higher level of inflation, higher public expenditure are also justified by the need to enhance economic development and diversification both in public and private investments. These tendencies are enhanced by global imbalances and the need to recycle oil revenues.

Fiscal policies in resource rich countries may face a conflict between the intergenerational equity and fiscal sustainability that add a pressure to save oil windfall for future generation, that are countercyclical policies, and the need to diversify the economy which in turn is pro-cyclical policy

Chart 1 Features of Fiscal policy in Oil exporting Countries

Oil revenue —— USD ——→ State-oil company

State-oil company —— USD ——→ Government

Government —— USD ——→ Savings (foreign assets in central bank and/or SWF´s)

Government —— Domestic currency ——→ Expenditure (capital and current)

Savings (foreign assets in central bank and/or SWF´s)

Financial channel

Oil revenue recycling

Trade channel

Expenditure (capital and current) → Income of private households corporate↑ profits

Domestic demand (public and private consumption and investment)↑

Income of private households corporate↑ profits → Liquidity in banking system Money and credit ↑

Imports ↑

Inflation ↑

Depending on exchange rate regime and currency movements

Source: Sturm, Gurtner and Alegre (2009)

Chart 1 shows as well the features of fiscal policy in resource rich countries, the export of extracted oil and gas generates a huge revenues, this revenues **accrue to the government** via their oil national companies, oil-revenues represent a major share of the total revenues of the government, as result the fiscal policy take all it importance in oil-exporting countries especially because of the constrain of monetary policy by adopting managed float (fixed exchange rates) or conventional pegs. According to high oil and gas incomes the executive find it hard to argue a restrictive fiscal policy during rising up oil- prices, and generally adopt during this period an expansionary fiscal policy as response to diverse pressures (distribution–related consideration, development–related consideration, global imbalances).

In macroeconomics theory, fiscal expansionary policy is traduced by increasing expenditure as result to increase public expenditure (capital or current), income of private households corporate profits rises which increase consequently the **domestic demand on the form of private and public consumption and investment** (because the non-diversified economy the former induce the **rising of import**).

In other side, the rise of household's corporate profits increases automatically the **liquidity in banking system** (Money and credit).

The underlined aggregates impact negatively in economic system by increasing inflationary rate, which make the economy in main OEC´s pro-cyclical with it devastating effects, as macroeconomic volatility and reduction of growth prospect.

4.3.2 Leave it in the ground

In order to avoid the resource curse, Stevens (2003) proposes that, although it would seem extreme, it is better to leave natural resources in the ground. Stevens´ proposition is informed by the report of Oxfam that claims that oil and minerals export are bad for growth and bad for the poor. The suggestion is not to leave minerals and oil definitely in the ground but to develop them at a slower pace to deal with issues of production and revenue flow. Stevens acknowledges that project economics and discounted cash flow methodology, which underlies project appraisal favours a faster development rate. However, if a country is to address the resource curse problem, then a slower development pace is common sense.

Common sense argues that a slow, steady flow of revenues should be easier to handle than a sudden surge. In that case the revenue management will be easier to deal with; the resource movement effect and crowding out are likely to be less severe. Slow development is likely to allow the development of a service industry based on the project whereas swift development must be based upon imported services.

Leaving the resources in the ground induces to a slow development; this can be seen by investors   as a problem in one hand, and by the conventional terms of the economics of project in the other hand. The author argues that is better to resolve this problem instead a rapid development generating the curse which can threaten the viability of the project because of the political fall-out. For the originators of the "leave it in the ground" the resource curse affect the whole economy by the following transmission mechanism:

1. The curse embodies increase conflict within a country, threaten the project equipment and infrastructure;

2. Government in resource rich countries try to squeeze ever more rent out of the agreement, by the consent of "obsolescing bargain". Thus providing the project is covering its variable cost and making some contribution to the fixed coasts, a loss-minimizing owner will continues to operate even if losses are incurred, this can happened in a cursed countries because first, the curse demands ever greater resources to feed the errors underlying the policy. Second, unilateral agreements inhibit other foreign investment that is often the only constraint preventing the government from being too greedy.

In our point of view, this kind of reforms can be unrealistic, as recognized by Stevens himself, constitutes an extreme solution and cannot be seen as serious for the main following reasons. First, world economy depends from primary commodities, in general and point-resource in particular. Second, technological shocks or discovery of a new source of energy or it substitute will make hydrocarbons obsolete[4].

For that reasons other more realistic reforms are presented tackling directly the management of the resource revenues. One of the most famous consists on the revenue diversification.

4.3.3 Revenue diversification

Economic Diversification is generally taken as the process in which a growing range economic output is produced. It can also refer to the diversification of markets for exports or the diversification of income sources away from domestic economic activities (Zhang, 2003).

In petroleum – dependant economies, diversification is persuading as a process of converting limited and non-renewable oil and gas resources into sustainable development and prosperity (Aissaoui, 2009).

Economic Diversification means heavily reducing dependence on the oil and gas sector by developing a non-oil economy, non-oil exports and non-oil revenues.

There exist a lot of empirical studies which characterize the pattern of sectoral diversification along the development path, the most known and agreed is the study provided by (Imbs and Wacziarg, 2003). The paper studies the evolution of sectoral concentration in relation to the level of per capita income. Its shows that various measures of sectoral

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[4] We mean by the technological shocks the discovery of any other source of energy or its substitutions. For example we can cite a hydraulic fracturing technology, which have opened up greatly increased supplies of natural gas in the US. Psion power, the development of save a cheap nuclear technology or renewable energy such as the battery technology can have a major effect on the demand of oil.

concentration follow a U-shaped Pattern across a wide variety of data sources: countries – following this study – first diversify, in the sense that economic activity spread more equally across sectors, but there exists, relatively late in the development process, a point at which they start specializing again.

There exist four considerations which highlight the rationale of Economic Diversification.

- **Trends in terms of trade and price instability** – Diversification is considered necessary in order to combat poor market conditions, especially worsening terms of trade and price instability for primary commodities, which cause large macroeconomic swings in output, employment, government revenues and investment in the home country.

- **Depletion of mineral resources** – The depletion of the mineral resources that underpin many developing economies raises the issue of economic sustainability. Basic economic logic requires the compensatory building up of other types of capital in order to maintain a non-declining flow of income for future generations. These include physical capital (embodied in manufacturing, hardware, and infrastructure), human capital (health, skills and the ability to learn) as well as natural capital. According to the analysis of (Gelb, 2010), the threat which challenges the oil-exporting countries consists also in technological shocks, which can eliminate or sharply reduce their only comparative advantage, either by creating substitutes or by opening up new sources of supply.

- **Economies of scale and external economies in manufacturing** – Some researchers believe that there are other important reasons why Economic Diversification. One of the most important is the fact that manufacturing offers a greater scope for economies of scale and external economies. Romer´s model highlight that the diversity of intermediate good inputs enhances productivity in the final goods sector (Romer, 1990). Engaging in Manufacturing enables dynamic learning-by-doing gains that raise productivity and income. A related argument is that Diversification exposes producers to a wider range of information, including about foreign markets, and so raises the number of points for potential "self-discovery". Capability in one sector can open the way to others, especially those that use related knowledge (Gelb, 2010). It´s also recommended investing in such "dense" sectors in product space than in products which are in the periphery without clear knowledge, skills or market

relationships with other sectors, in order to create a greater externality. It is also preferable if the country´s export bundle resembles those of countries with higher level of productivity and income, otherwise the country risks being located into low-wage competition with poorer countries (Gelb, 2010).

- **Reduction of portfolio "Risk"** - Diversification also has the benefit of expending the possibility to spread investment risks over a wider portfolio. Greater Diversification will enhance average capital productivity in the long-run by providing better investment opportunities at lower risk. Lack of Diversification leads economic agents to invest in low return, safe traditional products, rather than in riskier projects with higher growth potential. The absence of such possibility will hamper capital productivity in the short-run and capital accumulation in the long-run (Acemoglu and Zilibotti, 1997).

The diversification experience of resource rich countries varied across nations due to the differences in policy design, implementation and the degree of political commitment. In sum, the following factors are critical to the success of diversification:

- Maintaining a good macroeconomic environment;

- Designing a realistic diversification strategy that takes into consideration local conditions and geographic factors;

- Creating well-functioning government institutions to aid the diversification process;

- Adopting policies to mobilize financial resources and support of the general public;

- Building adequate physical and social infrastructure to support diversification efforts.

In general, it doesn't exist one way how to make the economy of rich – resource countries more diversified; each country may enhance some of the economic sectors where they can generate a value added to them economy, some countries such as Indonesia invests more in human capital, develops new agricultural methods and rise up from the agricultural sector. Some others have experienced other ways for diversification.

As mentioned above diversification may need the maintaining of a good macroeconomic environment (macroeconomic stabilization). As developed above the main way to attempt this

objective is to manage the revenues streaming from the export of primary commodities (the fiscal policy) this can be possible by **sterilization, saving** or **investing** those revenues.

4.3.4 Revenue sterilization

The economic theory from the neoclassical point of view, argues that the key policy to avoid the negative impact of resource curse is the macroeconomic policy adopted by the government tending to neutralize the impact of the large expenditure on the rest of the economy. Revenue sterilization are applied when oil windfall is highly invested in a domestic economy when oil prices are high. It can be also applied once oil prices are down that lead the government to borrow from abroad to fulfil its fiscal tasks.

A scholar debate has been raised around how the resource windfalls must be managed, this debate has been initiated between two main tendencies, one leaded by the World bank and the other by Latin American structuralists. The world bank group insists on the fact that government intervention should stem mainly in accordance with the primacy of the market forces, government intervenes to assist structural changes as an answer to market failure. Structuralists, argues that resource rich countries have a gap in term of infrastructure which ask the government for to intervene more often in the economy.

Revenue sterilization are the minimal government intervention to restore the Exchange rate at the equilibrium level. It i also considered as being a tool to sharp price fluctuation in commodity markets Auty and Mikesell (1998a). this may require (Stevens, 2002):

- Government resistance to spending pressures and the accumulation of;

- Budget surpluses on capital accumulation or establishing fund and channel the revenues from commodities sector to the fund.

The short – run management of volatile resource revenues can pose a challenge to coordinate monetary and fiscal policies, fiscal policies in this field plays a key role:

- If the government saves a resource windfall abroad, for example in a sovereign wealth fund, or spend them on import, there are no domestic implications, and currency appreciation is likely to be limited.

- If the government saves the windfall domestically, placing deposits with domestic banks or repaying domestic debt, this will in turn increase domestic liquidity. The move could well be expansionary and inflationary; this will depend on what the

banks and others do with the additional resources and the degree of capital mobility.

- If the government repays domestic debt, and the central bank sterilizes the liquidity injection, this transfers the public debt from government debt to central bank debt, central banks then resort to sterilization to reduce the threat of inflation and currency appreciation, sterilization in this case involves the use of open market operations to absorb liquidity. Consequently, government interest costs will go down, but a rise in central bank interest costs will be reflected in lower profit transfers from the central bank to the government. The central bank could also raise reserve requirements to reduce liquidity, but this policy would be effective only to the extent that there is no excess bank reserve.

Comparing the case of Indonesia and Mexico is one of the best historical economic argument in favour of resource revenues sterilization. According to Unsui (1997). Mexico has adopted large expansionary fiscal policy for an aggressive investment the Mexican government accelerated public spending by heavy foreign borrowing. Consequently, the Mexican expenditure was strongly biased toward investment in the oil sector that accumulates the external debts in the short run with the need to only finance the current account deficit which are largely attributable to fiscal expansion and capital flight. While Indonesia always accumulates budget surpluses under the principal of the balanced budget. The Indonesian government wisely avoided the expansionary effects potentially to be brought about by the abundant oil revenues, as the Indonesian budget expenditure was more balanced and went largely into non – tradable sector with a small external borrowing by maintaining a conservative stance of its foreign borrowing strategy. Finally, both countries, Mexico and Indonesia devaluated their domestic currency during oil booms, but Mexico failed to sustain the devaluation effect due to an inappropriate economic management.

High foreign borrowing appreciates the exchange rate and contributes directly to the Dutch Disease, to avoid this situation two main options can be applied:

1. Invest all oil windfalls offshore – this is in order to avoid a fixed exchange rate when domestic inflation of any magnitude exists, the sterilization of the oil revenues can only delay the real appreciation but not eliminate it, in this case , it is highly recommended that the full amount of the transfer of windfalls are invested offshore there will be no effect on the balance of payments – outflow are exactly equal to

inflow-which means no effect on disposable income, the real appreciation will be avoided till the repatriation of the income from the offshore investment begins.

2. Devaluation of the currency – a perquisite to this policy is a good macroeconomic managerial policy, the devaluation has no effect on the real exchange rate and impacts negatively the price of imported goods and is politically very unpopular.

As already mentioned, the revenue sterilization can be also embedded by establishing funds, following part will analyse the option calling to establish Sovereign and stabilization funds.

4.3.5 Saving (stabilization) funds

Many resource rich countries have established resource funds in response to the challenges and complications that resource revenue poses to fiscal policy and asset management. In some of these countries, the fund is a part of fiscal rule and guidelines. These funds have been established in order to reach objectives such as fiscal and macroeconomic stabilization, saving, budget financing and national development and portfolio management. As saving and stabilization funds are public sector institutions, this part has been broadly discussed in the economic-political recommendation heading resource funds.

4.3.6 Investment policy

It has been confirmed that establishing SWFs will save resource windfalls and avoid macroeconomic instability and save the resource wealth from spending volatile revenues. Simultaneously, recent surges in resource revenue may this provide a valuable source to finance public investment, which is essential for economic development (Berg et al, 2013). (IMF, 2012) confirms that resource-rich developing countries experience poverty headcounts in excess of 55 %, human development indicators in the bottom 50 %, and less than 30 % of the roads are paved. Whereas, public investment in resource rich developing countries is likely to be inefficient, with high absorptive capacity constraints, and weak tax systems.

The efficiency of public investment depends on institutional factors, such as the capacity to implement, select and evaluate projects. These features are also strongly linked to the business climate, corruption and the availability of skilled human capital.

The impact of public investments in resource rich countries, and particularly in creating infrastructure and human capital has attracted a lot of research interest as the stock in infrastructure are often constraints to growth and development (Servén, 2007; Calderón and

Servén, 2014). This view has been supported by Rajaram et al. (2014) who stated that public investment is key realizing the potential developmental for extractive economies to broad based growth and improve social welfare. So that weakness in public investments can undermine one of the primary argumentations for higher investment. It has been also noticed that developing resource rich countries tend to have weaker Public Investment Management (PIM), evidence is provided in the following three studies:

- The World Bank Group found out that PIM are short in developing resource rich countries due to capacity and political constraints (Rajaram et al., 2014) and this is due firstly to high volatility, secondly, as those countries are continuing to use traditional budget financing, thirdly because of large public investment are applied in relation with the size of the economy (congestion and crowding out effects) and finally because of very rapid scaling up and cutting back.

- It has been also found out that institutional environment supporting PIM stages such as project appraisal, selection, implementation and then evaluation are not efficient as only a half of public investment effort in a sample of 52 resources rich countries are translated into actual productive public capital (Dabla-Norris et al. 2011).

- In other study (Albino War et al. 2014) stated that developing resource rich countries lag behind the best performers on all three public investment efficiency measures. Thus, they found out that those countries with better institutions can play the key role in fostering the efficiency of public investments.

For poor country with a finite reserve horizon for its natural resources, the critical decision when designing its fiscal policy is to answer the question **how much to consume and how much to save and invest.** Three distinct fiscal frameworks have emerged as policy prescriptions (Collier et al., 2009; Collier, 2011; Collier, 2012; Ghura, Patillo et al. 2012) those are known as Permanent Income Hypothesis (PIH), the modified PIH and the Fiscal sustainability Framework (FSF) those are explained as following:

- *Permanent Income Hypothesis PIH* – the PIH implied for a country with only resource revenues, the intertemporal budget constraint is satisfied when the yearly spending (i.e. the non-resource primary deficit) is limited to the eternal value of resource wealth (i.e. the present value of all future resource revenue). The PIH does not distinguish between current and capital investment (Baunsgaard et al., 2012). The most extreme approach for the PIH is the so-called bird in hand approach which suggest that all resource windfalls should be transferred to a fund and only the interest from these funds should be invested.

- *Modified PIH* – the PIH approach has, however, been criticised for setting benchmarks that are too tight for capital scarce resource rich countries, consumption- spending/ investment path is not optimal for resource rich, low per capita income and capital constrained countries. In response to this critique, two alternatives to the traditional PIH approach have been developed, the modified PIH allows for an initial scaling up of spending to meet immediate demands in poor countries, including both for consumption and public investment. However, fiscal policy remains anchored to an estimate of long-term sustainable use of resource revenue, although spending can be front loaded and financed through a drawdown from resource revenues, thereby reducing spending in future years.

- *The fiscal sustainability framework (FSF)* – aims to stabilize net resource wealth over a longer term than PIH similar to modified PIH, the FSF also considers the inter temporal budget constraint. Although it allows for an actual drawdown of government wealth accumulated from the natural resources. The rational for this drawdown is that public spending can be stabilized at a higher level because growth enhancing domestic public investment (e.g. in infrastructure and human capital) will have fiscal returns in the form of larger non-resource revenues. Moreover, it is frequently argued that some frontloading of consumption spending to benefit the current poor may also be welfare enhancing as their marginal utility of consumption is assumed to be higher that that of future potentially richer generations. Hence, the principal challenge for resource rich developing countries is how the depleting resource wealth can be transformed into a range of other assets that will support continued development. Therefore, attention to the quality of public investment is crucial. Table 15 summarizes features of the above-mentioned policies.

The golden rule has been established by Cherif and Hasanov (2013) which consists on a measurable precautionary saving (about 30 % of initial income) notice that oil exporters and by extend resource exporters, face high income volatility and have sizable saving but relatively low investment. Using a mathematical model, they establish the "Golden Rule" which consists on a sizable precautionary saving, about 30 % of initial income. In addition, the tradable sector plays a paramount role in investment-saving dynamics. Tradable volatility determines the level of precautionary saving and investment, and the productivity of investment in the tradable sector significantly affects the optimal investment rate. If the productivity is high enough, the investment rate increases substantially from about 15-20 percent to about 50 % of initial income. If, in addition, the investment rate in the tradable sector affects non-tradable production, the optimal investment rate is even higher. The

productivity in the non-tradable sector is not important for aggregate saving and investment dynamics. Improving productivity in the tradable sector is crucial for sustained growth.

Table 15 Fiscal framework for resource rich countries

		Indicator/framework	Definition/objective
Fiscal policy indicator		Overall fiscal balance	Total revenues minus total spending. Indicates net financial position (i.e. whether government is accumulating or reducing financial wealth). This indicator) is also useful to assess financial vulnerability
		Non-resource primary fiscal balance	Overall fiscal balance, excluding resource revenues, spending associated with the development of the resource sector, and interest payments. Useful to measure the fiscal stance (i.e. whether fiscal policy is being pro cyclical or counter cyclical). It can help to delink fiscal policy from revenue volatility
Fiscal policy anchor/rule	**Resource horizon**		
	long	Price based- rule	Aims to determine expenditure levels on the basis of smoothed resource revenue for a given fiscal target.
		Expenditure growth rule	Sets a limit on the growth of government spending useful to limit the pro-cyclicality of the fiscal policy and I cases of absorptive capacity constraints
	short	Non-resource primary balance rule	Set in line with long term sustainability benchmarks and calibrate in the short term depending on cyclical conditions.
Long term fiscal sustainability benchmarks		Modified PIH	Deviate from the traditional PIH by allowing a scaling up of investment over the medium term but followed by a scaling down of spending after the scaling up period in order to preserve net financial wealth at the PIH level. It does not consider the growth impact or emplacement and recurrent cost associated with additional investment
		Fiscal sustainability Framework	Based on a debt sustainability framework. Aims to stabilize net resource wealth (over the longer term) at a level lower than the PIH, or the MPIH, would imply, while allowing scaling up of expenditures. Considers the growth impact and the replacement and recurrent associated with additional investment

Source: (Ghura and Catherine Pattillo, 2012)

Cherif and Hasanov (2013) provide an optimal policy prescription:

- If productivity in the tradable sector is low, a build-up of sizable buffer-stock savings is necessary to mitigate negative persistent income shocks that might

occur in the future; moreover, a growth-risk trade-off applies a relative low optimal investment;

- In case the productivity is high, low buffer-stock-savings and higher investment would be optimal;

- Spending policy should be conservative as the optimal MPC (Marginal Propensity to consume)[5] out of permanent shocks below one and the MPC out of temporary shocks is much lower.

It has been also suggested that this policy should focus on improving productivity in the tradable sector and reducing volatility through developing and diversifying this sector. This represents an optimal solution for sustained growth and lower precautionary/buffer-stock saving needs, increase investment, raise consumption, and improve utility.

Investment policy is a part of a global spending policy, spending resource rent contains private and public consumption which occur their benefit in the short run, public and private investment and saving resource rent those in opposition occur in the mid and long run, the following chart shows the mechanism of spending resource rent as well and their time profile and benefit with what we will conclude the current sub-chapter.

Chart 2 The overview of public spending in resource rich countries
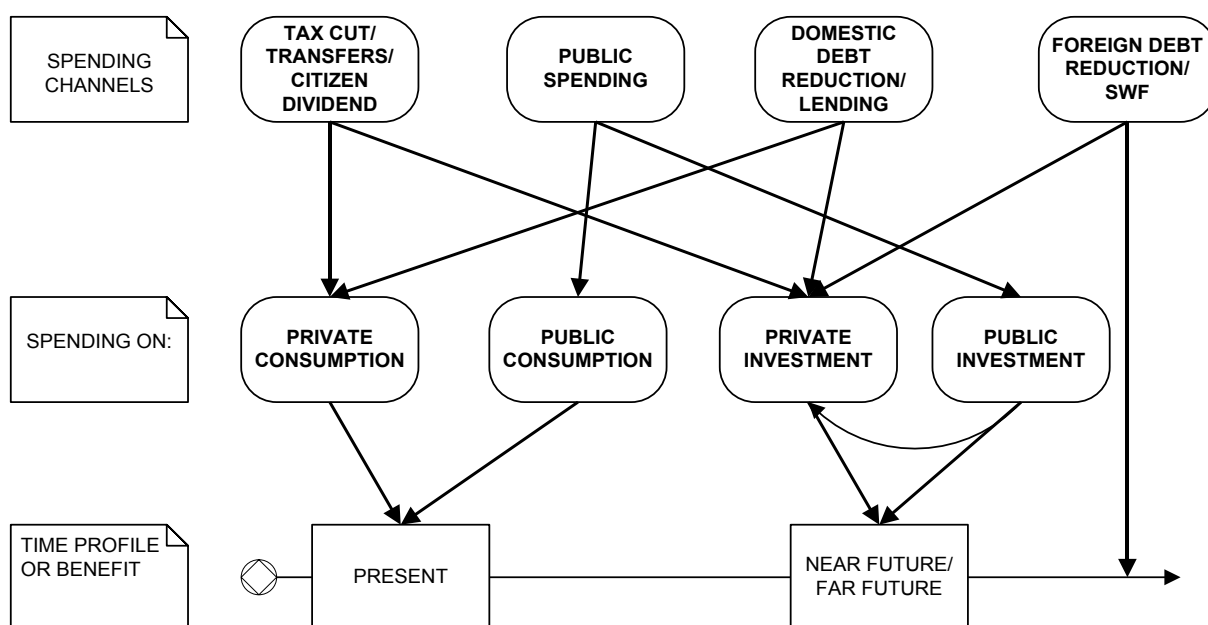
Source: Natural Resource Charter (2014)

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[5] Measures a change in consumption if the government has received revenue windfalls or income has been hits with a permanent negative or positive shock.

Above analysis was about how to invest public means in the way that it will bring a benefit for resource rich countries, this in turn should not hide the importance of the private sector as it is known from public economics that the public sector relieves to private sector failures, this is not the case of Middle East and North African countries. Thus, a sustained economic growth should be driven by the private sector, the private sector has been central in all countries that have grown strongly over long periods. International experience indicates that replying on state owned enterprises to enhance employment and investment has never been a sustainable substitute of the private sector – because no government has been able to expose publicly owned to real competition and hard budget constraints. This has been the experience across the Middle East and North Africa (MENA) region as well. Governments have realized that the model of state-led development used in earlier decades yielded economic stagnation and consequently created a need for establishing a new model. Challenge for policy makers will be to align incentives of profit maximizing that characterize the public sector with social objectives of shared growth and job creation as the private sector is unable to achieve what the public sector is able to do – growth requires public investment in education, knowledge, and infrastructure. Thus, does not crowd out private investment. Together with other characteristics such as market openness, stability, good governance, and visionary leadership are common characteristics of economies that have been able to grow fast over the last few decades.

Sustained growth in MENA will require more private investment, higher productivity of firms and greater diversification, the latest have a greater importance especially in countries rich in natural resources and will be discussed as well latter on in this chapter.

The role of government policies in ensuring a business environment conductive to private-led growth is central. The role of state and regulatory institutions to ensure proper functioning of private market is also a key one. Policy makers should re-examine roles of markets and government, the need for a stronger government role should not imply relaying the leadership of the private sector to the second position, but market regulatory institutions are crucial to ensure an orderly functioning of market to serve both private and public objectives. Whereas, the Public- Private relationship in the MENA region is a story of mutual mistrust[6], the private sector is perceived by officials as being rent seeking and corrupted, bribing of civil servants, lobbying for special benefits and tax exemptions, hiding of revenues and salaries to avoid tax

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[6] Interviews were conducted by the World bank group with MENA Public sector officials 60 percent of them believe that the Private sector is corrupted and rent seeker, 21 percent claimed it is dynamic an percent think that private sector is transparent and law abiding.

obligations, and non-transparent corporate governance. On the private sector side, the Public sector is perceived as a bottleneck for better investment climate for all business kinds, acting only for the benefits of politicians. The role of the Public sector in MENA countries is challenging especially in resource rich countries.

4.3.7 Encouraging trade openness

The resource curse theory does not delve into a practicalities, rules and complexities of international trade. It merely assumes that all preconditions for smooth trade exists in a free market without political constraints and barriers and recommends open trade. The literature on natural resources is fragmented and does not provide a comprehensive account of the effects of trade on the allocation of the resources and on their long-run sustainability. Otherwise the existing trade theory of natural resources shows that the traditional prediction that trade reflects comparative advantage also holds when the specific feature that natural resources are exhaustible is explicitly taken into account. However, traditional assumptions about the overall gains from trade hold true only under certain assumptions, such as the absence of externalities and imperfect competition. Trade may not necessary generates overall gains when the negative effects on extraction of natural resource. Some specialists such as Arezki and Van Der Ploeg (2007) insist that the natural resource curse is less severe in countries with less restrictive trade policies because open trade policy – and here they show the channels-aimed at more exposure to foreign competition and transfer of technology, managerial skills and know-how from abroad might turn the resource curse into blessing. In the opposite side, exists some specialists such as Winters (2003) argues that while trade liberalisation certainly helps, first there must be trading infrastructure that facilitates exporters and importers to take advantage of open borders but if infrastructure is not in place, then open trade does not help. This argumentation is comforted by Hallak and Levinsohn (2008) who surveyed literature on this issue observe *"unfortunately, the attempts of a long literature looking at cross-country evidence have failed to provide a convincing answer, several studies find an empirical connection between openness and growth, but they tend to suffer from basic methodological short coming. Recent studies address these shortcomings but, once they do, they no longer find a robust empirical relationship between openness and growth."* And they conclude that *"there is no significant causal connection between openness and growth."*

We have already analysed the importance of the fiscal policy in countries where the economy is based on the export of the primary commodities. The management of the resource windfalls may be a challenge for policy makers, the reforms showed above can be mixed for

example; the strategic aim consists on the diversification of the economy from the export of the primary commodity such as hydrocarbon and minerals, such strategic objective can be attempted by first the identification of sectors which can constitute a comparative advantage in term of international trade but in the same time value added to the national economy. For that reason, public investment is the key feature enhancing any process of diversification, the investment answers the question; where the resource revenues should be invested in order to generate for the economy new revenues other than those from the primary commodity. Huge public investment bill as advised by the macroeconomic theory crowds-out the private investment and does not promote a sustainable growth, for that reasons the curse theorists recommend an optimal rate of investment using the Hotelling rule and the Hartwick rule because in one hand, the economic scarcity in some developing countries need investment in infrastructure and in human capital which are essential for the strategic diversifying objective. Investing more the accruing revenues from commodities challenge the absorptive capacity constraints, in this case the need is to sterilize those revenues by saving them in a sovereign funds (saving, stabilization or financial funds) according to the aim of their establishment. All these policies combined may make less severe the effects of the resource curse.

Literature tackling the resource curse is divided on both causes and cures, although there is a growing consensus that essentially it has something to do with governance and the answer lies more in political economy than macroeconomic analysis. Hence, the key question is not what was done in term of policy decision? But, rather, why was it done? The former question opens the way to analyse one of the pillars of the resource curse theory. Some theorists claims the double diversification; the Economic diversification being already discussed, and the "*Political diversification which encourages growth in a similar way by redistributing political power from narrowly based ruling elites to the people, thus in many cases replacing with democracy and pluralism an extended monopoly of sometimes ill-gotten power. The essence of the argument is the same in both cases: diversify pays*" (Arezki et al., 2011). The following chapter will answer the economic political reforms as well.

4.4 Results discussion and main recommendations from economy political perspective

In studying the role of natural resources in economic growth, it was not enough to show evidence that a relationship exists between these two factors it is important then to investigate the mechanism that link resource dependence to poor economic performance. These mechanism, as explained before are shared into two groups, economic and political economy

explanation. Economic reasons have been already tackled and policy recommendation provided to address them as well so that this part will focus on political economy aspects of the resource curse. The political economy transmission mechanism leading to the resource curse are traced to rent seeking, weak institutions and corruption. Before we review this causal mechanism, it is important to ask whether are uniquely present for resource rich countries or if they are endemic to poorer countries in general. For political factors such as rent seeking and corruption are endemic to many poor economies whether they have natural resources or not. However, the predominant view in rentier state theory is that natural resources economies experience a higher level of such factors than non- resource economies. The evidence has been provided by the study of (Di John, 2011).

When people seek to political rent s when they try to obtain benefits for themselves through their political influence, this lead to the so-called rent seeking of Political Dutch Disease (Lam and Wantchekon, 2003) Many economists, such as Gylfason (2001), Hodler (2006), Iimi (2007), Deacon and Rode (2012), argue that in some countries, the windfall of resource revenues increases the power of elites, who have the capacity to enlarge income inequalities. Elites and powerful groups generally take a large share of these revenues and distribute it for the benefit of their immediate circles rather than investing them to enhance the public welfare such as infrastructure or sustainable economic development.

The role of institution in determining how natural resources affect economic growth has been a point of divergence in the resource curse literature these are summarized in the below three points:

- Resource rents negatively impacts the quality of institution - Resource rents are thought to bring not only conflict but also corruption and downward pressures on institutional quality (Arezki and Brückner, 2011) found out that the increase in oil rents significantly increases a political risks of higher corruption score especially in countries where the government participate more in oil production.

- Natural resource rents may hinder a country's transition to democracy, because they increase the incentives and ability of autocratic leaders to retain power. Such leaders are more prepared to use repression or other means to avoid having to democratize or to avoid losing power if they are compelled to hold elections. According to Ross (2001) and Mc Ferson (2010), authoritarian regimes in resource rich countries relay more on resource rents than tax revenues, this weaken public demand for democratic accountability.

- Mehlum et al. (2006) and Mavrotas et al. (2011) argue that institutions are decisive for determining whether resource revenues bring curse or blessing. The difference in growth performance among resources rich countries is attributed primarily to how their resources are distributed through institutional arrangements. Sarmidi et al. (2014) argue that as institutional quality improves, the negative effect of resource abundance on growth should dissipate.

Institutions are a key variable in mediating the effect of natural resource rents on development. Institutions constitute rules of the game that influence the positive and negative effects of resource rents and their relative dominance in both centralised and decentralised political economy models of the resource curse. For the above explained reasons, we highly recommend to government in resource rich countries to establish and perform good institutions, transparency when dealing with the public budget in general and resource revenues and follow standards for better governance in a wide range of Special fiscal Institutions SFI

4.4.1 Special Fiscal Institutions SFI

The implementation of SFIs should be considered within the context of the broader Public financial Management. In order for SFI to be used effectively, a strong and well developed Public Financial Management system with strong internal controls is considered to be a perquisite to good SFI. International Handbook of Public Financial Management, (Corbacho and Ter-Minassian, 2013) stressed on (i) the critical importance of consistency between the budget and the fiscal rule, (ii) appropriate recording and corrective action during budget execution and (iii) adequate and transparent enforcement mechanism. No matter how perfectly fiscal rule is designed, the most important stills how strong is the PFM as the rule will lose relevance and credibility. In addition, it has been argued that more advanced forms of budgeting, such as a medium expenditure framework, may not only help expand the investment planning horizon by connecting annual budgets to medium term policies but also improve the effectiveness of fiscal rules, as budget horizons need to extend beyond a single year, and strong monitoring and compliance procedures are required.

Most of MENA countries including Algeria lack a PFM system and public administration competency to design and implement a sound fiscal strategy (Dabán and Hélis, 2010). A study that analyses the dimension of public expenditure and financial accountability framework scores found that oil producing economies did not perform as well as non-resource rich developing countries (Andrews et al., 2011) this situation of poor PFM performance is

exacerbated in fragile states where there is a gap in human capacity which may affect a PMF system and other institutional reforms. Therefore, if SFIs are implemented in resource rich countries, in is likely to be in a context where institutions and PFM systems are weak, and where the basic internal controls are not in place. Indeed, in countries where there is no political will or commitment to fiscal discipline the risk is that the rule may be broken. This requires further political engagement in the way to control expenditures in the way it was designed within the SFI. The risk of breaking rules in resource rich countries are higher as there is a potential lack of accountability between decision makers and citizens. Resource rich countries exposed to this risk are those with weak institutions, low levels of democracy, deep social division and high political instability (Humphreys and Sandbu, 2007). This is seen in countries with:

1) A large part of the society is suffering poverty with high discount rates,
2) Small groups or elites can be politically powerful and affect the public choice,
3) Governments have the monopoly to finance patronage networks to increase their support base,
4) The population has limited participation in the policy making process due to low education and lack of transparency.

This part of the thesis suggests that policy makers have a number of options to consider regarding the correct implementation of Special fiscal institutions in the context of managing natural resources (Sharma, Strauss 2013):

1) Identify requirements for the best implementation of SFI and decide about the right time to implement them,
2) To begin first with policy guidelines that help to enhance the fiscal discipline then to establish fiscal rules, this is to benefit from a learning process,
3) Then design and implement an SFI and learn what works through an iterative process.

SFI should be implemented keeping in mind their main objectives, here in, macroeconomic stability, reducing price volatility, increasing investment efficiency and constraining expenditures. Within the broader fiscal framework, there is several types of SFIs that can be implemented separately or by combining them. Here we can cite, fiscal rules, resource funds, fiscal responsibility laws and fiscal advisory councils. Below discussion will analyse them shortly.

4.4.1.1 Fiscal Rules

Fiscal rules are defined as standing commitments to specified numerical targets or ceilings for some key budget aggregates. Unlike fiscal rules, fiscal guidelines are not legally

obligatory. In resource-rich countries fiscal rules or guidelines are often motivated by a desire to reduce the procyclicality of fiscal policy in the face of volatile resource revenue, and to promote savings and sustainability. Often, fiscal rules have been motivated by political economy factors: they have been seen as potentially useful instruments to address spending pressures or to enhance the credibility of the government. Fiscal rules are typically defined in term of an indicator of overall fiscal performance. In general, there are two different sets of fiscal rules, first, restrictions or rules on the procedure by which fiscal decision are made, second, quantitative constraints on fiscal policy. Many countries have combine both sets when implementing their fiscal rules.

The choice of fiscal rules depends on whether a procyclical or counter cyclical fiscal stance is taken, historically most resource rich countries preferred procyclical, once the budget institution, political and economic indicators have significantly improved most of resource rich countries moved toward counter cyclical fiscal rules. Rigid fiscal rules were have been always been changed or eliminated particularly during external shocks that shift priorities to increase pressure for more spending. This in turn is a lesson to indicate some degree of flexibility when designing a fiscal rule in developing resource rich countries subjects for shocks, shifting priorities and spending pressure.

Fiscal rules can be procedurals and numerical, procedural fiscal rules are those which stipulate principles and practices of transparency and accountability that should guide the design and implementation of fiscal policy, they help to ensure that policy rules are well executed raising by this way their predictability and increasing transparency of the budgetary process. Procedural rules include the budget hierarchical budget formulation process clarifying responsibilities of for example the ministry of finance and other line ministries; transparency requirements. Procedural rules are very important in creating consensus for fiscal reforms and provide power to instances who are responsible to deliver fiscal discipline, and they raise the accountability of voters. In the other hand, Numerical fiscal rules, are several however, those targeting the budget balance, or the current balance are not that suitable for developing resource countries as they are pro-cyclical policies (Ossowski, 2013). The most suitable numerical fiscal rules include the non-resource primary balance rule, non-resource current balance rule, price-based rule, structural balance budget rule, expenditure rule.

4.4.1.2 Resource Funds

Sovereign wealth funds are becoming popular tool for managing natural resource wealth, the aim of establishing SWFs is not to increase the country's wealth assets but to shift them into foreign exchange assets.

Many resource rich countries have established resource funds in response to the challenges and complications that resource revenue poses to fiscal policy and asset management. In some of these countries, the fund is a part of fiscal rule and guidelines. These funds have been established in order to reach the following objectives:

Fiscal and macroeconomic stabilization – as discussed previously, resource windfalls are highly volatile and uncertain and this in turn impact negatively a macroeconomic and public finance stability, so that establishing stabilization funds helps governments to manage budget volatility and uncertainty.

Savings – oil and minerals resources are exhaustible and run the risk of depletion and obsolescence so that saving funds aim to turn at least part of the country's resource wealth into other forms of wealth that may benefit for future generations.

Budget financing – this objective includes stabilization and saving funds, a few of them are aligned with fiscal balances: they receive budget surpluses, and finance budget deficits.

National development and portfolio management – this includes several cases. Some resource rich countries have created resource funds as separate entities with authority to undertake domestic investment or otherwise spend off budget for public policy purposes; many recent funds have national development as an objective, which may combine with stabilization and/or saving aims. Some other governments have allowed their funds to invest in domestic financial assets in commercial area as a part of their portfolio management strategies or with dual commercial/policy objectives.

As cited above, the fund can take the form of stabilization, saving or financial in the following part we are going to analyse the differences between those forms of funds.

Stabilization funds aim to reduce the short-term impact on volatile resource revenue on the budget and the economy they are also used to support fiscal discipline most of these funds have rigid price – or revenue contingent deposit and withdrawal operation rules. Deposits and withdrawals depend on the realization of an outcome (resource price or revenue) relative to a specific control mechanism. In some cases, the entire excess revenue relative to the revenue computed at the level of the benchmark trigger is mandated to be deposited in the fund; in others, this is only a specified share and the same applies to permissible withdrawals. In some

funds, limits are placed on the total accumulation of fund assets. The operational objective of stabilization funds is to reduce the volatility and uncertainty of resource revenue flows to the budget, this in turn facilitate the decoupling of budget expenditure from changes in revenue flows and save resources that can be used later when prices fall. When the resource prices are high, the expectation is that making deposit in the fund and therefore making those resources unavailable to the budget and contain spending. When prices are low, the fund is expected to act as a damper (via the transfer of assets to the budget) to face unpredictable fiscal adjustments. Noticeable, is that establishing stabilization funds does not eradicate the negative effects that raised from the volatility and uncertainty of oil funds but transfer that volatility and uncertainty from public budgets to a given fund.

Two types of contingent mechanisms are applied for the accumulation of assets in stabilization funds; rules contingent on resource prices or revenues that are specified in advance (fixed or through a formula), this kind of rules are applied in Chile, Russia, Sudan, and Venezuela. Rules contingent on the difference between the price (revenue) set in the budget for the current year specified on ad hoc basis or through a formula and the actual price (revenue). This kind of rules are applied in Algeria, Bahrain, Iran, Libya, Mexico Oman and Qatar.

Saving funds – as discussed earlier, saving funds are dedicated to store wealth for future generation, they typically have rigid noncontingent operational rules in the form of a specified share of resource or of total resources, into a fund. Rules for withdrawals vary and are not clearly specified and sometimes used for stabilization purposes as example for early or current saving funds are Angola, Azerbaijan, Chad, Ecuador, Equatorial Guinea, Gabon, Iraq, and many others. Furthermore, we should also mention that sometimes, saving funds may play the role of stabilization funds in case of sever recessions and catastrophic events.

Financial Funds – differently than funds discussed above, financial funds have flexible operational mechanisms aligned with overall fiscal balances. Their operational objective is dedicated to finance public non-resource budgets to balance them. Unlike stabilization and saving funds, financial funds do not try to discipline expenditure through the removal of resources from the budget, flows and out-flows depend on the resource revenue first, then on macroeconomic conditions and policy decisions embodied in the non-resource fiscal stance. Furthermore, financial funds have no spending authority in the way that all expenditure is on budget. Financial funds provide an explicit and transparent link between fiscal policy and asset accumulation.

Establishing Stabilization, saving and financial as it was previously explained helps governments in resource rich countries to decrease the real exchange rate, volatility and the negative effects of the so called Dutch Disease as they allow to place resource revenues abroad during booms. Their establishment allows governments to create a stock of liquidity assets, as an element of self-insurance. Funds may seek for greater transparency and can be useful to improve the public management of non-renewable resources. In the same time, it can be an element of opacity, for example, if the assets accumulated are from the government's borrowing and not from the exported resources. With regards to the general rule; more adding institutions and extra accounts to a fiscal system may in practice hamper transparency and budget management efficiency; this issue depends from institutional level.

Scholars, although the positive results of the establishment of resource funds are divided into pessimistic and optimistic, this opinion divergence on point of view are summarized as well in the following Table 16.

Table 16 Argument pro and against the establishment of Sovereign Funds

Pro	Against
Funds can help to avoid rent seeking and corruption and create a focal point constituency for proper management of the revenues	Funds are no guarantee of an appropriate fiscal stance and indeed are no substitute for sound fiscal and macroeconomic management
Allows the significant accumulation of assets for future use	Public knowledge of how much is in the fund, creates serious pressures for more to be spent
They can help avoid revenue volatility by absorbing fluctuations in the price of commodities	The rules governing the operation of the fund are changed to suit political circumstances, and present a temptation to corruption and fraud
Funds can improve fiscal policy impact by defusing spending pressures by sterilizing revenue inflows when prices are high	Control of the fund endows considerable "Patronage" that may lead to the entrenchment of the regime
Funds may keep revenues out of "kleptocratie" until emerging democracies	Gives a false sense of security which may undermine the basis need for real fiscal discipline

Source: Stevens (2008)

Although the drawbacks mainly connected to management policy, the establishment of SWFs bring benefits to their owner according to several statistical evidences. Sugawara (2014) finds out that their establishment in resource rich countries is associated with the reduction in the expenditure volatility at 13 percent lower than countries without funds. Gunes (2013) attests that recently a group of countries have graduated from fiscal procyclicality, 1/3 are resource rich countries which have a stabilization fund in place. Rutland (2013) highlights that resource rich countries have the possibility to diversify their wealth and avoid the Dutch disease (the combined influence of two main effects: first, the appreciation of the real exchange rate caused by the sharp rise in exports and second, tendency of a booming resource sector to draw capital and labour away from a country´s manufacturing and agriculture. More recently Mohaddes and Raisi (2017) find out that the impact of the commodity price volatility is less severe if a country has a SWF and better institutional quality. In other terms, more stable government expenditure. Tsani (2015) states that resource funds may support policy making and strengthen governance and institutional formations not only in countries with good governance and institutions but also in countries which lag behind in the latter.

4.4.1.3 Fiscal Responsibility Laws

Fiscal responsibility Law (FRL) is the broader framework that contains all fiscal rules; FRLs are have a strong legal framework that is very difficult to reverse. FRLs are defined as a is a limited-scope law that elaborates on the rules and procedures relating to three budget principles: accountability, transparency and stability (Lienert, 2010) these laws enhance fiscal discipline by forcing government to declare and commit to a transparent, predictable and credible, fiscal policy that can be monitored and judged by other stockholders, FRLs are highly recommended as they may survive to political changes comparing to regular fiscal rule, which is important as a political change may undermine the credibility of previous regular fiscal policy. As the legislation is costly and difficult to revert.

As for fiscal rules, Fiscal responsibility laws may be procedural or numerical. The latest is less common, FRLs are used to address the systemic problems for fiscal policy making and are identified by (Allen, 2012):

- Issues connected to time inconsistently, when policy makers intentions ex ante differs from ex-post incentives;
- Issue connected to provide long term vision for policy makers as they discount the long-term consequences of their current policies,

- To enhance collective actions, as policy makers favour sectional over collective interest,

- Information asymmetry as the policy makers are hiding the result of their action from the public

- Principal agent when policy makers have different incentives from budget agents and,

- Exogenous shocks as such legislation may be disrupted from unexpected events.

To address such issues FRLs should include first, legislated broad principles to guide the formulation of fiscal policy, Second, to include short, medium and long-term perspectives for rolling budget plans and fiscal policy. Third, effective budget mechanisms and procedures designed to minimise deficit mistakes. And robust transparency requirements and public oversight mechanisms.

FRLs can be applied to national governments in general, or specifically to supranational governments or public enterprises. FRLs may contain retentions and clear sanctions for non-compliance that can be either institutional (withholding transfers or imposing credit restrictions) or personal (for example dismissal, penal prosecution or imposing the fine). The implementation of FRLs should be monitored by independent fiscal advisory councils in charge of providing advice and monitoring fiscal developments.

As mentioned before a FRL should be adopted if there is a strong political support and an existing PFM, weak institutions and poor implementation may undermine the credibility of such laws. As this is the case for almost all MENA countries, Algeria in Particular, an implicit policy guideline or a fiscal rule are sufficient to initiate such laws this with time can be developed after several adjustment (learning process) to be finally spread as a FRL with regard to country specific legal precedents and cultural traditions.

4.4.1.4 Fiscal Advisory Councils

Fiscal committees or advisory council are temporary or permanent advisory bodies generally linked to the ministry of finance responsible for specific, narrow tasks such as providing advice on institutional changes or investment of SWFs, their recommendation could be binding or not for the government. Their establishment can be a radical institutional solution to establish them as a fiscal authority. Members can be unelected officials, for a fixed period of time, accountable to Parliament and responsible to provide a set of targets that should be followed by the government. There is a softer version of fiscal Advisory Council that is responsible to provide non-binding recommendations to governments. In general, fiscal councils are a politician operation used to gain the trust of voters and markets about the

government commitment to fiscal discipline (Hemming, 2013). Their establishment should be in the way that the government will be under pressure to fulfil fiscal targets that were stipulated by the legislation or/and fiscal rules.

Typically, fiscal councils are government or legislative agencies mandated to provide independent advice and make fiscal policies adopted by the government auditable (check the consistency of policies, plans and objectives, analyse the deviations and identify shortcomings in policy design and implementation (Hemming, 2013).

Some scholars argue for the benefit of establishing fiscal councils can help in the way they provide guidance on how the rule should be applied and ensuring they are not manipulated (Arbatli, 2012). Nevertheless, there is a risk that these council will undermine the government action by draining scarce resources from governments. Actually, there is sparse empirical evidence that confirm whether establishing fiscal councils are beneficial for resource rich countries or not. At the same time. It has been advised that those public institutions should not be involved in decision making process but restrain them to advisory function with the possibility to publish their findings.

4.4.2 Global actions promoting good governance, transparency and fighting Corruption

As previously discussed, transparency and good institutions are a perquisite to build up a public Financial management and special fiscal institutions. There is a general consensus that transparency can help establish and maintain credibility in the distribution and collection of natural resources promoting transparency in a context of resource rich countries should be done in a broader framework and not as a stand-alone initiative. This broader framework aims to create a favourable climate for institutions with higher transparency and governance quality standards.

The World Bank defines good governance as a set of Rules, compliance procedures, and moral and ethical behavioural norms designed to constrain the behaviour of individuals in the interest of maximizing the wealth of utility of principles." According to this definition. Good institution constrains public authorities to a permanent behaviour that aim to cause growth and promote the public interest.

The institutional theory assumes that good and transparent institutions would reduce corruption and rent seeking that in turn will positively impact growth and poverty reduction. Governance have three dimensions: political, economic and institutional aspects. Governance

is then seen as being a set of traditions and institutions by which authorities in a given country exercise for the common good. This include, first the process by which those in authority are selected. Monitored and replace. Second, government abilities to design, manage and implement sound policies and finally the respect of citizens.

Dimensions of good governance are measured by a set of governance indicators as adopted by the world bank and includes:

1. Voice and accountability – measure the ability of citizens to participate in the choose of their government, freedom of expression and association and free media
2. Political stability and absence of violence
3. Government effectiveness- measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures. The quality of policy formulation and implementation, and the credibility of the government's commitment to such policies

4. Regulatory quality: measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development;

5. Rule of law: measures the extent to which agents have confidence in and abide by the rule of society. And in particular the quality of contract enforcement, the police and the courts, as well as the likelihood of crime and violence;

6. Control of corruption: measures the extent to which public power is exercised for private gain. Including both petty and grand form of corruption. As well as capture of the state by elites and private interests.

These indicators are aggregated from 350 variables drawn from 33 data sources provided by different organisations.

A number of resources and initiatives are available to enhance fiscal transparency efforts such as add them once the sub chapter is concluded

For natural resource revenues specifically, countries are encouraged to join the Extractive industries transparency Initiative (EITI) which aim to strengthen governance by improving transparency and accountability in the extractive sector and thereby limit the rentier state culture.

Following part of the dissertation will discuss some of proposed international initiatives, first we will discuss WBG and IMF initiatives

4.4.2.1 World Bank and International Monetary fund's initiatives

The World Bank defines the corruption is defined as the abuse of public or corporate office for private gain, corruption can occur in different forms and in different types of organizations and at different level within organizations. The World Bank and the IMF advocate transparency and good governance to fight corruption, these two institutions and other transparency and good governance initiatives adopts the previous definition of corruption that can take many forms such as bribery, extortion, fraud conflict of interest, and others. The corruption is more likely to be endemic when the political, economic and social environment is characterized by:

1. **Ambiguous laws and regulations** - A lack of clear rules governing the public sector and its officials creates loopholes for persons or firms to receive a government benefit to which they might not otherwise be entitled. Opportunities for corruption also arise when one person or firm has a monopoly on information about the government's practices or plans, or when the rules are clear but allow public sector officials wide discretion in their official actions.

2. **Opportunity to abuse power** - All governments has the power to impose regulations, levy taxes, and enforce the law and impose sanctions on wrongdoers. Public officials may choose to abuse these powers by harassing the businesses or individuals subject to their regulation, taxation, or law enforcement, or they may treat citizens unfairly by imposing these costs selectively. Even firms and individuals who have done nothing wrong may feel obliged to pay bribes to these officials just to avoid the costs and delay of artificially extended official proceedings. Businesses that are engaged in illegal activities may also pay bribes to avoid prosecution or to obtain preferential treatment.

3. **Relatively low income per capita** - Measures of corruption and poor governance are negatively correlated across countries with income per capita and with scores on the UN Human Development Indicators. That is, richer countries and countries with higher human development ratings tend to have less corruption and better functioning governments. This might lead one to think that marginal improvements in governance are of questionable value in the absence of increased income per capita, and that good governance is a luxury good that citizens will demand once they are rich enough to care. However, evidence also suggests that poor governance is itself one reason why some countries are poor or have stagnant economies. Thus, low income may be both a cause and a consequence of corruption. Poor enforcement of property rights and the

rule of law. Weak enforcement of law and order and insecure property rights encourage corruption. When property rights are weakly defined and poorly enforced, the boundaries between public and private ownership become blurred. The resulting ambiguity of ownership not only discourages domestic investment but also deters the inflow of foreign capital. Corruption is also more likely to take place when bureaucratic red tape is excessive and legislative and judicial systems are weak. Ironically, the same economic liberalization policies that are an essential part of reform in transition economies may also facilitate corruption, if the necessary reduction in the size of government also reduces its regulatory capacity.

4. **Closed economic and political systems** - A variety of governance indexes suggest that greater political and economic freedom is associated with lower corruption. Closed systems are more prone to social inequalities, which in turn contributes to high levels of corruption through state capture. Political competition, an active and well-organized political opposition, an independent legislature, and freedom of expression (including free media) are bound to increase transparency and accountability in all parts of society, and so limit the frequency and magnitude of corruption.

5. **Historical and cultural factors** - The particular historical and cultural characteristics of individual countries also, in some cases, help explain cross-country variances in corruption. For example, gift-giving can be a widely accepted behaviour in some cultures, whereas it could be considered an act of corruption in others.

Due to the negative impact of corruption the world Bank took head on the issue of corruption by applying countries to enhance their principles of transparency and good governance. The bank then provided a very comprehensive review of principles involvement in extractive economies called the Extractive Industries Review (updated version WBG 2017 Extractive Industries review) a large part of the report is dedicated to enhancing transparency and good governance by Cameron et al. (2017):

- Promoting transparency and act to remove, to the maximum extent possible, any legal or political impediments to public disclosure,
- Promote transparency in revenue windfall and particularly in resource revenues,
- Develop the capacity to manage volatile revenues,
- Promote initiative that help government to develop a modern policy and regulation framework,
- Integrate the public in decision making processes at regional and national levels.

As for WBG, the IMF believes that macroeconomic stabilization and implementation of fiscal reforms requires core environment of good Governance and fiscal transparency, the project was launched in 1998 called a code for good practices on fiscal transparency, it was updated to give Fiscal transparency Modules of report on the observance of standard and codes. The project was extended once again to create the Manual of fiscal transparency released on 2007. On 2014 and 2017 it was revised.

Fiscal transparency code focuses on output and takes under account of different levels of country capacity adding a differentiation between basic, good, and advanced practices for each fiscal principle; and places a greater interest on fiscal risks; the code covers four key elements of fiscal transparency:

- Fiscal reporting- government should offer relevant, comprehensive, timely, and reliable information on the government's financial position and performance.
- Fiscal Forecasting and Budgeting - which should provide a clear statement of the government's budgetary objectives and policy intentions, together with comprehensive, timely, and credible projections of the evolution of the public finances.
- Fiscal Risk Analysis and Management- which should ensure that risks to public finances are disclosed, analysed and managed, and that fiscal decision-making across the public sector is effectively coordinated.
- Resource Revenue Management- which should provide a transparent framework for the ownership, contracting, taxation, and utilization of natural resource endowments.

Initiatives and codes for better governance and transparency raised also from non-governmental organisations in their fight against global poverty, the following part will discuss two initiatives among several others.

4.4.2.2 Civil society Initiative for transparency

From the early 2000s there has been a significant proliferation in transparency forums and initiatives focusing on the extractive industry sector[7]. Extractive industries transparency has been a regular item on the agenda of UN agencies, countries and regional grouping. However, in term of dedicated to extractive industries transparency initiative, there are currently three major different forums that have been developed, each forum has different approach to the problematic of transparency in resource rich countries. These are the, the Publish what you Pay (PWPY) campaign and the EITI.

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[7] For more see link: http://www.worldbank.org/en/topic/extractiveindustries

Publish what you pay (PWYP)

Established in 2002, the PWYP is an international coalition of more than 650 civil society organizations in more than 30 countries. It undertakes public campaigns and policy advocacy to achieve greater transparency in EI revenue reporting and contract. It two main goals have been Cameron et al. (2017):

- To encourage extractive companies to publish what they pay and to government to publish what they earn as a necessary first step toward a more accountable system of resource revenue management and,

- To encourage public disclosure of extractive contracts and transparency of licensing procedures in accordance with best international practice.

This campaign is one of the most effective by global condition of civil society, its vision is really as it has an original vision to compare what was disclosed by companies and governments. And then hold the government accountable for the management of resource windfalls. Revenue transparency will then allow the civil society to work within a democratic debate to assess the most efficient use and allocation of resource revenues and public finance. These steps are needed in the view to promote development objectives, improve public services and the redistribution of wealth. In turn, companies that fail to disclose payment to host government may be perceived as a complicit in the disempowerment of people to whom natural resources belongs.

Extractives Industries Transparency Initiative (EITI)

Established as an independent international body in 2007, the Extractives Industries Transparency Initiative is a multi-stakeholder initiative intended to promote accountability and good governance in resource rich countries through the generation and publication of credible data on payments made by the extractive sector companies to host state government. The number of petroleum and mining states compliant with or candidates for the EITI standard was 51 as per beginning of 2017. Committed stakeholders include host and home government, investors, industry, international organizations and civil society. Its operation as for PWYP linked to disclosure of public companies (payments) and government (earning) EITI is then providing a whole report that was oversight with multiple stockholders including civil society.

A standard compliance with the EITI process has been agreed, and procedures for a country performance have been established are currently applied. The seven requirements of the EITI are:

- Effective oversight by the multi-stakeholder group,

- Timely publication of EITI reports,

- EITI reports that include contextual information about the extractive industries the production of comprehensive EITI reports that include full government disclosure of extractive industry revenues and disclosure of all material payments to government by oil, gas, and mining companies,

- A credible assurance process applying international standards

- EITI reports that are comprehensible, actively promoted debate

- A multi-stakeholder group that takes steps to act on lessons learned and reviews the outcome and impact of EITI implementation

In many countries, the most important contribution of EITI has come about because governments have decided to act on recommendations that have emerged from EITI reporting. Experience suggests that the nature of recommendations in EITI report

Chart 3 How does the EITI works
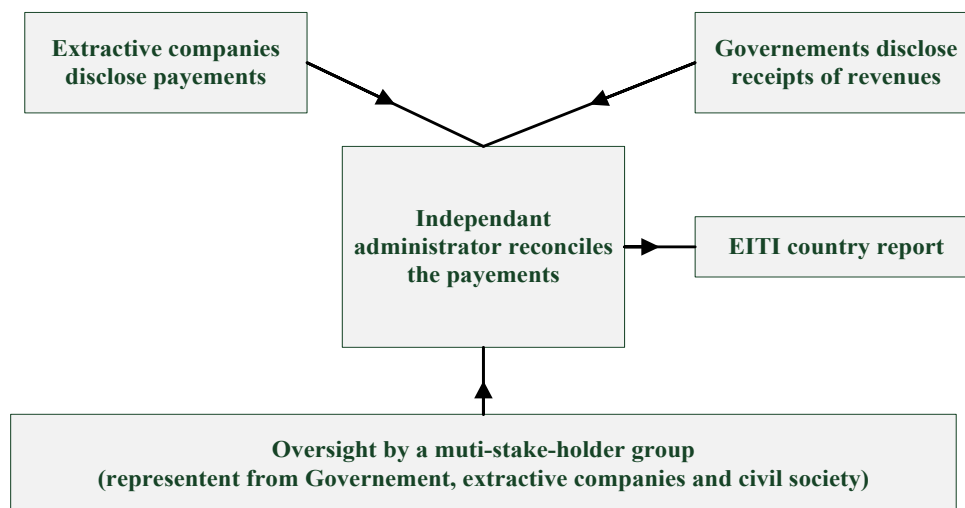
Source: Olcer (2009)

In many countries, the most important contribution of EITI has come about because governments have decided to act on recommendations that have emerged from EITI reporting. Experience suggests that the nature of recommendations in EITI reports and the extent to which the EITI multi-stakeholder groups and the government follow up on the

recommendations significantly influence the impact of the EITI. These reports were very useful as a tool to identify weakness in government systems in the way to improve sector management and they are making an important potential contribution to policy reform and change.

CONCLUSION

The main aim of this dissertation work was to evaluate the performance of the public sector. Their measurement is an important feature since they are connected to public budgets and their rational use. Our dissertation slot into this interest for North African and Middle East countries commonly known as MENA region. MENA region offers a sample of countries that are slightly similar at political, economic and cultural levels. The region also offers the possibility to compare public sectors in countries with and without natural resources. Furthermore, the region has been a scene in recent years for contests against absolute political regimes, human right violation, political corruption, an overtime economic decline and high unemployment rate especially within the youth. These in turn, suggests the failure of their respective public sectors.

Our dissertation is an add to the so-called resource curse theory as its problematic was never tackled in the view of public economics and public-sector approach.

The theoretical background of our dissertation first, defined the stand of the public sector in the overall economy, it also provided justifications for public sector existence and its extend we then concluded theory part by the rational of public sector reforms.

Responding to the aim of our dissertation, performance of the public sector in MENA countries has been assessed first through the DEA method, using composite Musgravean and Opportunity indicators, in one hand, to assess the performance of administrative (institutional), human capital and infrastructure and in the other hand to measure the purely economic performance of those countries. **The main results of the DEA method were that the dependence of a country in a given natural resources does not undermine the performance of the public sector**. The main result shows that countries such as United Arab Emirates, Qatar and Bahrein, all heavily dependent on the export of their primary commodities and classified as high-income resource rich countries, were laying on the efficiency curve, whereas other resource rich countries such as Algeria (middle income resource rich country) were above the curve.

We also applied the Principal Component Analysis in order to determine which of the used variables (indicators) in DEA method were the most relevant, **our findings were that the Principal component was highly correlated with six of variables, three of them were administrative (institutional) and the principal component was decreasing with increasing factor corruption, red tape and quality of the judiciary.** Furthermore, we tried

via factor scoring in the principal component to test which countries better fit the principal component and the result shows **that countries driven by factor corruption, red tape and judiciary were Lebanon (resource importer country) followed by Algeria (resource exporter country).**

Following our main findings, we focused all policy recommendations on institutional aspects by special emphasis on establishing Special fiscal Institutions (SFIs), we recommend to policy makers on the establishment of fiscal rules, procedural and numerical, instituting public saving and stabilization funds, promulgating Fiscal responsibility Laws, and point out fiscal councils. All this reform may play a control role in countries where natural resource is predominant. Nevertheless, those institutional reforms are unlikely to be credible and successful within a political economy environment that lacks transparency, good governance and fighting corruption. For this purpose, we add some of the international initiatives governmental and non- governmental campaigns promoting transparency better governance and counter corruption measures. we believe that special institutions and better environment are a perquisite for broader range of policy prescriptions tending to make less severe the adverse effects of the resource curse.

Policy prescription previously mentioned i.e. revenue diversification, revenues sterilization, establishing sovereign funds and efficient investment policy will help policy makers in the public sector to meet its objectives at all public-sector levels in an efficient way. We continue to believe that this will need two basic conditions; political will and large consensus of the public.

Contributions of the dissertation

The dissertation has provided several contributions at the theoretical and practical levels.

Theoretical contributions of the dissertation are as the following:

- The theoretical background has been provided a wide range of researches from different sources tackling the problematic of the public-sector performance and its measurement, the literature regroups different researches and studies that analyses the problematic of public sector performance from several point of view. This to explain the importance of assessing the efficiency of the public sector in a global world context of maintaining public finance prudence.

- The theoretical part of the dissertation in a large part analysed the concept taxonomy, methods and benefits of the measurement of the public-sector performance.

- The dissertation also focuses on its theoretical background on the problematic of the resource curse, the dissertation indeed offered the analysis of all aspects of the resource curse and this was enhanced by a battery of studies and researches that explained, analysed and provide – based on empirical results- evidence about the paradoxical phenomenon of the resource curse, those included its economic and institutional channels.

- The dissertation has contributed in tacking the resource curse theory from public economics and public-sector theory point of view, this in fact can be considered as a novelty as the resource curse theorists focused all their attention only on the impact of commodity dependency on economic growth. our aim was to measure how volatile and uncertain resource windfall, managed by the state impacts the performance of public sector in different countries

- The theoretical part also provided a contribution about how the public sector especially in resource rich countries may be reformed and finances otherwise.

Practical contribution of the dissertation is:

- In its practical part, the dissertation offered through the DEA method, a measurement of public sector performance and efficiency in sixteen MENA countries, selected variables (indicators) are fourteen and captured the main sovereign functions of the state including those related to public administration, public health, public education and infrastructure in addition to sovereign macroeconomic performance. The study was based on macro data rather than micro and sectorial data usually applied in almost all MENA case- studies. Using DEA method allowed to rank MENA countries from the best to the least performance, and leaded to a very important conclusion that can that bring an add to the resource curse theory; high dependence on its primary commodities does not negatively impact the performance of the public sector.

- Another statistical method has been applied in the practical part of our dissertation (PCA) this step was used to determine the indicator that influence most the performance of the public sector in the selected data-set and we find out that most of them are institutional, their determination confirmed that being dependent on natural resources does not matter but the most important is how these resources are managed. Form this conclusion, recommendations and policy prescriptions that help public sector policy makers in resource rich MENA countries to efficiently manage their public means.

- Results of this dissertation were obtained via non-parametric and mathematical-statistical methods that can be used in future research in this field.

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APPENDIX A

		DEA ANALYSIS TOTAL PUBLIC-SECTOR PERFORMANCE- FIRST STEP THE RAW DATA														
		OPPORTUNITY INDICATORS									MUSGRAVIAN INDICATORS					
		Administration				Education		health		Public infrastructure	distribution	stability		Economic performance		
countries		corruption	red tape	quality of judiciary	shadow economy	secondary school enrolment	education achievement	infant survival at birth	Life expectancy	Quality communication and infrastructure	Income share of 40 % of poorest households	inverse of Stability of GDP growth	inverse of average inflation	GDP per capita	GDP growth	unemployment
Algeria		3.40	2.30	2.80	3.24	83.20	3.60	0.98	70.75	3.80	64.22	2.00	0.27	7271.85	3.71	16.35
Azerbaijan		3.30	3.70	3.30	4.47	105.60	3.30	0.97	70.55	4.40	66.29	1.26	0.13	10213.21	13.30	5.92
Bahrein		5.80	4.00	5.00	4.30	86.80	4.50	0.99	76.40	5.60	64.22	2.93	0.61	27735.31	5.63	7.66
Egypt		4.10	3.10	3.90	3.58	79.30	2.70	0.98	70.68	4.30	69.23	2.62	0.12	6454.82	4.65	10.05
Iran		4.00	2.90	3.80	3.77	79.70	4.60	0.98	73.45	4.00	71.72	2.28	0.07	13311.98	5.15	11.92
Israel		6.00	3.10	6.20	4.83	90.00	3.50	1.00	81.70	4.90	64.57	1.39	0.44	31466.29	3.34	8.29
Jordan		4.80	3.50	4.60	5.08	88.10	4.40	0.98	73.59	5.20	64.57	2.65	0.24	5907.01	5.98	13.89
Kuwait		4.50	2.70	4.90	5.06	89.80	3.50	0.99	74.26	4.90	64.22	0.73	0.29	38332.08	4.93	1.50
Lebanon		3.00	3.10	2.70	3.82	81.60	5.60	0.99	48.22	2.50	64.22	1.46	0.32	15449.48	4.83	30.89
Morocco		3.80	3.40	3.50	3.76	55.80	4.00	0.97	70.41	4.10	59.12	2.84	0.58	5074.65	4.95	10.35
Oman		5.90	4.30	5.10	4.30	88.10	4.20	0.99	76.32	5.80	64.22	1.50	0.32	28148.41	4.92	8.50
Qatar		6.00	4.50	6.30	4.30	93.20	5.90	0.99	78.30	5.10	58.90	1.91	0.20	97987.01	13.14	0.74
Syria		3.00	2.30	2.90	4.30	74.00	3.90	0.99	74.77	3.60	64.22	1.61	0.17	5040.58	4.11	9.55
Tunisia		5.40	4.20	4.80	3.95	91.80	5.60	0.99	74.85	5.50	63.94	1.63	0.30	9359.29	3.88	13.47
Turkey		3.90	3.10	3.40	4.19	82.00	3.40	0.99	74.54	5.10	59.97	0.82	0.06	14543.16	4.41	10.72
UAE		5.90	4.30	4.90	5.91	93.80	4.90	0.99	76.78	6.20	64.22	0.92	0.20	47728.78	5.33	3.30
	min	3.00	2.30	2.70	3.24	55.80	2.70	0.97	48.22	2.50	58.90	0.73	0.06	5040.58	3.34	0.74
	max	6.00	4.50	6.30	5.91	105.60	5.90	1.00	81.70	6.20	71.72	2.93	0.61	97987.01	13.30	30.89
	average	4.55	3.41	4.26	4.30	85.18	4.23	0.99	72.85	4.69	64.24	1.78	0.27	22751.49	5.77	10.19

		DEA ANALYSIS TOTAL PUBLIC-SECTOR PERFORMANCE- SECOND STEP: EACH VALUE WAS DEVIDED BY THE AVARAGE OF A GIVEN VARIABLE														
		OPPORTUNITY INDICATORS									MUSGRAVIAN INDICATORS					
		Administration				Education		health		Public infrastructure	distribution	stability		Economic performance		
countries	typ of natural resource	corruption	red tape	quality of judiciary	shadow economy	secondary school enrolment	education achievement	infant survival at birth	Life expectancy	Quality communication and infrastructure	Income share of 40 % of poorest households	inverse of Stability of GDP growth	inverse of average inflation	GDP per capita	GDP growth	unemployment
Algeria		0.75	0.68	0.66	0.75	0.98	0.85	1.00	0.97	0.81	1.00	1.12	1.01	0.32	0.64	1.60
Azerbaijan		0.73	1.09	0.78	1.04	1.24	0.78	0.98	0.97	0.94	1.03	0.71	0.49	0.45	2.31	0.58
Bahrein		1.27	1.17	1.17	1.00	1.02	1.07	1.01	1.05	1.19	1.00	1.64	2.26	1.22	0.98	0.75
Egypt		0.90	0.91	0.92	0.83	0.93	0.64	1.00	0.97	0.92	1.08	1.47	0.45	0.28	0.81	0.99
Iran		0.88	0.85	0.89	0.88	0.94	1.09	1.00	1.01	0.85	1.12	1.28	0.24	0.59	0.89	1.17
Israel		1.32	0.91	1.46	1.12	1.06	0.83	1.01	1.12	1.05	1.01	0.78	1.63	1.38	0.58	0.81
Jordan		1.05	1.03	1.08	1.18	1.03	1.04	1.00	1.01	1.11	1.01	1.48	0.89	0.26	1.04	1.36
Kuwait		0.99	0.79	1.15	1.18	1.05	0.83	1.00	1.02	1.05	1.00	0.41	1.09	1.68	0.86	0.15
Lebanon		0.66	0.91	0.63	0.89	0.96	1.33	1.01	0.66	0.53	1.00	0.82	1.18	0.68	0.84	3.03
Morocco		0.84	1.00	0.82	0.87	0.66	0.95	0.99	0.97	0.87	0.92	1.59	2.14	0.22	0.86	1.02
Oman		1.30	1.26	1.20	1.00	1.03	0.99	1.00	1.05	1.24	1.00	0.84	1.19	1.24	0.85	0.83
Qatar		1.32	1.32	1.48	1.00	1.09	1.40	1.01	1.07	1.09	0.92	1.07	0.74	4.31	2.28	0.07
Syria		0.66	0.68	0.68	1.00	0.87	0.92	1.00	1.03	0.77	1.00	0.90	0.64	0.22	0.71	0.94
Tunisia		1.19	1.23	1.13	0.92	1.08	1.33	1.00	1.03	1.17	1.00	0.91	1.10	0.41	0.67	1.32
Turkey		0.86	0.91	0.80	0.97	0.96	0.80	1.00	1.02	1.09	0.93	0.46	0.21	0.64	0.77	1.05
UAE		1.30	1.26	1.15	1.37	1.10	1.16	1.01	1.05	1.32	1.00	0.51	0.73	2.10	0.92	0.32
	average	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

countries	type of natural resources	DEA ANALYSIS TOTAL PUBLIC-SECTOR PERFORMANCE- THIRD STEP PROVIDE THE WEIGHT OF EACH SUB-INDICATOR TO ITS RELEVANT INDICATOR							
		opportunity indicators				Musgravian indicators			
		Administration	Education	Health	infrastructure	distribution	stability	economic performance	total public-sector performance
Algeria		0.71	0.91	0.98	0.81	1.00	1.07	0.86	0.91
Azerbaijan		0.91	1.01	0.98	0.94	1.03	0.60	1.11	0.94
Bahrein		1.16	1.04	1.03	1.19	1.00	1.95	0.98	1.19
Egypt		0.89	0.79	0.98	0.92	1.08	0.96	0.69	0.90
Iran		0.87	1.01	1.00	0.85	1.12	0.76	0.88	0.93
Israel		1.20	0.94	1.07	1.05	1.01	1.20	0.93	1.06
Jordan		1.09	1.04	1.00	1.11	1.01	1.19	0.89	1.05
Kuwait		1.03	0.94	1.01	1.05	1.00	0.75	0.90	0.95
Lebanon		0.77	1.14	0.83	0.53	1.00	1.00	1.52	0.97
Morocco		0.88	0.80	0.98	0.87	0.92	1.86	0.70	1.00
Oman		1.19	1.01	1.03	1.24	1.00	1.02	0.97	1.07
Qatar		1.28	1.25	1.04	1.09	0.92	0.91	2.22	1.24
Syria		0.75	0.90	1.01	0.77	1.00	0.77	0.62	0.83
Tunisia		1.12	1.20	1.01	1.17	1.00	1.01	0.80	1.04
Turkey		0.88	0.88	1.01	1.09	0.93	0.34	0.82	0.85
UAE		1.27	1.13	1.03	1.32	1.00	0.62	1.12	1.07
1.00	average	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

DEA ANALYSIS PUBLIC SECTOR PERFORMANCE- AVERAGE OF ALL INDICATORS FOR A GIVEN COUNTRY WITHOUT ITS RELEVANT PUBLIC FINANCE		
countries	PSP	ranking
Qatar	1.24260946	1
Bahrein	1.19340355	2
UAE	1.07003145	3
Oman	1.06542221	4
Israel	1.05565971	5
Jordan	1.04518872	6
Tunisia	1.04427186	7
Morocco	1.00245651	8
Lebanon	0.97077166	9
Kuwait	0.95297495	10
Azerbaijan	0.93869817	11
Iran	0.9290269	12
Algeria	0.90559955	13
Egypt	0.90058848	14
Turkey	0.85095303	15
Syria	0.83234379	16

DEA ANALYSIS PUBLIC SECTOR FINANCE FOR EACH RELEVANT INDICATOR RAW DATA					
Countries/variables	Total Expenditure	Good and services	social transfer	Health	education	public investment*
Algeria	33.86	2.51	11.08	2.92	4.34	34.63
Azerbaijan	27.88	1.94	7.24	4.77	2.94	30.48
Bahrein	26.60	4.08	5.57	2.72	3.10	25.46
Egypt	34.79	2.21	10.41	2.12	4.31	18.68
Iran	22.09	2.39	6.97	2.29	4.71	34.10
Israel	46.57	11.32	13.28	4.76	6.18	18.91
Jordan	35.14	3.47	7.69	5.14	4.95	26.17
Kuwait	37.20	6.61	11.76	2.30	5.62	17.41
Lebanon	33.95	0.87	8.36	3.13	2.29	25.84
Morocco	30.21	3.19	9.01	1.71	5.57	31.27
Oman	36.43	16.58	2.29	2.73	4.00	23.37
Qatar	28.64	5.90	3.30	2.17	2.30	36.75
Syria	27.90	1.18	3.42	6.21	5.15	20.95
Tunisia	30.21	1.75	10.57	3.15	6.39	24.29
Turkey	36.56	3.91	17.56	4.16	2.89	19.36
UAE	20.28	1.28	0.92	1.77	1.11	22.62
min	20.28	0.87	0.92	1.71	1.11	17.41
max	46.57	16.58	17.56	6.21	6.39	36.75
average	31.77	4.33	8.09	3.25	4.12	25.64

DEA ANALYSIS PUBLIC SECTOR EXPENCES WEIGHTED TO THE AVERAGE OF EACH COMPONENT						
Countries/variables	Total Expenditure	Good and services	social transfer	Health	education	public investment*	average
Algeria	1.06586762	0.580380059	1.369420002	0.898566827	1.053642673	1.350594018	1.053078533
Azerbaijan	0.87769742	0.447606365	0.894985857	1.467228275	0.71452731	1.188709209	0.931792406
Bahrein	0.83729286	0.943311674	0.688104953	0.834912383	0.754322399	0.992703682	0.841774659
Egypt	1.09519183	0.510776259	1.287350703	0.650456202	1.04699741	0.728456969	0.886538228
Iran	0.69541621	0.552234054	0.861752423	0.703786131	1.145112844	1.329651104	0.881325461
Israel	1.46587845	2.61723174	1.641663913	1.462458439	1.501823365	0.737244181	1.571050014
Jordan	1.10602608	0.802888753	0.950235761	1.581687028	1.201380332	1.020469403	1.110447894
Kuwait	1.17089085	1.529011424	1.453729128	0.70625688	1.364823357	0.679090453	1.150633682
Lebanon	1.06869765	0.201152596	1.033144838	0.961763698	0.556818553	1.007722673	0.804883335
Morocco	0.95081765	0.736800597	1.11393384	0.524786916	1.354296466	1.219594015	0.98337158
Oman	1.14659947	3.834121282	0.283603872	0.840311931	0.971266028	0.911377069	1.331213275
Qatar	0.9015796	1.364065126	0.408265188	0.668442156	0.5584329	1.433233903	0.889003146
Syria	0.87806598	0.273951166	0.422958628	1.907715218	1.251511032	0.816864777	0.9251778
Tunisia	0.95086629	0.405646127	1.30630387	0.968991658	1.552410569	0.947088743	1.021884543
Turkey	1.15062848	0.904585413	2.170955715	1.278910829	0.703105608	0.755175874	1.16056032
UAE	0.63848356	0.296237365	0.113591307	0.54372543	0.269529153	0.882023927	0.457265123
average	1	1	1	1	1	1	1

		opportunity indicators				Musgravean indicators			
DEA ANALYSIS PUBLIC SECTOR EFFICIENCY- PUBLIC SECTOR PERFORMANCE DEVIDED BY THE RELEVANT PUBLIC-SECTOR EXPENDITURE									
countries	**type of natural resources**	**Administration**	**Education**	**Health**	**infrastructure**	**distribution**	**stability**	**economic performance**	**total public sector efficiency**
Algeria		0.28	0.87	1.09	0.02	0.73	1.00	0.80	0.69
Azerbaijan		0.47	1.41	0.66	0.03	1.15	0.68	1.27	0.81
Bahrein		0.28	1.38	1.23	0.05	1.45	2.33	1.17	1.13
Egypt		0.40	0.75	1.51	0.05	0.84	0.88	0.63	0.72
Iran		0.37	0.88	1.43	0.03	1.30	1.09	1.27	0.91
Israel		0.11	0.63	0.73	0.06	0.61	0.82	0.63	0.51
Jordan		0.31	0.86	0.63	0.04	1.06	1.07	0.80	0.68
Kuwait		0.16	0.69	1.43	0.06	0.69	0.64	0.76	0.63
Lebanon		0.89	2.05	0.87	0.02	0.97	0.93	1.42	1.02
Morocco		0.28	0.59	1.86	0.03	0.83	1.96	0.73	0.90
Oman		0.07	1.04	1.22	0.05	3.52	0.89	0.85	1.09
Qatar		0.22	2.23	1.56	0.03	2.25	1.01	2.46	1.39
Syria		0.64	0.72	0.53	0.04	2.36	0.88	0.71	0.84
Tunisia		0.64	0.77	1.05	0.05	0.76	1.06	0.84	0.74
Turkey		0.23	1.26	0.79	0.06	0.43	0.29	0.71	0.54
UAE		0.99	4.19	1.89	0.06	8.80	0.97	1.75	2.67
	average	0.40	1.27	1.16	0.04	1.73	1.03	1.05	0.95

DEA ANALYSIS EFFICIENCY OF THE PUBLIC SECTOR- AVERAGE OF ALL VARIABLES FOR A GIVEN COUNTRY		
countries	PSE	ranking
UAE	2.66565678	1
Qatar	1.39260317	2
Bahrein	1.1284693	3
Oman	1.09306088	4
Lebanon	1.02090038	5
Iran	0.90845917	6
Morocco	0.89683981	7
Syria	0.83893542	8
Azerbaijan	0.81104514	9
Tunisia	0.73852685	10
Egypt	0.72250683	11
Algeria	0.68599518	12
Jordan	0.68384989	13
Kuwait	0.63295818	14
Turkey	0.53769919	15
Israel	0.51176851	16

	corruption	red tape	quality of judiciary	shadow economy	secondary school enrolment	education achievement	infant survival at birth	Life expectancy	Quality communication and infrastructure	Income share of 40 % of poorest households	inverse of Stability of GDP growth	inverse of average inflation	GDP per capita	GDP growth	unemployment
PCA METHOD TOTAL PUBLIC-SECTOR PERFORMANCE- FIRST STEP THE RAW DATA															
Algeria	3.40	2.30	2.80	3.24	83.20	3.60	0.98	70.75	3.80	64.22	2.00	0.27	7271.85	3.71	16.35
Azerbaijan	3.30	3.70	3.30	4.47	105.60	3.30	0.97	70.55	4.40	66.29	1.26	0.13	10213.21	13.30	5.92
Bahrein	5.80	4.00	5.00	4.30	86.80	4.50	0.99	76.40	5.60	64.22	2.93	0.61	27735.31	5.63	7.66
Egypt	4.10	3.10	3.90	3.58	79.30	2.70	0.98	70.68	4.30	69.23	2.62	0.12	6454.82	4.65	10.05
Iran	4.00	2.90	3.80	3.77	79.70	4.60	0.98	73.45	4.00	71.72	2.28	0.07	13311.98	5.15	11.92
Israel	6.00	3.10	6.20	4.83	90.00	3.50	1.00	81.70	4.90	64.57	1.39	0.44	31466.29	3.34	8.29
Jordan	4.80	3.50	4.60	5.08	88.10	4.40	0.98	73.59	5.20	64.57	2.65	0.24	5907.01	5.98	13.89
Kuwait	4.50	2.70	4.90	5.06	89.80	3.50	0.99	74.26	4.90	64.22	0.73	0.29	38332.08	4.93	1.50
Lebanon	3.00	3.10	2.70	3.82	81.60	5.60	0.99	48.22	2.50	64.22	1.46	0.32	15449.48	4.83	30.89
Morocco	3.80	3.40	3.50	3.76	55.80	4.00	0.97	70.41	4.10	59.12	2.84	0.58	5074.65	4.95	10.35
Oman	5.90	4.30	5.10	4.30	88.10	4.20	0.99	76.32	5.80	64.22	1.50	0.32	28148.41	4.92	8.50
Qatar	6.00	4.50	6.30	4.30	93.20	5.90	0.99	78.30	5.10	58.90	1.91	0.20	97987.01	13.14	0.74
Syria	3.00	2.30	2.90	4.30	74.00	3.90	0.99	74.77	3.60	64.22	1.61	0.17	5040.58	4.11	9.55
Tunisia	5.40	4.20	4.80	3.95	91.80	5.60	0.99	74.85	5.50	63.94	1.63	0.30	9359.29	3.88	13.47
Turkey	3.90	3.10	3.40	4.19	82.00	3.40	0.99	74.54	5.10	59.97	0.82	0.06	14543.16	4.41	10.72
UAE	5.90	4.30	4.90	5.91	93.80	4.90	0.99	76.78	6.20	64.22	0.92	0.20	47728.78	5.33	3.30
mean	4.55	3.41	4.26	4.30	85.18	4.23	0.99	72.85	4.69	64.24	1.78	0.27	22751.49	5.77	10.19
stdeviation	1.14	0.70	1.14	0.67	10.78	0.92	0.01	7.25	0.95	3.25	0.71	0.16	23969.93	2.99	7.01
max	6.00	4.50	6.30	5.91	105.60	5.90	1.00	81.70	6.20	71.72	2.93	0.61	97987.01	13.30	30.89

	PCA METHOD Z-SCORE STANDARIZATION OF THE DATA VIAN FUNCTION STANDARIZE													
Country	corruption	red tape	quality of judiciary	shadow economy	secondary school enrolment	education achievement	infant survival at birth	Life expectancy	Quality communication and infrastructure	Income share of 40 % of poorest households	inverse of Stability of GDP growth	inverse of average inflation	GDP per capita	GDP growth
Algeria	-1.01	-1.57	-1.28	-1.60	-0.18	-0.68	-0.51	-0.29	-0.93	-0.01	0.30	0.02	-0.65	-0.69
Azerbaijan	-1.10	0.42	-0.84	0.24	1.89	-1.00	-2.38	-0.32	-0.30	0.63	-0.73	-0.85	-0.52	2.52
Bahrein	1.10	0.84	0.65	0.00	0.15	0.30	0.72	0.49	0.96	-0.01	1.60	2.10	0.21	-0.05
Egypt	-0.40	-0.43	-0.31	-1.08	-0.54	-1.65	-0.63	-0.30	-0.41	1.54	1.17	-0.92	-0.68	-0.37
Iran	-0.48	-0.72	-0.40	-0.80	-0.51	0.41	-0.24	0.08	-0.72	2.30	0.70	-1.26	-0.39	-0.21
Israel	1.28	-0.43	1.71	0.79	0.45	-0.79	1.37	1.22	0.22	0.10	-0.55	1.05	0.36	-0.81
Jordan	0.22	0.13	0.30	1.16	0.27	0.19	-0.38	0.10	0.54	0.10	1.21	-0.18	-0.70	0.07
Kuwait	-0.04	-1.00	0.57	1.14	0.43	-0.79	0.57	0.19	0.22	-0.01	-1.47	0.15	0.65	-0.28
Lebanon	-1.36	-0.43	-1.37	-0.73	-0.33	1.49	0.74	-3.40	-2.30	-0.01	-0.45	0.30	-0.30	-0.31
Morocco	-0.66	-0.01	-0.66	-0.81	-2.72	-0.24	-1.81	-0.34	-0.62	-1.58	1.48	1.89	-0.74	-0.27
Oman	1.19	1.27	0.74	0.00	0.27	-0.03	0.50	0.48	1.17	-0.01	-0.40	0.32	0.23	-0.28
Qatar	1.28	1.55	1.80	0.00	0.74	1.82	0.96	0.75	0.43	-1.64	0.18	-0.43	3.14	2.46
Syria	-1.36	-1.57	-1.19	0.00	-1.04	-0.35	0.17	0.27	-1.15	-0.01	-0.25	-0.60	-0.74	-0.55
Tunisia	0.75	1.13	0.48	-0.53	0.61	1.49	-0.06	0.28	0.86	-0.09	-0.22	0.17	-0.56	-0.63
Turkey	-0.57	-0.43	-0.75	-0.17	-0.29	-0.89	0.13	0.23	0.43	-1.31	-1.35	-1.31	-0.34	-0.45
UAE	1.19	1.27	0.57	2.40	0.80	0.73	0.85	0.54	1.59	-0.01	-1.21	-0.45	1.04	-0.15

	corruption	red tape	quality of judiciary	shadow economy	secondary school enrolment	education achievement	infant survival at birth	Life expectancy	Quality communication and infrastructure	Income share of 40 % of poorest households	inverse of Stability of GDP growth	inverse of average inflation	GDP per capita	GDP growth
PCA METHOD MAXIMUM NORMALIZATION OD SCALE- ALL VERIABLES DEVIDED BY THE MAXIMIUM OF THE RELEVANT VARIABLE TO OBTAIN DATA VALUE FROM 0 TO 1														
Algeria	0.57	0.51	0.47	0.55	0.79	0.61	0.99	0.87	0.61	0.90	0.68	0.45	0.07	0.28
Azerbaijan	0.55	0.82	0.56	0.76	1.00	0.56	0.97	0.86	0.71	0.92	0.43	0.22	0.10	1.00
Bahrein	0.97	0.89	0.85	0.73	0.82	0.76	1.00	0.94	0.90	0.90	1.00	1.00	0.28	0.42
Egypt	0.68	0.69	0.66	0.61	0.75	0.46	0.98	0.87	0.69	0.97	0.90	0.20	0.07	0.35
Iran	0.67	0.64	0.64	0.64	0.75	0.78	0.99	0.90	0.65	1.00	0.78	0.11	0.14	0.39
Israel	1.00	0.69	1.05	0.82	0.85	0.59	1.00	1.00	0.79	0.90	0.47	0.72	0.32	0.25
Jordan	0.80	0.78	0.78	0.86	0.83	0.75	0.99	0.90	0.84	0.90	0.90	0.39	0.06	0.45
Kuwait	0.75	0.60	0.83	0.86	0.85	0.59	0.99	0.91	0.79	0.90	0.25	0.48	0.39	0.37
Lebanon	0.50	0.69	0.46	0.65	0.77	0.95	1.00	0.59	0.40	0.90	0.50	0.52	0.16	0.36
Morocco	0.63	0.76	0.59	0.64	0.53	0.68	0.98	0.86	0.66	0.82	0.97	0.94	0.05	0.37
Oman	0.98	0.96	0.86	0.73	0.83	0.71	0.99	0.93	0.94	0.90	0.51	0.53	0.29	0.37
Qatar	1.00	1.00	1.07	0.73	0.88	1.00	1.00	0.96	0.82	0.82	0.65	0.33	1.00	0.99
Syria	0.50	0.51	0.49	0.73	0.70	0.66	0.99	0.92	0.58	0.90	0.55	0.28	0.05	0.31
Tunisia	0.90	0.93	0.81	0.67	0.87	0.95	0.99	0.92	0.89	0.89	0.56	0.49	0.10	0.29
Turkey	0.65	0.69	0.58	0.71	0.78	0.58	0.99	0.91	0.82	0.84	0.28	0.09	0.15	0.33
UAE	0.98	0.96	0.83	1.00	0.89	0.83	1.00	0.94	1.00	0.90	0.31	0.32	0.49	0.40

	PCA METHOD STATISTICA RESULTS - THE PRINCIPAL COMPONENT OF UNROTATED FACTOR LOADING				
	PC 1	PC 2	PC 3	PC 4	PC 5
Corruption	- .911*	- .264	-.170	-.074	.216
Red Tape	- .736*	- .228	.261	.347	.218
Quality of the Judiciary	- .908*	- .168	-.133	-.043	.120
Shadow Economy	- .667	.265	-.021	-.288	-.096
Secondary School Enrolment	- .559	.508	.370	-.050	.307
Education Achievement	- .324	- .527	.648	-.033	.172
Infant Mortality Rate	- .505	- .301	.116	-.718*	.027
Life Expectancy	- .675	.210	-.595	.087	-.058
Infrastructure	- .850*	.063	-.306	.031	.103
Income Distribution	.288	.398	- .152	- .143	.786*
Stability of GDP Growth	.233	- .517	- .326	.548	.374
Inverse of Average Inflation	- .125	-.753*	- .298	.098	- .109
GDP per Capita	- .782*	-.080	.361	.023	- .211
GDP Growth	- .339	.321	.512	.671	- .076
Unemployment	.708*	-.382	.358	- .265	.243
Expl. VAR	5.877	2.147	1.877	1.591	1.137
PRP. Total	.391	.143	.125	.106	.075

STATISTICA RESULTS – FACTOR ANALYSIS FACTOR SCORING IN UNROTATED PRINCIPAL COMPONENT EXTRACTION					
Countries	PC 1	PC 2	PC 3	PC 4	PC 5
Algeria	1.24343	.01528	- .27547	- .09305	- .27873
Azerbaijan	.25086	2.27556	.92775	1.92333	.12619
Bahrain	- .71556	- 1.41460	- .81816	.55079	.81217
Egypt	.82935	.60744	- .96642	.48567	1.14967
Iran	.72159	.50975	- .09388	- .05192	1.72774
Israel	- .86047	- .21563	- 1.11102	- 1.31315	- .01883
Jordan	- .11337	- .09046	- .26591	.30287	.85983
Kuwait	- .46667	- 1.27595	- .39372	- 1.07528	- 1.08760
Lebanon	1.55971	- 1.67783	2.57052	- 1.21133	.22407
Morocco	.91317	- .28285	- 1.05356	1.71145	- 1.60793
Oman	- .81529	- .28285	- .31365	- .17426	.46945
Qatar	- 1.85965	- .48879	1.68597	1.27841	- .84643
Syria	.95290	.46676	- .39476	- .64293	- 1.00589
Tunisia	- .41191	- .65485	.29398	- .10353	1.00155
Turkey	.24563	.79575	- .08119	- .66448	- 1.55851
UAE	- 1.47371	.52553	.28952	- .92259	.03325

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