Oil and Macroeconomic Policies and Performance in Oman

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Abstract:

This thesis investigates the relationship between oil revenue and macroeconomic policies and performance in Oman. The thesis contains five empirical chapters along with introduction, literature review and conclusion. The first empirical chapter looks into the dynamic relationship between oil revenue, government spending and economic activities. The results indicate oil revenue has immediate and significant impact on both the country's GDP and the government expenditure. The government expenditure also has significant impact on the GDP.

The second empirical chapter examines the validity of the Wagner's Law and the Keynesian hypothesis in regards to the relationship between the government spending and economic performance. The chapter uses both aggregated and disaggregated government expenditure where the data are divided into recurrent and capital investment. The findings show that there is a long run-relationship between the government spending and the GDP for the period covered. The causality analysis suggests that public investment causes economic growth, but the recurrent expenditure is insignificant.

The third empirical chapter investigates the impact of government spending on economic performance where the government spending was decomposed into health, education and military expenditure. The results of these components of the government expenditure and along with an index of openness have long-run relationship with GDP. The short-run coefficient on military spending is insignificant and that of health is negative and significant. However, the long-run coefficients are all positive and significant, except that of military.

The fourth empirical chapter analyses the relationship between government expenditure and oil revenue in Oman. The disaggregated government expenditure of health, education and military are used for the analysis in order to see the response of each component to oil revenue changes. The results show that, although all the components responded positively to a positive oils revenue shock, it is the military component that has recorded highest response with more persistence.

The fifth chapter investigates the relationship between the current account and the fiscal deficits in Oman. The chapter uses a threshold cointegration technique that is capable of capturing non-linearity and asymmetric adjustment between the series. The estimated results show that there is a long-run relationship between the current account and fiscal deficits in Oman and that adjustment between the series is asymmetric. It is found that upward adjustment is much faster than downward adjustment.

Contents

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Dedication

To my parents, my family and my great country; Oman.

Chapter 1

Oil and Macroeconomic Performance in Oman

1.1 Introduction

The oil industry has recently been subject to significant scrutiny due not only to the importance of oil for industrial, commercial and residential purposes, but also the changing structure of both the demand and supply of oil. Oil reserves and prices have an influence on countries; they can provoke wars and other socio-economic upheavals. Although, many oil-rich countries have been able to use their oil revenues productively, but they are also threatened by the volatile oil prices and prospect of depletion of the oil reserves. Similarly, as in the case of many oil-rich countries exploring and exporting oil are not automatic vehicles for economic development in terms of human capital, technological capital and long-term investment. The proceeds have been wasted in corruption and on non-sustainable or non-productive projects.

Consequently, many oil-exporting countries, it has been argued suffer from the phenomenon of the "natural resource curse"; indeed, it has been observed that they experienced more underdevelopment and unemployment than some resource-poor countries. Apart from the issue of oil price volatility, six other channels of the resource curse have been identified in the literature: the Dutch disease channel, the education and human capital channel, the investment and physical capital channel, the political economy channel and the sixth channel is the downward long-term trend in commodities prices – known as the Prebisch-Singer hypothesis.

The petroleum sector is the main engine of the Omani economy; it represents the predominant contributor of the GDP over the last forty years; ranging between 45% and 51%. Also, the contribution of oil exports in the total exports ranges from 74% to more than 96% over the same period; oil proceeds alone (excluding gas) accounted for 75% of the total public revenue Despite its prominent position in the Omani economy, the petroleum sector is considered to be in isolation; in other words, it does not contribute much to local markets. In fact, it only employs a small percentage of the local labour force, as investments in the sector are capital-intensive. With its fast-growing population, diversifying the economy and developing other sectors of the economy is essential to provide employment to its teeming population. This becomes more apparent due to the fact that the economy faces fall in oil prices, depletion of oil reserves and the consequent environmental problems. These and other issues faced by Oman require in-

depth analysis that can proffer appropriate economic policies. This is what this thesis attempts to do.

Since the 1980s, there has been rising interest in the relationship between oil revenues and macroeconomic growth in developed and developing countries. It is note-worthy that the downward trend suggested by the Presbisch-Singer hypothesis is not evident in oil prices, but it is the volatility in prices that has increased in the past two to three decades. It is likely that the volatility in the prices could be translated into volatile sources of revenue and may negatively affect the economies of the countries that depend on oil. However, oil prices have generally been on an upward trend. This generates good revenues to the countries, although, amidst uncertainty due to the high volatility of oil prices.

From the extant literature, one can observe only few studies on oil-rich countries where oil revenue is major part of the GDP, such as the Gulf Cooperation Council (GCC) countries, including Oman. It also seems that research on the topic have been complicated by the excessive changes in oil prices since the 1970s. In fact, the debate on the resource curse has been partly flawed by this trend as most oil-rich economies have had considerable economic growth and considerable economic development during the past three decades, particularly, those in the GCC.

However, in the past two years there is a dramatic drop in oil prices, which provokes further interest in the topic and opened new research perspectives. Although this thesis' data are limited to 2013, the changing trend will certainly open new research perspectives if consolidated in the coming years. With the current low oil prices, the GCC countries have been implementing radical measures and budgets cuts, which are aimed at addressing the over reliance on oil by these economies.

On the other hand, the upward trend could resume if we consider the effect of the inevitability in depletion of the oil reserves. Indeed, one could argue that the recent drop in oil prices is primarily due to geopolitical tensions between Saudi Arabia and Russia/Iran over Syria's conflict on the one hand, and Saudi and the US over shale gas and the US/Iranian diplomatic normalcy on the other hand. Many analysts argue that Saudi Arabia's over production has something to do with the US diplomatic normalization with Iran and the US drive for energy independence programme based on shale gas (Crawford, 2016).

This argument is plausible, since Saudi Arabia is not only the biggest oil producer in the world, but it recently pushed up its production levels which might have contributed to the current oil price decline. Secondly, since shale gas production is only viable over a certain crude price (between 70 and 80 USD according to industry analysts), this strategy may also reduce the prospect of shale gas profitability in the US and parts of Northern Europe. However, with social tensions mounting as a result of budget cuts and increases in taxes, Saudi Arabia cannot sustain the current production levels in the long-run. In April 2016, the oil price has recovered a bit due to low shale gas production in recent months. This may lead one to argue that the price may recover in the near future. However, this is only from the supply perspective. The demand structure is also changing, which needed to be taken into consideration.

Oil revenues have boosted economic growth in the GCC countries for over three decades and therefore, a detailed analysis is required to uncover the relation between different components of public expenditure, GDP growth and the oil revenue. Consequently, this thesis investigates the relationships between various macroeconomic variables and economic growth for the last thirty-year period in Oman, a small oil-exporting country where public spending is closely linked to oil revenue. When oil prices rise, the fiscal policy becomes expansionary and when oil prices decline the public expenditure is contracted. From a Keynesian perspective, a reduction in public expenditure causes a fall in total demand, consumption and investment; thus adversely affecting economic growth. Conversely, when oil price declines, the public spending is cut, which affects the economy.

Therefore, the thesis aims at establishing the nature of the relationship between oil and macroeconomic variables in Oman, both in the long- and the short-run. This is in particular, to ascertain the relationships between public expenditure, public revenue and the GDP in Oman as well as the direction of causality between the variables. It is worth noting that this is the first time such analysis where the country's oil revenues, policies and the economic performance is carried out. The work of Hakro and Omezzine (2016) was limited on the impact of global oil price changes on some of the Omani's variable.

Most studies in the literature use cross-country regressions although there are also some case studies focusing on a single country. In contrast with existing cross-country studies, I focus on a single oil-exporting country, Oman and use time series cointegration and Granger causality tests to examine the link between oil revenue and economic performance through the fiscal policy channel with data for Oman. While there may be studies that looked into the relationship

between total revenue and expenditure, this study makes a contribution to the literature as it deals with dynamic interrelationships between oil revenue, government expenditure and economic growth. Second, it uses time series data for 33 years. Also, disaggregated government expenditure is used and examines their relationship with economic growth. Moreover, in contrast to Al-Faris (2002) it makes a clear distinction between short and long-run causal relationships between the variables. Finally, both real and nominal variables have been used as suggested by Beck (1982).

As a small open economy, Oman is a particularly interesting case study for several reasons. Firstly, the public sector in Oman is a major component of GDP as explained in Chapter 2. Secondly, over the past two decades Oman experienced a decrease in the size of the public sector as a share of GDP, accompanied by an increase in GDP for the same period. Thirdly, 70% of total government expenditure is financed by oil revenues which are dependent on international oil market fluctuations. Generally, the public sector is considered as the leading sector and the engine of economic growth in oil exporting countries, particularly the GCC countries[1] (Auty, 2001). The investigation is crucial for Oman from a policy point of view since Oman depends heavily on oil revenue and as oil prices are highly variable due to responses to the changes in demand and supply in international markets.

1.2 Theoretical and Research Issues

1.2.1 The Effects of the Natural Resources

Whilst developed economies are often characterised by revenue diversification, until recently oil-rich developing countries have relied almost exclusively on their petroleum industry for revenue. Consequently, their economic growth has been dependent on oil prices; thus creating an unstable and volatile economic climate which strongly hinders long-term investment. Also related here is the concept of the natural resource curse: most resource-rich countries exhibit a lack of investment in labour-abundant industries and often suffer from underdevelopment and unemployment. There are six theoretically identified channels through which the abundance of natural resource curse translates into underdevelopment and unemployment. The first identified channel is known as the Dutch disease channel: exporting commodities leads to an appreciation in the exchange rate and this in turn leads to a contraction of the tradable sector. The second channel is the education and human capital channel. Natural resources tend to reduce investment in skilled labour and high-quality education. The third channel is investment

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[1] These countries are Bahrain, Kuwait, UAE, Saudi Arabia, Qatar and Oman

and physical capital: abundance in natural resource tends to reduce the incentive to save and invest, thus impeding economic growth.

The fourth channel is the political economy channel which refers to the poor quality of governance and public institutions as a result of rent seeking behaviour due to the abundance of natural resource. The fifth channel is oil price volatility and its impact on public revenue. Indeed, oil price fluctuation is one of the most important challenges facing oil exporting countries. Such volatility puts the economy under the risk of exogenous fluctuations which obstructs planning, increases level of inflation, boost deficits, raises domestic and foreign debts and leads to exchange rate appreciation.

The sixth channel refers to the long-term trends of commodity prices. Raul Prebisch (1950) and Hans Singer (1950) hypothesised that the prices of mineral and agricultural products follow a downward trajectory in the long run relative to the prices of manufactured products. Whilst demand for primary products is inelastic with respect to world income (for every one percent increase in income), the demand for raw materials increases by less than one percent. The Engel's Law is the proposition that households spend a lesser fraction of their income on food and other basic necessities as they get wealthier. This would support the conclusion that over-dependence on natural resources would represent a bad strategy.

1.2.2 The Public Revenue and Expenditure

The theoretical literature has identified four main hypotheses on the relationship between public revenue and public expenditure. The first hypothesis is the '*revenue-spend*' approach, which suggests that a rise in public revenue will lead to an increase in government expenditure and consequently worsen the public budgetary balance (Nwosu and Okafor, 2014). The main advocate of this school of thought is Friedman (1978, 1982) who claimed that raising taxes would lead to more expenditure. This argument suggests that the government would spend all its revenues, and thus any extra revenue would encourage the governments to expand its activities. If this hypothesis holds, it suggests a unidirectional causality from public revenue to government expenditure. Hence budget deficits can be avoided by implementing fiscal policies that stimulate public revenue and diversify sources of income of the economy.

The second hypothesis, the *'spend and tax'* hypothesis promoted by Peacock and Wiseman (1961, 1979) argue that increased taxes arise from increasing government spending and hence

public expenditure brings about changes in public revenue (Aregbeyen and Insah, 2013). Peacock and Wiseman (1979) claimed that a severe crisis that initially increases government expenditure will eventually change the government behaviour resulting in a permanent increase in government tax. This hypothesis evokes a unidirectional causality from government expenditure to government revenue due to economic or political forces; it is sometimes referred to as the displacement effect (Bhatia, 2003).

The third hypothesis is *'the fiscal synchronization'*, which was theorised by Musgrave (1966) and further applied by Barro's (1979) tax smoothing model. In this framework, Meltzer and Richard (1981) explain that spending and taxation decisions are taken simultaneously. In econometric terms, Chang (2009) notes that simultaneous decisions suggest contemporaneous feedback and bidirectional causality between these two variables. Takumak (2014) claims that the government can be seen as a rational agent who takes decisions from comparing the marginal cost of taxation with the marginal benefit of government spending.

The fourth school of thought is the *'fiscal neutrality'* or *'institutional separation'* hypothesis, proposed by Baghestani and McNown (1984). While asserting that none of the above schools accurately describes the relationship between government revenue and government expenditure, they suggest that government revenue and expenditure decisions are taken independently. Takumak (2014) believes that government expenditure is determined by the public requirement while government revenue depends on the maximum tax burden tolerated by the population. Mehrara and Rezaei (2014) add that government expenditure and government revenue are determined separately by the long run economic growth; but they do not affect each other as there is arguably an institutional separation between them. This situation would be characterised by non-causality in the empirical literature (Chang, 2009).

1.2.3 Public Expenditure and Economic Growth: The Wagner's Law or the Keynesian Hypothesis?

Public finance literature and the macroeconomic modelling literature (Ansari, 1993). Public finance studies posit that economic growth causes the growth of public expenditure. On one hand, the macroeconomic modelling literature argues that the growth of public expenditure causes economic growth. These different views on the causal relationship between national income and government expenditure may be due to differences in assumptions (Huang, 2006). Wagner (1890) offered a model of determination of public expenditure in which the growth of

public expenditure is an outcome of increasing national income. He considered public expenditure as a behavioural variable, similar to private consumption expenditure. 'The law of increasing extension of state activity' or the 'Wagner's law' considers economic growth as an essential determinant of the size of the public sector.

On the other hand, the macroeconomic literature treats public expenditure as exogenous. Keynes argues that government spending enhances economic growth by injecting purchasing power into the economy (Biswal et al., 1999). Keynesian theory considers public expenditure as a policy instrument designed to correct short-term cyclical fluctuations in aggregate expenditure (Singh and Sahni, 1984). In line with this, governments play a major role during times of recessions by borrowing money from the private sector to diffuse it back into the economy through various spending programs.

The Keynesian theory predicts how total spending affects national output. According to this this theory, the level of employment and national output is determined by effective demand (Ansari et al., 1997). Keynes argues in his "General Theory of Employment, Interest and Money" (Keynes, 1935) that government intervention in the marketplace is the only method of ensuring stability and economic growth. Keynesian economists believe it is the government's job to smooth out the business cycles fluctuations (Dogan, 2006). So the government should control the level of aggregate demand to avoid insufficient or excessive demand by adjusting government expenditure and taxation to reach full employment (Demirbas, 1999). The endogenous growth models have lent support for the public sector role in economic growth. The endogenous growth models postulate that the economy's output is conditional not only on the level of labour stock and physical capital, but also on additional production factors which may enter the production function with constant returns to scale alone (Barro, 1990). If this is the case, there is a possibility of both long-term effect and temporary effect from government spending on economic growth. This provides some support for the fiscal policies aiming at enhancing economic stability and increasing economic growth as suggested by the Keynesian hypothesis.

1.2.4 The Twin Deficit Hypothesis

Theoretical literature on the relationship between the current account and fiscal deficits presents four suggestions. Keynesian absorption theory argues that fiscal deficit would lead to the current account deficit. The Mundell-Fleming model suggests that fiscal deficits increase

the current accounts deficits through the effects of interest rates and exchange rates changes. The risk premium hypothesis supposes that changes in exchange rates affects domestic consumption through the perceived rise/fall in assets' value and this affects the country's exports as a result of rises in price level (Bachman, 1992). The last view is that of the Ricardian Equivalence that postulates that there is no relationship between the current account and fiscal deficits.

1.3 Motivations, Research Objectives and the Hypotheses

This section outlines the motivation and the main research objectives of the thesis, based on the theoretical introduction summarised above.

1.3.1 The Relationship between Oil revenue and Government Expenditure

Over the past three decades, a large number of studies have investigated the link between government revenue and government expenditure focusing on oil-importing countries; whereas those focusing on oil-abundant economies are rarer. In most oil-exporting countries, oil revenues are paid directly to the government and hence the government becomes the channel through which oil revenues flow into the economy.

The policy-makers need to understand the dynamic relationship between oil revenue and expenditure in order to make decisions based on evidence. With a good understanding of this relationship and appropriate policy, the natural resource curse would turn out to be a blessing. The analysis is crucial for Oman from a policy point of view since its budget depends heavily on oil revenue, where oil revenue represents on average 80% of government revenues although with the recent level of oil price volatility, the percentage is dwindling dramatically. The determination of the direction between these macroeconomic variables would help policy makers explore the origin of fiscal imbalances (Petanlar and Sadeghi, 2012).

It is the growth in oil revenues that can boost the GDP through the fiscal channel. Hence, the hypothesis to be tested by the empirical chapter is whether the revenue-spend approach is predominant in Oman in the past thirty years. It is stated as:

Hypothesis 1: the revenue–spend approach does not hold for Oman; whereas increasing oil revenues increases public expenditure and vice versa

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1.3.2 Oil Revenue and Economic Performance: The Fiscal Channel

Whilst most studies investigating the relationship between oil prices (hence revenue) and macroeconomic variables are on developed oil-importing countries, very few studies have explored this relationship for oil-exporting countries where the impact of oil prices and revenue is likely to be drastically different. The channels by which oil prices may affect economic performance have not been systematically documented in oil-exporting countries, but several studies have argued that variations in the fiscal behaviour have exacerbated output cycles (Erbil, 2011). Some studies argue that fiscal policy and its pro-cyclicality is one of the main channels of the natural resource curse. Bleaney and Halland (2009) investigate the fiscal policy volatility channel by using primary exports and volatility together in a growth regression for 75 countries over the period 1980-2004. They found that the volatility of government consumption is explained by natural resource exports and that greater fiscal volatility acts as a transmission mechanism for the resource curse.

Oman is a small oil-exporting country where public spending is tightly linked to oil revenue, which accounts for a substantial part of the public budget. Therefore, the response of fiscal policy to rising oil prices may be expansionary and when the prices fall the government may cut the expenditure. In this context, the role of fiscal policy might be a channel through which the fluctuations in oil prices are transmitted to the rest of the economy. Hence, as it is argued from the Keynesian viewpoint, a reduction in public expenditure can cause a fall in total demand, consumption and investment. Consequently, this will adversely affect economic growth. On the other hand, when oil prices rise, economic growth will resume as a result of the spending effect multiplier.

The effect of oil revenue on economic growth and the mechanisms through which oil price shocks can be transmitted to economic growth from the government expenditure in Oman are analysed. This is to examine how oil revenues affect economic growth directly and indirectly through the fiscal policy channel.

It is assumed that the revenue-spend approach is predominant in Oman and therefore, the country has escaped from the natural resource curse. The main specific and sub-hypotheses are stated as:

Hypothesis 2: Oil revenue has positive effects on the Omani economic activities.

1.3.3 Causality between the Public Expenditure and Economic Growth

The relationship between public expenditure and the economy has been investigated in the related literature using cointegration tests (Jiranyakul and Brahmasrene, 2007). Indeed, empirical testing and determination of causal direction only became possible with the use of this approach (Sims, 1972 and Demirbas, 1999). Causality analysis using time series econometrics has not convincingly determined the nature and direction of the relationship between government spending and economic growth. It seems that there are some methodological shortcomings that make results in this area rather inconclusive. In addition, to my knowledge there is no time series study using cointegration and Granger causality for Oman. In fact, only two cross-country studies have included Oman in their sample. Al-Sheikh (2000) investigates the existence of Wagner's Law for 27 countries including Oman using aggregate government spending and national income. The results support the Wagner's Law for most countries including Oman. Al-Faris (2002) examines the relationship between disaggregated government expenditures and national output for GCC countries without making a clear distinction between long and short-term relationship.

As a small open economy, Oman is a particularly interesting case study for several reasons. First, the public sector in Oman is a predominant component of the GDP, on average, accounting around 43% of the GDP for the period under study (1980-2005). Second over the past two decades Oman experienced a decrease in the size of the public sector as a share of GDP. Third, about 70% of total government expenditure is financed by oil revenues which are subjected to international oil market fluctuations. More generally, the public sector is considered as the leading sector and the engine of economic growth in oil exporting countries, particularly the GCC countries which are highly dependent on oil revenues (Auty, 2001).

The relationship between aggregated and disaggregated government expenditures (public investment expenditure and consumption expenditure), and the GDP was analysed to test Wagner's law within a time-series framework. The Granger causality test was also employed to check whether the causal relationship is in line with the Wagnerian (government expenditure

is an endogenous variable) or Keynesian hypothesis (government expenditure is an exogenous variable).

ARDL cointegration test in a multivariate system based on the Keynesian growth function proposed by Ram (1986) was used to analyse the long-run and short-run dynamic interactions between disaggregated government expenditures (education, health and military) and the GDP were explained.

The contribution to the literature is three-fold. First, the use of Oman's data. Secondly, in contrast to Al-Faris (2002), both the short-run and long-run causal relationships have been examined. Finally, both real and nominal variables are used to address the issue of the suitability of variables in the literature (Beck, 1982).

The hypotheses and the sub-hypotheses relevant for the chapter are:

Hypothesis 3: The relationship between total expenditure and GDP is Wagnerian/Keynesian.

H3.1. GDP Granger causes total expenditure.

H3.2. Total expenditure Granger causes the GDP.

H3.3. There is a bi-directional Granger causality between total expenditure and the GDP.

The model using the disaggregated data tests that:

Hypothesis 4: The relationship between recurrent expenditure and GDP is Wagnerian.

Hypothesis 5: the relationship between capital expenditure and GDP is Keynesian.

1.3.4 Components of government expenditure and growth

Government expenditure in Oman has continuously risen in the last three decades due to increasing oil revenue and increased public demand for infrastructure, such as energy, communication, education and health services. Defence expenditure has also dramatically increased during this period, a phenomenon observed in all the GCC countries. The continuous decline in oil price since the summer 2014 has put the government under considerable pressure. Although the causes of such an oil price decline do not seem structural, the phenomenon may

be prolonged by the political economy nature of oil. This includes different relationship between the major producers such as Saudi Arabia and Iran. Other major factors one could cite include the economic slow-down in China and other emerging economies which has considerably reduced demand for oil. These and couple with the fact that oil production and exporting have resumed Iraq and Libya as well as the easing of Iranian sanctions by the western countries may have also increased the supply-side. In addition, whilst shale gas exploration in the US had exploded in the years 2014-2015, it is argued that Saudi Arabia has maintained its highest level of oil production during the same period may not be a coincidence. All these have forced Oman and other oil-dependent countries to search for other public revenues through increased taxation and cut expenditures to control budget deficit. Like many developing countries, Oman lack effective means of tax collection; thus the main solution involves decreasing government expenditure by prioritizing government spending in order to find which government spending component has least effect on the economic growth.

Whilst the government plans to decrease total expenditure by 10%, a crucial question is which component of the government expenditure should be cut without adversely affecting economic growth. Attempts to provide answers to these questions are searched by empirically estimating the effects of three main government expenditures: education, health, and military spending on economic growth in Oman.

There are a number of empirical studies analysing how the composition of public expenditure affects economic growth and also how to distinguish between productive and unproductive expenditures (Aschauer, 1998, Devarajan et al., 1996, Nurudeen et al., 2010 and Sugata et al., 2008). This area of research is particularly important today as many oil-dependent countries are looking into how to rectify their fiscal dependence on oil and reducing some of their expenditure components that are considered to be less efficient, or less likely to affect economic growth to address their fiscal deficits.

As studies investigating the impact of total government expenditure on economic growth do not provide a clear picture, it may be that only some components of expenditure significantly affect economic growth. Health and education spending is expected to improve the total productivity and so may positively affect the growth, while other components may not be significant. Aschauer (1988) and Barr (1990) theorise that government expenditure on productive activities have a positive association with economic growth while government consumption is negatively related to economic growth. Meanwhile, empirical studies

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disaggregating government spending by Derajavan et al. (1996), Feder (1983), Landua (1983), and Afonso and Jalles (2013) for both developed and developing countries provided mixed results. There is also a lack of empirical work using disaggregated data, and on the GCC countries and Oman in particular.

Therefore, the objective of empirical Chapter 6 is to analyse the impact of the three main government expenditure components on Oman's economic growth. Following Ram (1986), a model in which total government recurrent expenditure is disaggregated into expenditure on education, military and health is used. Total investment and openness were included following the practice in the literature. The following two main hypotheses are the main interest of the chapter:

Hypothesis 6: Economy openness, total investment, education, health and military expenditure boost the GDP in the short-run.

Hypothesis 7: Economy openness, total investment, education, health and military expenditure boost the GDP in the long- run.

Given the declining and volatile oil prices, this chapter complements the previous chapters in order to provide guidance for policy-makers regarding the usage of limited public resources.

1.3.5 The Twin Deficits Hypothesis:

The relationship between the fiscal deficit and current account deficit has received considerable attention in the past two to three decades. However, neither the theoretical literature nor the empirical one seems to suggest any emerging consensus. The empirical results as well as the theoretical explanation of the relationship between the two have different policy implications. Secondly, most of the empirical works are on developed countries. The empirical chapter 8, investigates this relationship for Oman and the specific hypotheses for the chapter are:

Hypothesis 8: Current and fiscal deficits are related in Oman

Hypothesis 9: Adjustments between current account and fiscal deficits in Oman are asymmetric

1.4 An Overview of the Empirical Chapters

The thesis comprises five empirical chapters in addition to the Introduction, the Overview of the Omani economy, the Literature Review and the Conclusion. The first empirical chapter investigates the dynamic relationship between oil revenue, government expenditure and the GDP. The relevant literature has generally concentrated on developed and oil-importing countries. The impact of oil price shocks on economic growth and their transmission mechanism in oil-exporting countries are most likely to be different from those in oil-importing countries. A few studies have investigated this kind of relationship for oil-exporting countries. The channels by which oil prices may affect economic performance have not been systematically documented in oil-exporting countries; however, several studies have argued that variations in the fiscal policies in such countries have exacerbated output cycles (Erbil, 2011). This chapter focuses on the effect of oil revenues on economic growth and the mechanisms through which that effect can be transmitted to economic growth from the government expenditure.

The second chapter tests the validity of Wagner's law versus the Keynesian hypothesis. Wagner's Law considers public expenditure as a behavioural variable; similar to private consumption expenditure. Wagner's Law 'of increasing extension of state activity' is known as one of the public finance theories that emphasises economic growth as a fundamental determinant of the size of the public sector. On the one hand, Wagner's Law states that as real income per capita of a country increases, the share of public expenditure also increases (Chang, 2002). On the other hand, the macroeconomic modelling literature argues that the growth of public expenditure causes economic growth. These two contrasting views have not been tested for Oman. This chapter tests this and I find that oil revenue has a positive effect on GDP through the fiscal policy channel. Granger causality tests, using the aggregated data in real terms suggest the validity of Wagner's Law and the Keynesian hypothesis on total government expenditure. However, when the data are disaggregated, the results are completely different. The causality tests suggest a unidirectional causality from the real GDP to recurrent expenditure and running from capital expenditure to real GDP. Hence, the Keynesian hypothesis holds only for capital expenditure whilst Wagner's Law is valid for recurrent expenditure. Herein this chapter, in contrast to the existing literature, particularly, Al-Faris (2002), both short-run and long-run causal relationships are identified. Finally, to overcome the recurring issue of the appropriateness of the variables, we use both real and nominal terms (Beck, 1982).

The third chapter complements the second one by disaggregating government expenditure into health, education and military spending and investigates how each of the composites of the government expenditure affects economic growth. It is believed that an effective use of limited public resources can decrease government size without affecting economic performance. A crucial question is which component of government expenditure could be least affecting economic growth of Oman. This chapter attempts to provide an answer to this question by empirically estimating the effects of disaggregated government expenditure on economic growth in Oman.

The fourth chapter looks into the relationship between the Omani government expenditure and its oil revenue. The chapter aims at providing an understanding of the nature of the relationship between these variables, which is essential for sound policy formulation and implementation.

The fifth and final empirical chapter investigates the twin deficits hypothesis the relationship between the current account and fiscal deficits in Oman. This is important as a sharp decline in oil revenue, which the country depends on, has started hurting the economy, leading to fiscal deficits, on one hand and on the other, the country depends on imports for most of its capital and consumable goods. Understanding the nature of the relationship between these deficits will assist in developing appropriate economic policy for the country.

Chapter 2

Overview of the Omani economy

2.1 Introduction

The production of oil in commercial quantities started in 1967 in Oman, and increasing oil revenue in the 1970s had a significant impact on the course of economic development in the country. As in other oil-exporting countries, government revenue increases are mainly due to oil price rises as oil proceeds constitute the major source of income. Since the 1970s, oil proceeds have allowed the Omani Government to increase both its recurrent and developmental expenditure. Investment has first focused on building infrastructure: roads, schools and hospitals and providing various public and social welfare services. Whilst the country needed such infrastructure, overreliance on oil revenue and increases in government expenditure appears to be increasing pressure on the government.

Source: http://www.lonelyplanet.com/maps/middle-east/oman

In addition, increasing oil price volatility due to worldwide speculation accentuated the economic instability of oil-exporting countries in particular; and the global economy in general. As a result, the economy suffers from increased public expenses largely fuelled by unsteady oil revenues that impact on the country's economic growth. In this chapter, the analyses of the relationships between the country's main macroeconomic variables and oil revenue aims at providing a good understanding of the economies issues in Oman. A Regional map showing Oman is given below for ease of reference.

2.2 Economic Development and Reforms

Oman started its economic expansion in 1970 through economic programmes introduced by Sultan Qaboos, who came to power that year. Oman, with a small population of 2.5 million, was classified as an upper-medium income developing country, with annual GNI per capita of $20,131 in 2012 (National Centre for Statistics and Information). Although Oman's oil resources are in absolute terms modest compared to neighbouring countries such as Saudi Arabia or the UAE, the country's economic development is similarly dependent on oil exploration and production (Oman Chamber of Commerce). Although its share of total GDP is declining, the petroleum industry remains the backbone of Oman's economy; averaging 70-80% of public income and more than 70% of total exports. It currently represents 35% of GDP, down from 70% at the beginning of the 1970s (National Centre for Statistics and Information).

The Omani economy expanded by 76% during the 1990s, which was mostly due to rising oil prices. More recently, liquefied natural gas (LNG) production has also substantially boosted the country's economic growth (National Centre for Statistics and Information). During the last three decades, greater input of external capital, optimal utilisation of oil revenues, sustained political stability and increasing private and public investments in the non-oil economy, as well as technological transfers, have been the other sources of economic growth in Oman (Oman Achievements and Challenges, 2004).

Records from the Ministry of Finance have indicated that the Omani Government has an excellent debt service record which suggests a positive impact on its relationship with foreign financial institutions. This gives the country low default risk. The budgetary surplus has been devoted to accumulating foreign assets and lowering debt since 1999 (National Centre for Statistics and Information). As a result, national debt has declined from 32.2% of GDP in 1998 to 16% in 2002. These figures obtained from various sources (the IMF, the country's central

bank, Central Bank of Oman (CBO), and the Ministry of National Economy) show that the economic performance appears to sound before the current oil price slump.

Nonetheless, the country's economy is inherently unstable due to its dependence on a source of income which is highly volatile: oil proceeds. For example, as a result of decreasing oil prices between 1986 and 1990, Oman's economy experienced an economic recession. Fluctuations in oil prices and moderate oil reserves reinforce the importance of diversifying the sources of government revenue through structural reforms. The aim is to develop of non-oil, and more sustainable economic activities. The government is focusing on agriculture, fisheries, mining, light and heavy industry. Tourism has also been considered a key part of the diversification effort (Sustainable Development Indicators, 2006).

The objectives of the Omani industrial strategy, according to the Ministry of Commerce and Industry, are to increase value-added products and export-oriented manufacturing output, as well as encouraging foreign direct investment (FDI) through privatisation and opening different sectors of the economy to foreign and private investors. Recently, the government has started to construct large industrial projects, such as an aluminium smelter project and a petrochemical complex project, which will help to diversify export earnings in the long term (Ministry of Commerce and Industry).

FDI remains small and mostly confined to tourism and the hydrocarbon sector. The government has recently offered many incentives to encourage more FDI into the non-oil sector. A corporate tax law from 1996 allows non-Omani investors to pay the same very low tax as their Omani counterparts. Companies with foreign ownership also get tax exemption for five years. Oman is trying to attract more foreign investment in tourism, telecommunications, financial services and utility projects (National Centre for Statistics and Information website).

In the late 1990s, as Oman was looking for greater opportunities for outward and inward investment, the country undertook the necessary reforms to become a member of the World Trade Organisation (WTO). This committed Oman to greater deregulation in order to improve FDI and to foster domestic competition (National Centre for Statistics and Information website). Under the WTO's laws, foreign equity participation should be permitted in insurance, banking and brokerage services. Thus when the country obtained the WTO membership in 2000, it further helped facilitated access to additional regional markets by non-Omanis.

Figure 2.1: World Oil Prices

Brent crude oil price, 1988-2015
Source: Bloomberg

Figure 2.1 depicts the world oil prices. When oil prices fell below $10 per barrel in 1998, the Omani authorities launched a diversification programme known as Vision 2020. It involved utilising oil and gas proceeds to finance infrastructure projects. Vision 2020 was a blueprint for development aiming at putting the economy on a par with newly industrialised developing economies by implementing fundamental structural reforms. These reforms include deregulation, heavy investment in the non-oil sector, greater liberalisation and opening the economy to foreign investment in order to benefit as much as possible from the spill-overs of globalisation. Additionally, one of the main objectives of this long-term development program is to apply fiscal reform by reducing public expenditure to 38% of GDP. It also emphasises human capital development by enhancing skills in technical and engineering fields; thus boosting the diversification of the (Oman Achievements and Challenges, 2006).

The government plans to have the economy fully diversified within the next five years, as laid out in Vision 2020 blueprint. It is also planning for the oil industry's share of GDP to fall to about 9% and the non-oil sector to be the main contributor to the GDP by 2020. According to Vision 2020, a developed industrial base is vital for a sustainable growth which will not be threatened by the incessant fluctuations in the world oil markets. However, progress towards

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achieving Vision 2020 remains a big challenge to the government. For example, privatisation plans are not moving ahead as quickly as some local business had hoped, although the government argues that privatisation is progressing at a rate that is appropriate to the market conditions of the country.

Oman, like many other developing countries, has had problems in harmonising and implementing economic plans. The government's economic policy has operated according to five-year development plans since 1976 (Evaluation of Oman National Economy Performance, 2006). The second five-year plan (1981-85) suffered from the impact of falling oil prices in the early 1980s. The third and fourth development plans' objectives were to encourage the private sector to play a larger role in the economy, achieve average economic growth of 6% and increase the rate of diversification of national income sources to reduce dependence on oil revenues. The aims of the fifth and sixth development plans were to achieve a balanced budget and reduce dependence on government spending and employment in order to let the private sector be the engine of economic growth (Evaluation of Oman National Economy Performance, 2006). The actual achievements of most of these plans are so far limited relative to their original goals.

High population growth has exerted pressure on public services and forced the government to increase its provision of public goods; it has also created an excess of labour supply. About 50,000 nationals enter the labour market annually, and unofficial estimates put the unemployment rates between 10 and 15% (National Centre for Statistics and Information website).

Since the beginning of the first of these five-year plans, the Government of Oman has recognised that the oil sector's huge potential is already being realised and utilised. Consequently, long-term economic strategy should first be focusing on sustaining the growth of non-oil sectors. Secondly, it should also consider serious fiscal consolidation in order to enhance economic growth and create more jobs in the economy. However, some of the objectives included in the plans seem to be overambitious, and achieving them will be a challenge. For instance, raising the contribution of the non-oil industrial sector to 29% of GDP by 2020 appears as a tough objective. Moreover, the government intervention strategies to achieve some of the objectives of Vision 2020 remain unclear.

The International Monetary Fund (IMF) lowered its forecast for Oman's economic growth to 1.8% in 2016 from 2.8% in 2015. The Fund said macroeconomic indicators suggest that economic activity in Oman fell short of expectation, a result of the drop of oil prices, which is the main source of public budget. The Fund has expected inflation to remain at 0.3% in 2016, but Oman's current account balance is expected to jump from 12.6% in 2015 to 25.1% of GDP in 2016 because of big drop of oil revenue.

In general, Oman seems to be at the crossroads between an oil-based economy and a diversified private sector-led economy. To achieve the stated objective of Vision 2020 - to transform the country to one of the most dynamic Middle Eastern economies in the next decade – Oman appears to be running out of time. The initial plan rightly suggested that the government should restructure its spending in such a way that it will lead to sustainable growth and also help diversify the economy in order to reduce its dependence on increasingly volatile oil prices. As diversification cannot occur without the appropriate human and technological capital, the government is facing serious challenges with regards to unemployment. The Omani government needs an action plan to restructure public budget to achieve and sustain economic growth and stability.

2.3 Oil Revenue and the Omani Economy

The public budget structure in most oil-abundant countries has followed a similar pattern; oil revenues constitute its biggest part and tax revenues are only a small and fragile component of the structure. There are various factors affecting oil revenues such as nominal crude oil prices, political decisions, oil reserves and oil production capacity. All these factors cause fluctuations in the size of oil revenue as shown in Figure 2.1 where the highest peak was in 2013 and the lowest was in 1986. Figure 2.1 shows the percentage of oil revenue to total revenues in Oman for the period 1978-2012. Over the whole period, oil revenue constitutes, on average, around 64% of total revenue. Between 1983 and 1986 oil prices dropped and as a result, the percentage decreased sharply from 90% to about 75.4%. However, with the subsequent oil price rise the percentage went up again to reach 82% in 1990. Afterwards, it fluctuated dramatically between 65% and 80%, with an average downward trend and a lowest percentage of 64.7% in 2006. The bulk of the increase in oil revenues was recorded during the period from 2007 to 2012 because of the unusual rise in the price of oil, which regularly exceeded $100 per barrel between 2008 and 2009. As a result, the contribution of oil revenue to the public budget increased rapidly. Overall, Omani government has tried to reduce the share of oil in total

revenue but with a share above 65% the diversification process is still ongoing. The fluctuation is mainly due to oil price changes whilst on average the share has been reduced from around 90% in the early 1980s to around 70% since the late 1990s. Based on this, the share of oil revenue is likely to stabilise below 65% and probably reach 60%.

Oil Revenue Percentage of Total Revenue
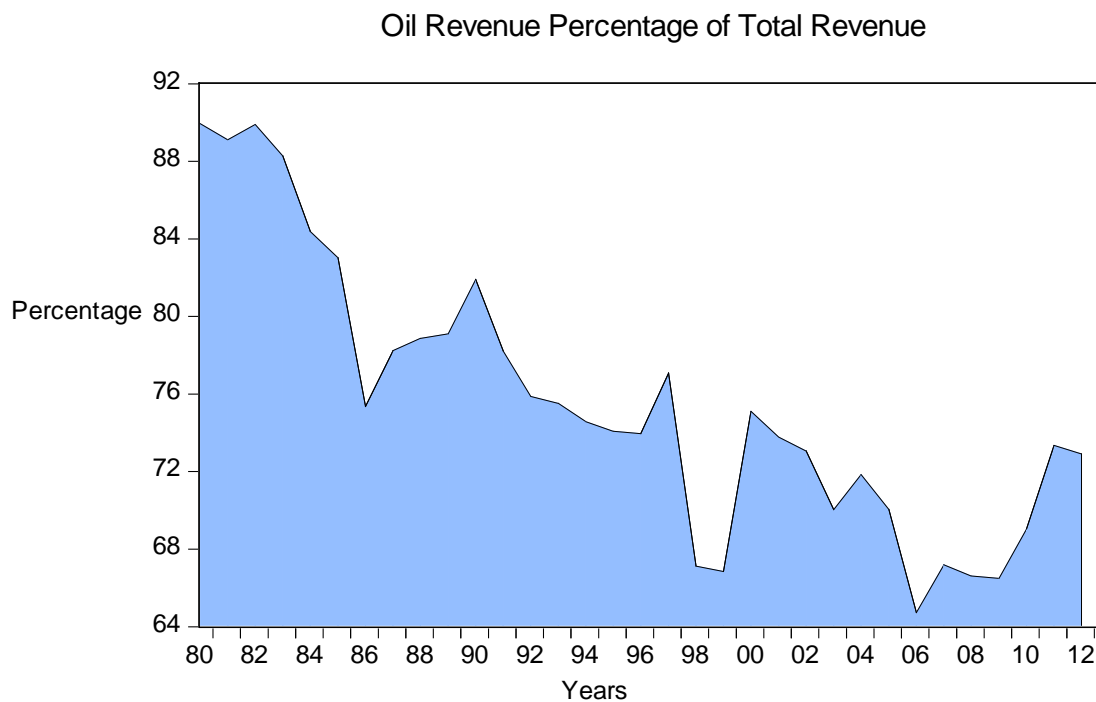
Figure 2.2
Source: author own data

Figure 2.2 shows the pattern of the Omani net oil revenues for the period 1980 to 2012. From 1980 to 1997, oil revenues had risen gradually but in marginal proportions before a sharp decline in 1998 and 1999. Between 2001 and 2002, global oil revenues have seen a decline as a result of the sharp drop in oil prices because of the dot com burst recession, which was aggravated after the events of September 2001. Given the impact of the US economy on the rest of the world, global demand for oil decreased, causing a huge fall in oil prices that reached about $23 per barrel in 2001. However, the Oman oil revenues increased in that same period. This may be due to technological advancements in oil extraction or the sector in Oman experienced an increase in the rate of oil production. Consequently, oil revenue increased from 1.8 billion Omani Rial (OMR) in 2001 to more than 2.2 billion OMR in 2002.

Net Oil Revenue

R.O. Millions
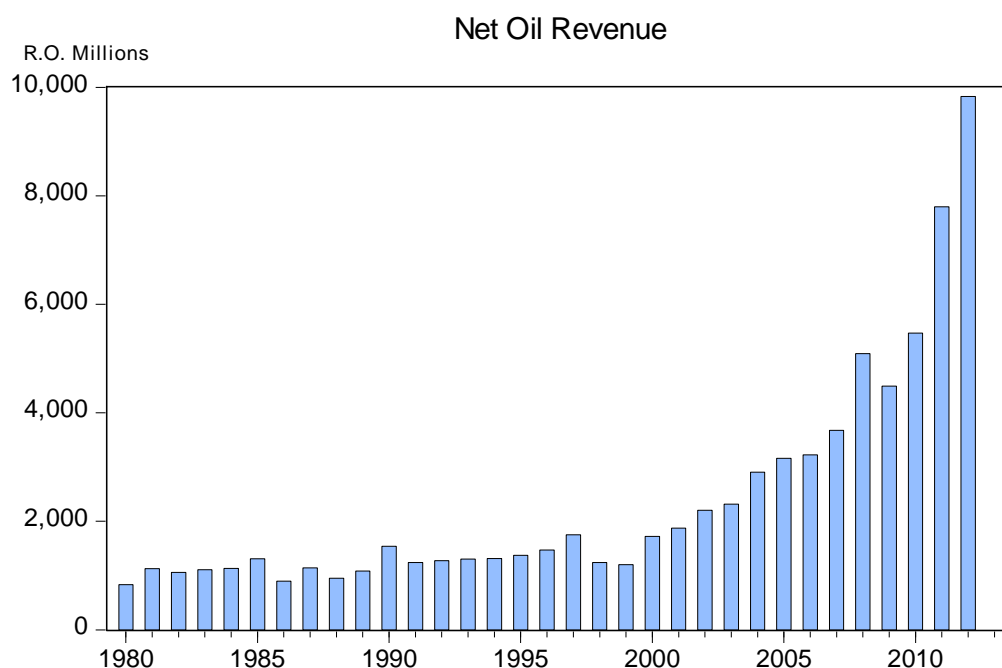
Figure 2.3
Source: author own data

It can be noted from the data presented in Figure 2.3 that oil revenues quadrupled in size during the last decade (2003-2012), rising from 2.5 billion OMR in 2003 up to 10 billion OMR in 2012. This increase took place due to the rise in global crude oil prices from $27/barrel in 2003 to peaks around $140 per barrel in 2008, which is the highest level ever reached. Meanwhile, the increase in the volume produced in Oman met the increasing global and domestic demand for oil. These developments, however, seem to have created and nurtured a huge fiscal expansion in the country.

2.4 The Oman Government Expenditure

In the 1970s and the 1980s Oman embarked on a modernisation programme that moved the economy into a new economic era; assisted by the revenue derived from the oil exports and rising oil prices. This phase necessitated a strong state intervention into economic activities, which resulted in high government spending during this period. For instance, government spending jumped from 46 million OMR in 1975 to more than 1.9 billion OMR in 1985. Huge public investments boosted economic growth and created jobs for the Omani youth. Positive economic growth rates pushed the government to continue its oil-driven expansion strategy for the expenditure in spite of the risks associated with it relying on one source of income.

The oil price crisis of 1986 had a big impact on the Omani economy and exposed the weakness of such a strategy; it also revealed the fragility of the country's tax system. Since the beginning of the 1990s the government began considering economic reforms in order to change the pattern of economic structures and mitigate the dependency on oil revenues. However, this new strategy did not lead to lower rates of government spending rather the volume of public expenditure doubled from 2.2 billion OMR in 1993 to 4.2 billion OMR in 2005. This owed primarily to the significant expansion of government services and social welfare. During this period, rises in oil prices gave some financial reserves to the government. Efforts to exploit alternative revenue sources led to further expansionary fiscal policy in terms of high volume of public spending to support their developments. This trend is in line with the Keynesian fiscal policy to activate the aggregate demand by stimulating major public investment projects. This fiscal policy has contributed significantly to the improvement of economic indicators, most notably the rate of real economic growth, which reached 7% in 2001.

The period from 2005 to 2012 has witnessed a constant growth in the size of government expenditure, as a result of continuously high oil prices and increased oil productivity. Thus oil revenues jumped from 4.2 billion OMR in 2005 to about 7.9 billion OMR in 2010 as shown in Figure 2.3. Such government spending continues to increase because it is important in the volume of economic activity from the point view of the government officials. From 2010 to 2012, government expenditure continued its rise to reach 13.5 billion OMR in 2012 as depicted by Figure 2.4. This increase is mainly due to a rise in recurrent expenditure, especially in the form of wages and social benefits. In fact, the government was forced by youth demonstrations during the Arab Spring of 2011 to employ large numbers of job seekers in various government sectors. The actual problem facing the government is that most of these expenses are fixed and cannot be easily reduced in the event of declining oil revenues.
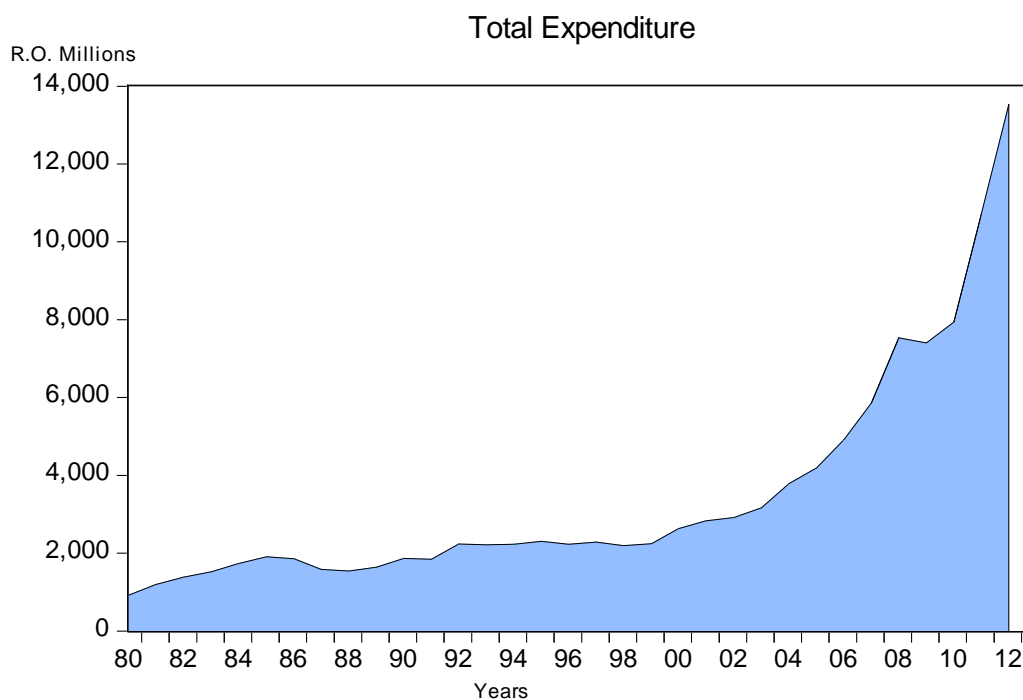
Total Expenditure

Figure 2.4
Source: author own data

2.4 GDP, Government Expenditure and oil revenue

Figure 2.5 shows the relationship between the GDP, the total government expenditure, and the oil revenues of Oman during the period 1980-2012. It can be seen that government expenditure rises along with oil revenue, but does not fall when oil prices fall. This can be attributed to the inflexibility of recurrent expenditure that does not decrease easily when oil revenues fall because of high social pressure against salary reduction. The other characteristic of the Oman public budget is that when oil revenues increase, total expenditure rises at accelerated rates exceeding total revenues. For example, between 1980 and 1985, oil revenues increased by 57%, but government expenditures rose by about 103%, causing budget deficit in 1984 (about 18% of total revenues). Such deficits in oil-exporting countries such as Oman creates pressure to expand oil production and exports to raise revenues in order to address the budget deficits.

Since 1987, oil revenue increased gradually until 2006. Thereafter, oil revenue has risen sharply and so the government expenditure and the GDP closely followed the trend and increased at similar rates until all three variables reached the peak in 2008. In 2009, all three variables witnessed similar decrease due to the effects of the global financial crisis, which impacted the global demand for oil, causing a decrease in prices. From 2010 onwards, oil

revenues returned to a rising trend again dramatically and also both government expenditure and the GDP increased at accelerating rates.

Oman GDP, Expenditure and Oil Revenue 1980-2013

R.O. Millions
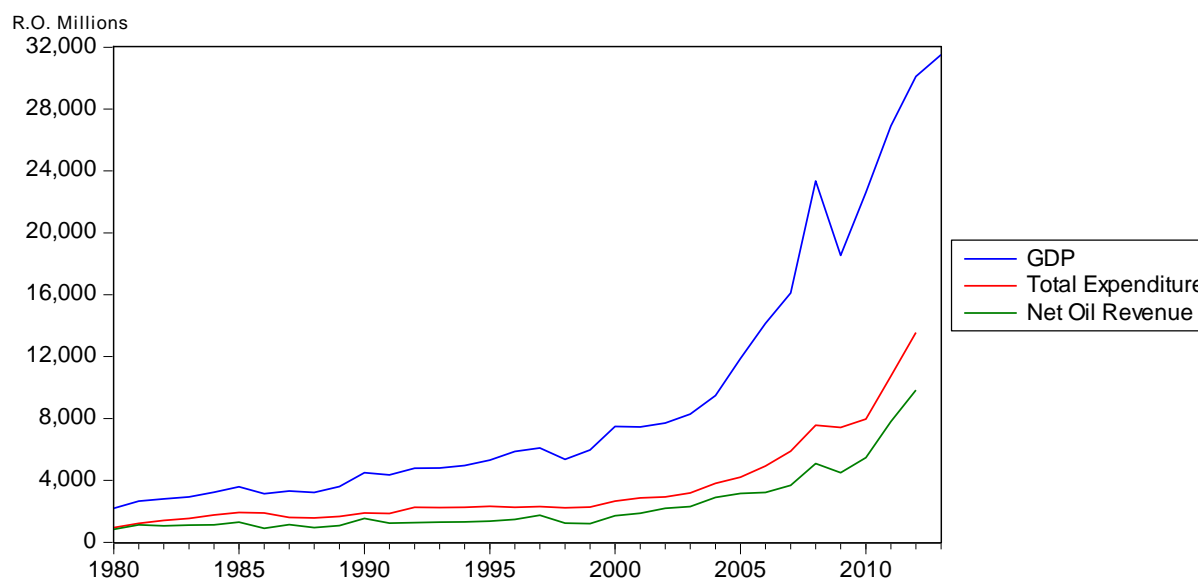
Figure 2.5

Source: Author's own data

In general, it can be deduced from Figure 2.4 that government expenditure increases are mainly associated with rises in global oil prices and the Omani oil production. These injections into the economy boosted the GDP to reach $80.57 billion in 2013. One could confidently assert that net oil revenue, total expenditure and the GDP seem to be positively correlated. Nevertheless, the relationship between government spending and revenues is likely to be weaker when oil revenues decline because some key components of government expenditures can be considered as nearly fixed expenditure such as employees' salaries. In conclusion, although the graphical evidence suggests a positive correlation between all three variables; the literature review in the next chapter shows that an asymmetric adjustment is plausible when we consider the strategies adopted by the Omani government. Whilst an increase in oil revenue is likely to increase the government expenditure; a decline in oil revenue is less likely to cause a similar decrease in expenditure.

Ministry of Oil and Gas is responsible for the oil industry and the revenues generated from therein are controlled by the country's ministry of finance. The oil revenues are obtained by

the government through two sources: direct and indirect. The first is from the activities of the Oman Oil Company S.A.O.C. (OOC), which is a commercial company wholly owned by the Government of the Sultanate of Oman. The latter through the issuing of licencing to oil prospective companies who pays royalties to the government.

Oman is a founding member of the Cooperation Council for the Arab States, which is an economic union that comprises of six Gulf countries of Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia, United Arab Emirates and Oman. The country has also signed free trade agreement with some countries that include the United States, which came into effect in 2009.

The central bank of Oman is not completely independent, but enjoys professional regards. The bank was established in 1974 and like other central banks, is in charge of the implementation of the country's monetary policy. Oman operates fixed exchange rate regime, pegging its currency to the US dollar since the 1970s.

Figure 2.6:
Oman Inflation

Sources: Oman Office of Statistics
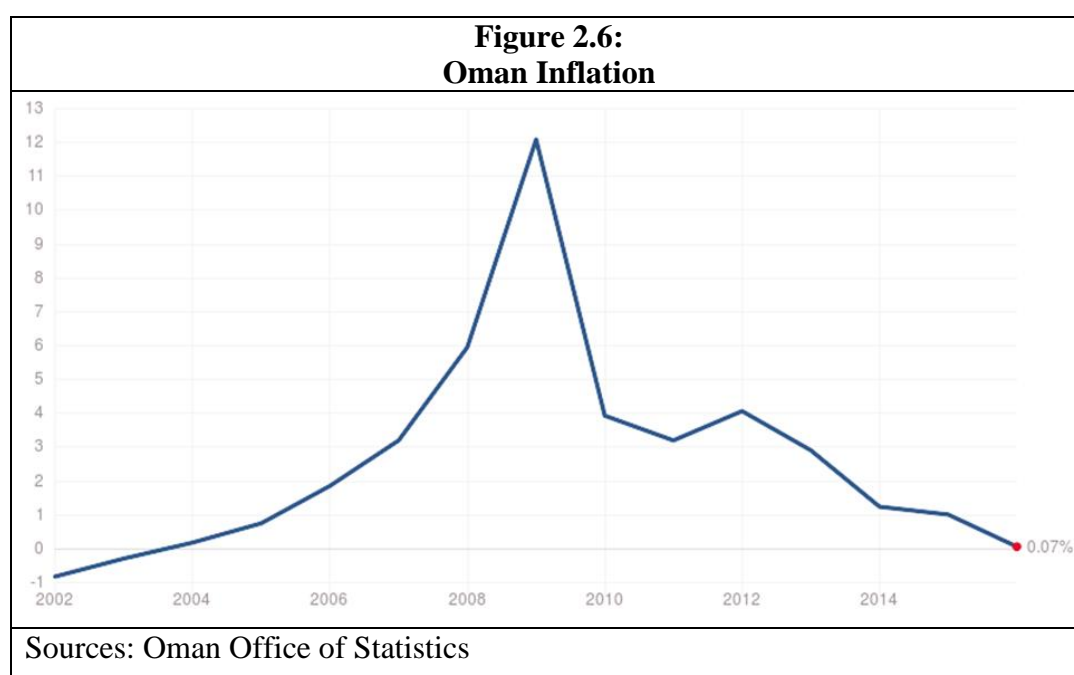
Inflation has not been a big issue in Oman. This has been depicted by Figure 2.6, where it shows the only period that a 7% inflation rate was recorded was during the 2007-8. This was mostly an imported inflation due to the rises in food prices that Oman depended on their importation.

Chapter 3

Literature Review

Natural Resource Abundance and Economic Growth

3.1 Introduction

This chapter presents relevant literature. It starts by looking at the natural resource abundance and economic growth and follows by reviewing the literature on the relationship between the government spending and economic growth. Then discusses the behaviour of government expenditure toward public revenue.

3.2 The Natural Resource Abundance and Resource Curse

There is a large body of literature that focuses on the relationship between resource-abundance and economic growth. Simple economic intuition would suggest that an increase in natural resources would have a potentially beneficial role in fostering economic development by converted into capital to support future output levels (Rodriguez, 1999). Theoretically, resource abundance can also give a "big push" to an economy through more investments in health, education programs, construction of roads and modernisation of telecommunication systems and so the whole economy benefits from such resource rents (Iimi, 2007).

However, the experience of various countries over recent decades reveal that availability natural resources may frustrate economic growth instead of promoting it. Sachs and Warner (1995) conducted a large cross-country study and report that there is a negative association between natural resource abundance and growth. Thereafter, there has been a growing literature focusing on the disappointing economic performance of natural-resource-rich countries and thus the phenomenon of "resource curse" appeared in an increasing number of papers (Iimi, 2007). The phenomenon has been studied from three different perspectives. The first strand of literature focuses on the negative association between resource abundance and growth-inducing activities. The second strand concentrates on the stability and quality of the political system in resource-rich countries. Finally, the third strand investigates government behaviour and the use of these "cursed" rents.

Meanwhile, the empirical evidence suggests that abundance of natural resources may reduce the quality of foreign, social, human and physical capital and so hinder economic growth (Gylfason, 2001). Dalmazzo and de Blasio (2003) argue that natural resource income shares characteristics with foreign aid: both are an income-impeding crowding-out phenomenon (Dalmazzo and de Blasio, 2003). The main difference is that aid is often monitored by international agencies supervising the utilisation of such aid in long-term projects whereas natural resource rents are unconditional and consequently governments tend to misuse such windfalls (Papyrakis and Gerlagh, 2006).

3.2.1 The Channels of the Resource Curse

The extant literature suggests different channels through which natural resources could retard economic growth. These channels can be described as crowding out channels: natural resources crowd capital out; especially the types of capital that are important for development and economic growth (Gylfason, 2001). As argued by Sachs and Warner (2001), natural resources are not harmful to income *per se* but tend to negatively affect several income-generating factors such as physical capital, human capital and institutional capital. There is no widely accepted theory in the natural resource curse literature; rather there are only possible explanations based on Sachs and Warner (2001) crowding-out logic (Cerny and Filer, 2006). Some models state that abundance of natural resources affects some variables or mechanisms "X" that in turn hamper economic growth. The real challenge for empirical researchers and theorists in this field is to identify the variables and mechanisms that transmit the adverse effect on economic performance (Gylfason, 2001).

The first identified channel is the Dutch disease channel, whereby exporting primary commodities leads to an exchange rate appreciation and this in turn leads to a contraction of the tradable sector (Krugman, 1987). Moreover, the natural resource-based industries in oil-rich countries usually pay higher wages than other manufacturing industries and thus make it difficult for the latter to make profit leading to reallocation of factors of production from manufacturing towards the booming sector (Corden and Neary, 1982). Since the manufacturing sector is essential in increasing return to scale and positive externalities, its decreasing competitiveness would reduce the productivity and profitability of investment and as a result negatively affect economic growth (Wijnbergen, 1984).

The second channel is the education and human capital channels. Natural resources tend to reduce investment in skilled labour and high-quality education (Papyrakis, 2006: 25). Since the manufacturing sector suffers from resource booms, the returns to education and training decline because of a decrease in demand for such labour. Gylfason (2001) used a seemingly unrelated regression (SUR) for 85 countries over the period 1965-1998 and found that natural resources crowd out human capital, therefore slowing down the economic performance of resource-abundant countries.

Using a stepwise regression approach incorporating a wide range of plausible explanatory variables, Kronenberg (2004) examined the impact of natural resources on the economic performance of a number of transition economies between 1989 and 1999. He found that basic education was neglected in the resource-rich countries and tertiary enrolment rates declined while they increased in the countries with little natural resources. These results support the human capital explanation for the natural resource curse.

The third channel is investment and physical capital: abundance in natural resource tends to reduce the incentive to save and invest, thus impeding economic growth (Gylfason, 2001). There are various mechanisms that can explain the crowding-out of investment. For example, natural resources provide a continuing stream of future wealth that is less dependent on public saving; as a result, it reduces the need for saving and investment (Gylfason and Zoega, 2001). In addition, heavy dependence on natural resources exposes the country to volatility which creates uncertainty for investors in resource-abundant countries (Mikesell, 1997). Furthermore, governments in most developing countries that are resource-abundant spend their rents on public consumption rather than on public investment which is more likely to foster economic growth (Atkinson, 2003). Gylfason (2001) shows that an increase in natural resources by 25% goes with a decrease in the investment ratio by 5% which in turn decreases economic growth by 1%.

Papyrakis (2004) argues that the investment channel is the most important channel as it accounts for 41% of the indirect negative effect of natural resources on economic growth. Atkinson (2003) used cross-country regressions for 91 countries over the period 1980-1995 and found that resource-rich countries which have suffered from a resource curse are those where natural resources, public expenditure and macroeconomic policies have led to negative or low genuine savings (saving adjusted for resource depletion).

The fourth channel is the political economy channel affected by the quality of governance and public institutions. It is argued that natural resource booms in conjunction with ill-defined property rights tend to put large amount of resource in the hands of the State and thus promote rent-seeking competition rather than productive activities. This reduces institutional quality by inducing corruption and rent-seeking behaviour. Martin and Subramanian (2003) stated that oil and minerals exert a negative impact on economic growth via their harmful impact on institutional quality. Also abundance of resources with lax legal structures may lead to the emergence of powerful interest groups that attempt to influence politicians to adopt policies that may not be beneficial to the general public (Mauro, 1998). Furthermore, natural resource rents may induce economic agents to bribe the administration to gain undue benefits (Ascher, 1999). In this corrupted environment, natural resource can be seen as seeds of conflict among citizens, politicians, local developers and local tribes (Iimi, 2007). Robinson et al. (2006) claim that countries that are most possibly getting benefits from natural resources are those that have good institutions, while those that do not have solid institutions are more likely to be exposed to the resource curse. Hence institutions are very important in mitigating the resource curse.

The fifth channel is oil price volatility and its impact on public revenue. Indeed, oil price fluctuations are one of the most important challenges facing oil exporting countries. Such volatility puts the economy under the risk of exogenous fluctuations which obstruct planning, increase inflation, boost deficits, raise debt and lead to exchange rate appreciation. These fluctuations impact on economic policies as the high dependence on oil is associated with the intrinsic instability and uncertainty of the global oil markets. In recent years, oil-rich economies have been increasingly vulnerable to shocks in oil prices. Van der Ploeg (2009) presented cross-country estimates on the effect of volatility in oil prices on economic growth and showed that the resource curse is foremost a problem caused by volatility. He concludes that the key determinant of growth volatility in income per capita of resource-abundant countries is fluctuations in commodity prices.

Ramey and Ramey (1995) found that countries are subject to volatility in the rate of economic growth tend to have lower economic growth on average. Blatman, Hwang and Willianson (2007) use a panel database for 35 countries to examine the impact of trade volatility and secular change on country performance for the period 1870-1939 and they found that countries that specialised in volatile commodities face more fluctuations in their terms of trade, less foreign investment and have lower economic growth than countries specialised in less volatile

industries. However, the impact of oil price is not the same across countries. The impact depends on the country's institutional structures, sectoral compositions and its economic development (Farzanegan, 2009).

The historical relationship between oil price fluctuations and macroeconomic variables highlight the impact of such shocks on the producing and consuming countries alike, but the size of such effect varies from one country to another and from one period to another. The most important studies in this regard (Darby, 1982; Hamilton, 1983; Burbdge & Harrison, 1984) find a statistically significant relationship between oil prices and aggregate economic performance in developed countries.

The sixth channel refers to the long-term trend of commodities prices. Raul Prebisch (1950) and Hans Singer (1950) hypothesised that the prices of mineral and agricultural products follow a downward trajectory in the long run relative to the prices of manufactured products. Whilst demand for primary products is inelastic with respect to world income (for every one percent increase in income), the demand for raw materials increases by less than one percent. Engel's Law is the proposition that households spend a lower fraction of their income on food and other basic necessities as they get wealthier. This implies that specialising in natural resources would be bad strategy.

Consequently, the policy implication advanced by Prebisch (1950) was that developing countries should discourage international trade with tariff and non-tariff barriers, to allow their domestic manufacturing sector to develop behind protective walls, rather than exploit their comparative advantage in natural resources. This policy was adopted in much of the developing world between the 1950s and the 1970s and was reverted to subsequent decades.

This explanation of declining commodities prices was mainly built around oil prices. As oil companies worldwide react by extracting more today, they drive down the current price of oil below its supposed long-run level. When the current price is below its perceived long-run level, companies will expect that the price must rise in the future. Only when the expectation of future appreciation is sufficient to offset the interest rate will the oil market be in equilibrium. That is, only then will oil companies be close to being indifferent between pumping at a faster rate and a slower rate.

On the other hand, the idea that natural resources are in a fixed supply; and that as a result their prices must rise in the long run as reserves begin to run low goes back to Malthus (1798) and the genesis of fears of environmental scarcity. Demand grows with population and supply is fixed; therefore, the price must rise. However, supply is not fixed and other factors need considering. Although at any point in time there is a certain stock of oil reserves that have been discovered, the historical pattern has shown that as the stock is depleted new reserves are found. As the price goes up, it makes exploration profitable for reserves that are further underground, underwater or in other hard-to-reach locations.

Over the two centuries since Malthus, exploration and new technologies have increased the supply of oil and other natural resources at a pace that has roughly counteracted the rise in demand from growth in population and income. This is contrary to the Malthusian theory. Because supply has always increased in the past does not necessarily mean that it will always do so. In 1956 Marion King Hubbert, anticipated that the supply of oil within the United States would peak in the late 1960s and then start to decline permanently. The forecast was based on a model in which the fraction of the country's reserves that has been discovered increases through time, and data on the rates of discovery versus consumption are used to estimate the parameters in the model. Many experts have extrapolated Hubbert's words and modelling approach to claim that the same pattern would follow for extraction of the world's oil reserves. Particularly, some of them claim that the 2000-2011 upward trend in oil prices confirmed a predicted global "Hubbert's Peak". Whilst there are solid theoretical arguments on both sides, either for an upward trend in commodity prices or for a downward trend; the empirical evidence also provides mixed views.

Although details will vary depending on individual measures, it is possible to generalise somewhat across commodity prices. Terms of trade for commodity producers had a slight upward trend from 1870 to World War I, a downward trend in the inter-war period, upward in the 1970s, downward in the 1980s and 1990s, and upward in the first decade of the 21st century. Simple extrapolation of medium-term trends is foolish. One must take a longer-term perspective.

The overall statistical trend seems to vary, which depends, more than anything else, on the date of the end of the sample. Studies written after the commodity price increases of the 1970s found an upward trend, but those written after the 1980s found a downward trend, even when both kinds of studies went back to the early 20th century. When studies using data through 2011 are

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completed some will probably again find a positive long run trend. This phenomenon is less surprising than it sounds. Real commodity prices undergo large cycles around a trend, each lasting twenty years or more. As a consequence of the cyclical fluctuations, estimates of the long-term trend are very sensitive to the precise time period studied. On the one hand, the fact that the supply of minerals in the earth's crust is a finite number, does not in itself justify the apocalyptic conclusion that we must necessarily run out.

Malthusians do not pay enough attention to the tendency for technological progress to ride to the rescue. On the other hand, the fact that the Malthusian forecast has repeatedly been proven false in the past does not in itself imply that the forecast will always happen in the future. One must seek a broad perspective in which all relevant reasoning and evidence are brought to bear in the balance.

3.2.2 Evidence from Developed and Developing Economies

Although there are plenty of studies that have tested the relationship between oil price and macroeconomic aggregates, most of these studies were conducted on developed economies (Emami, 2012). Such studies focusing on oil-importing countries have shown that oil price shocks affect industrial production negatively. These studies include among others, Hamilton (1983), Burbridge and Harrison (1984), Gisser and Goodwin (1986), Hamilton (1988), Morry (1993), Lee et al. (1995), Hooker (1996), Rotenberg and Woodford (1996), Huang et al. (2005) and Schmidt and Zimmermann (2007). Nevertheless, most of these studies pointed to the fact that the strength of the oil-economy relationship has not been stable for these economies over time. It is clear that the oil price fluctuation effect on developed economies has become weaker since the eighties (Farzanegan and Markwardt, 2009).

Recently, several empirical studies have focused on developing oil-exporting countries. According to Mehrara (2008), an oil boom would release foreign exchange constraints and would stimulate economic performance for oil-exporting countries from both supply and demand sides. Furthermore, the government would follow expansionary fiscal policy and would use such money to finance its development and infrastructure which will induce investment, consumption and economic growth (Emami, 2012). However, such positive effect could be weakened by real exchange rate appreciation which leads to the contraction of tradable sectors and so the country will be under the risk of the Dutch disease. In addition, when oil prices decrease governments are not able to adjust their current spending immediately. This

will lead to budget deficits which are a critical issue for most developing countries (Farzanegan, 2011).

Eltony (2001) uses a Vector Autoregressive model (VAR) and a Vector Error- Correction Model (VECM) to examine the impact of oil price volatility on seven macroeconomic variables for Kuwait. The results suggest that oil price shocks affect the key macroeconomic variables in Kuwait. Oil prices affect the country's oil revenue and in turn current and development expenditure; which are key drivers of the Kuwaiti economy. Tijerina-Guajado and Pagan (2003) examine the relationship between government spending, oil duties, taxes, and GDP for Mexico over the period 1981-1998 using a VAR. They found a substitution effect between tax revenues and oil duties: tax revenues are not capable of absorbing a temporary decline in oil duties.

Ayadi (2005) examines the effects of oil price shocks on some macroeconomic variables in Nigeria for the period 1980-2004, using a VAR model. Although he found that oil prices affect industrial production indirectly, such a relationship is not statistically significant and he concludes that oil price rises do not necessarily lead to an increase in industrial production. These findings were supported by Lwayemi and Fowowe (2011) who employed Granger-causality tests, impulse response functions, and variance decomposition for the same country. While positive oil price shocks do not significantly affect government expenditure, inflation, real exchange rate and output, their results suggest the existence of asymmetric effects of oil price shocks.

Jbir and Zouari-Ghorbel (2009) used a VAR to investigate the relationship between oil prices and 5 macroeconomic variables: oil revenues, government spending, inflation, real exchange rate and industrial production. They analysed the role of the subsidising policy in Tunisia for the period 1993 to 2007. Their results show that oil price shocks only have an indirect effect on economic activity and the most important channel by which the impact is transmitted is government expenditure.

3.2.3 The Effects of Oil Price Shocks and Volatility

Some papers have focused on the asymmetric responses of macroeconomic variables to oil shocks; depending of the sign of the shock. Symmetric responses would imply that the reaction of output to a positive and negative oil price shock is exactly the same; whereas asymmetry implies that the response of an economy to a positive oil price shock is not equal to the response to a negative one. Farzanegan (2009) studied the asymmetric effects of oil price shocks on the Iranian economy for 1975-2006 with quarterly data, using a VAR and 6 variables (oil prices, inflation, government expenditure, real effective exchange rate, industrial production and imports). He found a strong positive relationship between increasing oil prices and industrial production and both positive and negative oil prices shock significantly increase inflation. Mehrara (2008) explores non-linear relationship between oil revenues and industrial production for 13 oil exporting countries. He applied a dynamic panel model with two measures of oil shocks. He found that the relationship between output and oil revenues is non-linear and so the GDP responds to oil shocks in an asymmetric way. The results suggest that the magnitude of response of decreasing oil revenue is negative and more influential than positive oil shocks. He concludes that positive oil shocks have a limited role in inducing economic growth.

Berument, Ceylan and Dogan (2010) study the effects of oil price shocks on output growth (proxied by industrial production) for the Middle East and North Africa (MENA) countries, including Oman. They use several VAR models for the period 1960 to 2003. Their results show that the impact of oil prices on the GDP of Iraq, Algeria, Kuwait, Oman, Jordan, Syria, Qatar, UAE and Tunisia is significantly positive, but not significant for the other countries. This analysis can be extended by using more data, using a higher dimension VAR models and considering other key macroeconomic variables such as government expenditure and government revenue. I will discuss this in the empirical chapters.

Bouchaout and Al-Zeaud (2012) used a Vector Error Correction Model (VECM) and Variance Decomposition analysis (VD) to explore the effect of oil price volatility on the Algerian economy during the period 1980-2011. Their results reveal that oil prices changes have a very limited impact on most macroeconomic variables in the short run except a positive effect on inflation and a negative influence on the real exchange rate. However, in the long run oil price changes positively affect real GDP and inflation and have a negative effect on unemployment and real exchange rate. Ito (2008) investigated the impact of oil prices and monetary shocks

on the levels of inflation, interest rate and real gross domestic product (GDP) for Russia during the period 1995: Q3-2007: Q4, using the co-integrated VAR model. The results show that an oil price increase has a positive effect on real GDP and inflation and this shock's effects are greater than the monetary shock for Russia.

The channels by which oil prices may affect economic performance have not been systematically documented in the literature. Nevertheless, several studies have argued that variations in the oil price-driven fiscal behaviour have exacerbated output cycles (Erbil 2011). Therefore, some recent researchers argue that fiscal policy (sixth channel) and its pro-cyclicality is one of the main channels of the natural resource curse. Bleaney and Halland (2009) investigated the fiscal policy volatility channel by entering primary product exports and volatility together in a growth regression and run the model for 75 countries over the period 1980-2004. They found that the volatility of government consumption is explained by natural resource exports and greater fiscal volatility acts as a transmission mechanism for the resource curse.

There are many studies in this area showing that developing countries are the ones suffering the most from fiscal policy pro-cyclicality which have detrimental implications for their economies. Michael and Perotti (1997) were the first economists to discover the existence of fiscal policy pro-cyclicality in the Latin American countries, as they proved that fiscal policy tends to be expansionary in good times while it is contractionary in bad times. Talvin and Vegh (2000) added that fiscal policy pro-cyclicality is the norm in most developing countries in their path for economic development, and found that the coefficient of positive correlation between the components of public spending and GDP for a sample of 36 developing countries is about 0.53 on average. For industrialized countries (G7 countries), it was found that on average the correlation coefficient is not significant which suggests the absence of pro-cyclicality in these countries.

Mpatswe et al. (2011) examine fiscal cyclicality in six African countries for 1980-2008 using equations with the lagged values of explanatory variables as proxies for the long-run values. Their results show that total public expenditure is strongly pro-cyclical and although the cyclicality coefficients vary from one country to another, public investment is the most pro-cyclical component. More noticeably, they found that public investment overreacts to economic growth with an elasticity of more than a unity.

With regard to oil-exporting countries, public spending is strongly linked to oil revenue which accounts for a substantial part of public budget. Therefore, the response of fiscal policy to rising oil prices is expansionary and when the prices fall the government cut the expenditure. In this context, the role of fiscal policy provides a channel through which the fluctuations in oil revenue are transmitted to the rest of the economy. Hence, from a Keynesian perspective, a reduction in public expenditure causes a fall in total demand, consumption and investment; thus adversely affecting economic growth. On the other hand, when oil prices increase, public spending, investment and economic growth will rise as a result of that spending effect multiplier.

Erbil (2011) examines the cyclicality of fiscal policy in 28 oil-exporting countries during the period 1990-2009, using pooled OLS regression, Diff-GMM and Sys-GMM methods and found that all fiscal variables are strongly pro-cyclical in the full sample, but results are not the same across income groups. The results show that government expenditure is pro-cyclical in low and middle-income countries, while it is countercyclical in the high-income countries. Husain et al. (2008) assess the impact of oil price shocks on non-oil economic cycle in 10 oil-rich countries, including Oman over the period 1990-2007. The obtained results from a panel VAR show that in countries where the oil sector is dominant, oil price changes affect the economic cycles through the fiscal policy channel.

Arezki and Ismail (2013) examined the behaviour of government expenditure during the boom-busts in commodity price cycles of 32 oil-rich countries for 1992-2009. They found that current spending is downwardly rigid, but increases in good times On the other hand, capital spending behaviour is just the opposite to that. In the same line, Pieschancon (2009) used a vector autoregressive (VAR) model to assess the impact of oil prices on government revenue, government purchases, tradable and non-tradable output, transfers, private consumption and the real exchange rate for Norway and Mexico over the period 1980-2006. He found that fiscal policy is the most responsive policy to oil prices and he argued that this is the main transmission channel through which the degree of exposure of the economy to oil price volatility is determined.

Cologni and Manera (2011) consider the role of the government and its reallocation process in the economy through fiscal policy. They address the effects of oil shocks and the expansionary fiscal policy on the business cycle of GCC countries (Oman, Kuwait, Bahrain, Saudi Arabia, UAE and Qatar) by using the real business cycle model. Results revealed that the negative

impact of oil shocks on private output, capital and employment can be more than offset by the positive effects of oil shocks on government revenue and expenditure. This fact causes a shift of productive factors from the private sector to the public sector, thus government employment and output both expand causing a boost in the total output.

The causality and long-run relationship between government revenue and government expenditure in oil-exporting countries are also documented in the literature. Petanlar and Sadeghi (2012) used panel VAR framework to assess such relationship for 15 oil-exporting countries for 2000-2009. The analysis shows that a 1% increase in oil revenue induces an increase of public expenditure of 1.16%. Fasano and Wang (2002) examine the direction of causality between total revenue and total government spending for GCC countries including Oman for 1980-2000, using an ECM. The results show that an increase in revenue causes an increase in government expenditure in the first period for all GCC countries which means that government expenditure is pro-cyclical to changes in oil revenue.

3.3 Government Spending and Economic Growth

3.3.1 Wagner's Law

The relationship between public expenditure and national income has been documented in two areas of economic policy: the public finance literature and the macroeconomic modelling literature (Ansari, 1993). Public finance studies posit that economic growth causes the growth of public expenditure. On the other hand, the macroeconomic modelling literature argues that the growth of public expenditure causes economic growth. These different views on the causal relationship between national income and government expenditure may be due to differences in assumptions (Huang; 2006).

Public finance studies follow Wagner (1890), a leading German economist of the late 19th century. Wagner (1890) offered a model of determination of public expenditure in which the growth of public expenditure is an outcome of increasing national income. He considered public expenditure as a behavioural variable, similar to private consumption expenditure. He formulated 'the law of increasing extension of state activity' which has now come to be known as 'Wagner's law'. It is one of the public finance theories that emphasise economic growth as a fundamental determinant of the size of the public sector. Wagner's Law states that as real income per capita increases, the share of public expenditure increase (Chang, 2002).

According to Henrekson (1993), Wagner has three reasons to believe that government's role would increase over time as a result of economic growth. First, during the process of modernisation and industrialisation, public activities would substitute private activities and so public expenditure would increase as there is more demand for administrative and legal services. Second, cultural and welfare services are income elastic and they would increase with an increase in national income. Wagner argues that private sector is inefficient in providing some goods and services like culture and educational needs; therefore, public expenditure would expand as society gets richer. Third, as national income increases the public sector is required to finance large-scale projects to satisfy technological needs and manage monopoly. For example, airports, ports and railroads should be monopolised by the State according to Wolf Wagner (Tulsidharan, 2006).

Ansari (1993) states that Wagner's hypothesis is often considered representing a long-term relationship between national income and public expenditure applied to countries during their early stages of growth and development. The law states that the government grows because of increases in demand for public goods as society get richer. Also governments need to manage externalities and control of monopoly as national income increases and this would also increase public expenditure. Therefore, the implication of Wagner's law is that causation runs from economic growth to growth in public expenditure and so public expenditure is considered as endogenous to the growth of national income.

Wagner's theory predicts that the development of an industrial economy will be accompanied by an increase in the share of public expenditure in GDP. According to Wagner's law, public sectors in industrialising countries will grow at faster rate than per capita income. Empirical results show that Wagner's law differs from country to country and from period to period. Henrekson (1993) states that Wagner's law is more robust when applied to the behaviour of public expenditure in a country for as long a time period as possible. He adds that in comparison, there is little evidence of such a relationship investigating a cross-section of countries at different income levels. As far as Oman is concerned, there is a need to examine whether there is a long-run relationship between total public expenditure or its disaggregated components and GDP.

Some economists criticise Wagner's Law because of the ambiguity of the measurement of government expenditure (Musgrave, 1969). Commentators on Wagner's Law claimed that it is unclear whether the law of increasing extension of state activity relates to the absolute level

of government or to the share of government in national income (Henrekson, 1993). Gandhi (1971) points out that imprecision of the Law has led to the development of five different versions of Wagner's Law. Though, Henrekson (1993) argues that this claim of ambiguity is unjustified; Timm (1961) demonstrated that Wagner meant the relative growth when he formulated the Law. Thus, the Law according to Henrekson (1993) considers the increasing share of government expenditure in total economy.

Since there has been no agreement on the functional form describing Wagner's law, different interpretation of Wagner's Law has been applied to different countries (Halicioglu, 2003). According to Demirbas (1999), there are at least six versions of Wagner Law[2]:

A version of the Wagner's Law was initially used by Peacock-Wiseman (1961), Goffman and Mahar (1971) and Musgrave (1961). Pryor (1969) argue that Wagner's law should be tested on the relationship between government consumption and national output. The third formulation was used by Goffiman (1968) who considered that income per capita is the most appropriate variable to be used to test the validity of Wagner's law.

Henrekson (1993) asserted that Wagner's Law should be interpreted as the growth of government expenditure relative to GDP per capita as it is represented in version (4). Version (5) is Gupta's (1967) version and was also used by Michas (1975) who noted that this formulation is monotonically related to Musgrave (1969). The sixth functional form (6) was adopted by Mann (1980) as a modified version of Peacock-Wiseman (1961). In this thesis I use all the above versions except version (2) as government expenditure is already disaggregated into current and investment expenditures; so this version is not needed at all.

3.3.2 The Keynesian View

On the other hand, the macroeconomic literature treats public expenditure as exogenous. Keynes argues that government spending enhances economic growth by injecting purchasing power into the economy (Biswal et al., 1999). Keynesian theory considers public expenditure as a policy instrument designed to correct short-term cyclical fluctuations in aggregate expenditure (Singh and Sahni, 1984). In line with this, governments play a major role in times

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[2] See Chapter 5 for discussion on different versions of the Wagner's Law.

of recessions by borrowing money from the private sector to diffuse it back into the economy through various spending programs.

The Keynesian theory predicts how total spending affects national output. According to this this theory, the level of employment and national output is determined by effective demand (Ansari et al., 1997). Keynes argues in his "General Theory of Employment, Interest and Money" (Keynes, 1935) that government intervention in the marketplace is the only method of ensuring stability and economic growth (Al-Sheikh, 2000). Keynesian economists believe it is the government's job to smooth out the business cycles fluctuations (Dogan, 2006). So the government should manipulate the level of aggregate demand to avoid insufficient or excessive demand by adjusting government expenditure and taxation to reach full employment (Demirbas, 1999).

Classical economists argue that adjustments in prices would automatically lead demand to the full employment level. However, Keynes argued that a self-correcting process is impossible without government intervention; pointing to the sharp fall in output and employment in the 1930s (Demirbas, 1999). Therefore, Keynesian economists asserted that demand management by the government is required to stabilise the economy and have more efficient outcomes than laissez faire policy (Loizides and Vamvoukas, 2004). Keynes added that waiting for the economy to recover by itself is irresponsible so the active use of fiscal policy is very essential to return the country to high employment (Blanchard, 2003).

The concept of the multiplier in Keynesian theories is based on the role of public expenditure in enhancing economic growth. The Keynesian multiplier explains how a shock to demand can be amplified and leads to larger shifts in output. It refers to the idea that an exogenous increase in spending can lead to a multiple increase in aggregate demand and hence a greater increase in national income (Al-Sheikh, 2000). In other words, an initial change in aggregate demand by increase of government spending can cause further change in aggregate output for the economy. The Keynesian hypothesis states that government spending provides a short-term stimulus to end recession. Hence, the causation in these models runs from government expenditure to economic growth (Ansari, 1993). Therefore, the Keynesian school of thought recommends expansionary fiscal policies to avoid long recession; whereas classical economists believe that the hidden hand of market would return the economy to the long-run equilibrium by natural labour market adjustment. Keynesian economists refute the idea that the market is self-correcting and does not require government intervention. They argue that labour market

rigidity is an essential factor which hinders the return to the long-run equilibrium (Demirbas, 1999).

On the one hand, traditional Keynesian models argue that government consumption leads to more employment, investment and higher profitability through the multiplier effects on aggregate demand (Al-Shaikh, 2000). These models dominated the macroeconomic analysis from the 1930s to the 1970s and until now policy-makers take them into account to predict the uncertain economic effects of government expenditure (Chow, 2002). On the other hand, neoclassical economists assert that fiscal policies are ineffective because increased government expenditure raises the demand for savings which will increase interest rate and therefore decrease private investment. As a result, public expenditure will crowd-out private investment which is deemed more efficient; so this will negatively affect economic performance (Khan and Kumar, 1997).

The empirical literature examining relationships between economic growth rates and fiscal variables differs in terms of the size sample of countries, period of estimation and econometric techniques; and thus has produced conflicting results (Kweka and Morrissey, 2000). There is widespread non-robustness of coefficient signs and statistical significance even with similar specifications and variables. For example, while conventional wisdom suggests that government investment (consumption) is positively (negatively) correlated with economic growth, there are few consistent findings across studies.

Earlier studies that test the association between government expenditure and economic growth used cross-section data partly due to lack of long time series data for most countries (Dipendra, 2007). The few studies that used a time series framework did so without checking for the stationarity; which makes their results spurious (Jeselius and Hendry, 1999). Dipendra (2007) argues that studies that use cross section data are less useful because, as Bird (1971) stated, ''there is nothing in any conceivable formulation of Wagner's law which tells us country A must have a higher expenditure ratio than country B simply because the level of average per capita income is higher in A than B at particular point in time" (pp. 3). As a result, time series research is necessary to further recognize the causal relationship between public expenditure and economic growth.

In spite of the fact that Wagner's Law and the Keynesian hypothesis have been investigated in cross-sectional and time-series framework, the knowledge of the true direction of causality

between public expenditure and national growth is needed to determine the validity of Wagner's Law or the Keynesian Hypothesis. Both hypotheses have been tested by many researchers (Courkis, *et al.,* 1993). Initially most economists that tested this hypothesis have used traditional regression analysis but few have tested for causality. More recently, cointegration analysis has been used widely (Demirbas 1999), yet empirical results that test Wagner Law and the Keynesian hypothesis have remained largely inconclusive.

3.3.3 Endogenous Growth Models: A More Balanced View?

Endogenous growth models have lent support for the public sector role on economic growth. The endogenous growth models postulate that the economy's output is conditional not only on the level of labour stock and physical capital, but also on additional production factors which may enter the production function with constant returns to scale alone (Barro, 1990). If this is the case, there is a possibility of both long-term effect and temporary effect from government spending on economic growth. This provides some support to fiscal policies aiming at enhancing economic stability and increasing economic growth as presented by the Keynesian hypothesis. Nevertheless, endogenous growth models also show the negative effects of government expenditure.

Indeed, economic theory does not provide a general rule regarding the impact of government spending on economic growth. Yet there is almost consensus that there are circumstances in which higher levels of government expenditure would be growth-augmenting and other situations in which lower levels of government expenditures would improve economic performance (Mitchell, 2005). Gupta *et al*. (2002) argue that even though public expenditure may crowd out private sector spending, it enhances macroeconomic stabilisation and economic growth.

3.3.4 The Methodological Debates

There has recently been rising interest on the association between government expenditure and national income. This relationship has been discussed using two main methodologies, namely causality testing and regression analysis. Yet the outcome of both types of analysis has been inconclusive (Demirbas, 1999).

Earlier studies of the relationship between government spending and growth have mainly used cross-section analysis to investigate this relationship [Feder (1983), Landau (1983, 1986), Ram (1983, 1986), Romer (1986), Barro (1990, 1991), Devarajan et al. (1996), Sala- Martin (1997)]. However, Barro (1991) argue that these cross-section analyses provide only pooled estimates of the effects of government expenditure. They do not capture the dynamics of the relationship between these two variables and do not take into account country-specific factors (Bird, 1971).

Another problem of most cross-section studies is interpreting a significant coefficient of government expenditure in growth regressions as a confirmation of causality from government spending to economic growth:

"However a significant coefficient in growth regression can be equally compatible with the Keynesian view-causality from government to growth, or with Wagner's law-from growth to government expenditure as well as a bi-directional causality between the two variables" (Abu-Bader and Abu-Qarn, 2003, pp. 568).

Therefore, typical growth regressions just identify the correlation between growth and government spending, but do not determine the flow of causality between them (Hsieh and Lai, 1994). Ram (1986b) used government consumption as a proxy for government size and estimated the equations within the production function framework, using cross-section and time-series data for 115 countries. The results suggest that the marginal externality effect and the growth impact of government size for most countries were positive. In time series studies, estimating models using ordinary least squares (OLS) for non-stationary variables can give spurious results (Juselius and Hendry, 1999). Assuming the stationarity of variables is one of the shortcomings of many time-series studies; making their estimates unreliable (Chang *et al*; 2004). Therefore, most recent papers have used modern techniques in time-series econometrics in order to check the properties of data before investigating the direction of the causality between economic growth and government spending.

Since the literature of the relationship between government spending and national income is huge, the present thesis focuses on reviewing the investigations that used modern time series econometrics to test for the direction of causality.

Ahsan et al., (1992) claimed that causal relationship between national output and public expenditure was initially examined by Singh and Sahni (1984). They investigated the direction

of causality between the national income and the total spending (as well as various components of public expenditure) of India for the period 1950-81, using the Granger method. The data used in the study were annual and deflated by using the implicit national income deflator. They found that the growth in public expenditure as aggregate or by functions namely, administration, social and development, and defence serve both as cause and effect of growth of in national income. So they recommend that two variables be treated as jointly-dependent in both the public finance and macroeconomic studies.

Ram (1986a) test Wagner (WH) and Keynes Hypothesises (KH) for 63 countries for the period 1950-80. He found no causality between GDP per capita and government expenditure per capita. Only one-fourth to one-third support either WH or KH.

Most recent studies employed cointegration tests, error-correction models and Granger causality techniques to study the relationship between government expenditure and economic growth. These techniques have cast doubt on the existence of Wagner's proposition (Halicioglu, 2003). Henrekson (1993) re-examined Wagner's law in the case of Sweden over the period 1861-1990 using Engle-Granger two-stage cointegration and has found no support for the law although earlier Swedish studies suggested the existence of Wagner's Law.

Chang (2002) examined five different versions of Wagner's law by employing annual time-series data on six countries (South Korea, Japan, USA, UK, Taiwan and Thailand) over the period 1951-96. The hypothesis of a long-run relationship between income and government spending was tested using the methodology of cointegration analysis suggested by Johansen (1988) and Johansen and Juselius (1990). The results indicate that there is a long-run relationship between income and government spending for all the countries studied with the exception of Thailand. Then the ECM estimated confirmed Wagner's Law validity for all countries but Thailand.

Dogan (2006) examines the causality direction between government expenditure and economic growth for five South-Eastern Asian countries (Indonesia, Malaysia, Philippines, Singapore, and Thailand). The Johansen-Juselius cointegration method was applied to detect a long-term relationship between real per capita national income and real per capita government expenditure in all sample countries. The cointegration tests rejected the presence of such relationship, except for Indonesia. Granger causality tests indicate that Wagner's law is not supported for the five countries considered. Nevertheless, the tests reveal that the Keynesian

hypothesis is only supported for Philippines, suggesting that the direction of causality is from government expenditure to national income. Ansari et al., (1997) applied both the Granger and Holmes-Hutton statistical procedures to test the income-expenditure hypothesis for three African countries (Ghana, Kenya and South Africa). The results neither support Wagner's Law (economic growth cause public expenditure growth) nor the KH (government expenditure enhance economic growth).

Abu-Bader and Abu-Qaran (2003) argue that country specific factors are likely to affect the causal direction of economic growth and government expenditure. Demirbas (1999) investigates the existence of a long-run relationship between public expenditure and GNP in terms of cointegration analysis for Turkey over the period 1950-1990. He finds no empirical support for Wagner's Law.

Dipendra (2007) studies the relationship between GDP and government expenditure in Thailand for 1950-2003. Neither ARDL nor Toda-Yamamoto Granger tests show any causality between GDP and government expenditure. In the contrary, Sinha (1998) focused on Malaysia over the period 1950-92 using Johansen cointegration tests between various forms of government expenditure and GDP. The Johansen procedure confirms the existence of a long run relationship between GDP and government expenditure; however, augmented Granger tests between the growth rates of the variables provide an opposite conclusion.

3.3.5 The Data Aggregation and Modelling Issues

Most studies on the relationship between government expenditure and national income were undertaken with aggregated data rather than specific components of government expenditure. Assery and Perdikis (1999) argue that the contradicting results observed in the literature may be due to data aggregation. To address this, some researchers have undertaken to disaggregate the total government expenditure into sub-categories or functional components. Biswal et al. (1999) tested the relationship between total public expenditure as well as its various components and the national output of Canada over the period 1950-1995 using the Engle-Granger procedure and an ECM. When aggregate data is used, the results support both hypotheses: hence this suggested a two-way causality between public expenditure and national income. On the other hand, the results do not support any long-run relationship between the disaggregated expenditure components and GDP; although they interestingly show the

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existence of a short-run causation. This implies that some components of total government expenditure are only related to national income in the short run.

Chiletsos and Kollias (1997) investigate the causal relationship between GDP and decomposed government expenditures for Greece over the period 1958-1993; using cointegration and the ECM approach. They argue that the use of disaggregated variables offers a better explanation of the role of each component in the economic process. Their results suggest that only the growth of defence expenditure may correspond to Wagner's proposition.

Assery and Perdikis (1999) used disaggregated data of government expenditure according to economic category for Iraq over the period 1950-1980. Their data are measured in both real and nominal terms, but they lead to contradictory results. Whereas the nominal data back Wagner's law, the real data support the Keynesian hypothesis.

Ahsan et al. (1992) attempted to explain the diversity in results among the existing causality studies. One of the factors that may explain the inconsistency of results among authors is the influence of omitted variables. This could lead to misleading causal relationship between variables. They applied trivariate tests of Granger causality to the G7 countries excluding the US and introduced interest rate as an omitted variable in the system. Their empirical evidence confirmed the link between national income and government expenditure.

In line with this, Ghali (1999) used multivariate cointegration techniques and built a model of dynamic interaction between government spending and economic growth in a five-variable system containing total government spending, GDP growth, exports, imports and investment for ten OECD countries. The results support the Keynesian hypothesis for all countries.

Loizides and Vamvoukas (2004) tested whether the relative size of government spending Granger causes economic growth or economic growth Granger causes the relative size of government spending in Greece, Ireland and the UK. They used a bivariate ECM within a Granger causality framework as well as a trivariate analysis by adding unemployment and inflation separately. Their analysis shows that economic growth Granger causes the relative size of government for all three countries when they used the trivariate system. Also, they found strong support for the Keynesian hypothesis for the UK and Ireland in the short and long run. Subsequently, they advocate the combined analysis of bivariate and trivariate systems to get a better picture of the possible causal patterns.

3.3.6 The particular Case of GCC Countries

GCC oil-exporting countries have received little attention in the literature on the relationship between public expenditure and national income (Burney, 2002). Generally, most Middle East countries suffer from large fiscal imbalances due to high expenditures and vulnerability of government revenues to external shocks (Abu-Bader and Abu-Qarn, 2003). Therefore, it is interesting to investigate the causal relationship between government spending and economic growth in this region.

Al-Sheikh (2000) investigated the existence of Wagner's Law for aggregate government expenditure using cointegration analysis and ECM for 27 countries in different stages of economic development and found support for Wagner's Law for most countries including Oman. Al-Faris (2002) considers the structure of the relationship between government expenditure and economic growth for GCC countries for the period 1970-1997. Using cointegration tests, he found that for most GCC countries (including Oman) economic growth is a predictive factor of government expenditure growth (Wagner's Law). As far as Oman is concerned, the data did not reveal any effect of GDP on capital expenditure and it is insignificant in the case of current expenditure; a result which I disprove in chapter 6. The main problem in Al-Faris (2002) is the methodology which does not distinguish between long and short-run causality; and thus he attributed short-run interactions to long-term causality.

There are some country-specific studies of the causal relationship of government size and economic growth for some GCC countries but to my knowledge there is none on Oman. Ghali (1997) found no consistent evidence for the Keynesian hypothesis with Saudi data, whereas there is evidence of Granger causality from output growth to government spending as proposed by Wagner Law. Moreover, Al-Batel (2002) confirms the causality presented in Wagner's law, although he used aggregated as well as disaggregated public expenditure data.

Burney (2002) (10) analysed the relationship between a number of socioeconomic variables including national income and government expenditure for Kuwait over the period 1970-95. Burney (2002) augmented the version (5) of Wagner's law to include Zt as set of other relevant explanatory variables reflecting specific characteristics of the economy. He used the Engle-Granger cointegration test and an ECM and his findings do not support the validity of Wagner's Law for Kuwait.

It is clear from the above that the causal relationship between government and national income has been inconclusive. These studies present all types of results from no causality to bidirectional causality between the two variables. This may be due to the sensitivity of causality tests to the various versions of Wagner's law or to the lag structure specified; whereas other authors point at the filtering techniques used to achieve stationary variables (Haliciouqlu, 2003). From another perspective, it might finally be due to different nature of political climate and economic system (Liu et al., 2002).

Besides examining the direction of causality between government expenditure and GDP, the question one should ask is: what is the size of government spending effects? More specifically, is government expenditure one determinant of economic growth? And if so, which government expenditure component is more productive? However, answering these questions is not simple. The seminal contribution of Barro (1990, 1991) opened new ground for the intervention of government expenditure in the economy's production function. Barro (1990) built a new model linking government expenditures with economic growth by introducing government expenditure as a public good into the production function of individual firms. In this model, the rate of return to private capital increases, and in turn stimulates total investment and growth.

Barro and Sala-Martin (1992), Easterly and Rebelo (1993) pointed out that fiscal policy has gained additional theoretical support with the introduction of endogenous growth models. The endogenous growth literature argues that fiscal policy has a crucial impact on the long-run growth rate of the economy (Ghosh and Gregoriouy, 2008). The theoretical work of Aschauer (1988) indicates that public investment and other productive expenditures should have a positive impact on economic growth, while consumption expenditure is expected to impede the growth.

Nevertheless, the studies linking economic growth and public spending by regression analysis are inconclusive. Aschauer (1990) implemented a neoclassical model of fiscal policy and documented a positive and significant relationship between government expenditure and level of output. Within the framework of endogenous growth, Knoop (1999) found that reducing the size of government in the US would reduce economic growth; in other words, government expenditure correlated positively with economic growth with US data. This finding backs the empirical work of Slemrod et al. (1995), who found a positive correlation between the ratio of government spending to GDP and real GDP per capita for 13 out of the 24 countries included in their study.

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Another problem of most cross-section studies is interpreting a significant coefficient of government expenditure in growth regressions as a confirmation of causality from government spending to economic growth. Abu-Bader and Abu-Qarn (2003, pp. 568) note:

"However a significant coefficient in growth regression can be equally compatible with Keynesian view-causality from government to growth, or with Wagner's law-from growth to government expenditure as well as a bi-directional causality between the two variables".

In fact, standard growth regressions only identify the correlation between growth and government spending, but do not determine the flow of causality between them (Hsieh and Lai, 1994).

Nonetheless, some authors have provided robust evidence of a negative association between government spending and economic growth. Landau (1983) examined this relationship for a sample of 96 countries and found that consumption expenditure has a negative impact on economic growth for the full sample. Ram (1985) obtained a similar outcome for 115 countries. Further, Barro (1991) employed an endogenous growth model for a sample of 98 countries over the period 1960-1985 and also found that the association is significantly negative. Saunder (1985), (Romer, 1990) and Ghura (1995) also came to the same conclusion.

Whatever are the possible causes, the ongoing controversy has led researchers to focus on the issue of the specification of the variables across studies; in particular, the issue of the effect of various components of government expenditure (rather than aggregated government expenditure) on economic growth (Levine and Renelt, 1992). Theoretically, various sectors of public spending may affect economic growth in different ways (Abu-Bader and Abu-Qarn, 2003). Hence a number of empirical papers have investigated the effects and significance of different components of government expenditure on economic growth (Devarajan et al., 1996; Sugata et al., 2008; Aschauer, 1998; Nurudeen et al., 2010).

Devarajan et al. (1996) proposed what they called productive expenditures and assume that an increase in such expenditures leads to a higher economic growth via a direct impact on the private sector's productivity. They disaggregated government expenditure into productive and non-productive expenditure and derive the condition under which a change in the composition of expenditure leads to higher economic growth, depending not only on the productivity of various government expenditures but also on the initial shares. Their data covered 43

developing countries over 20 years. They included capital and current expenditure and found that an increase in the share of current expenditure has positive effects on economic growth. Their findings also suggest that productive expenditure could become unproductive when used in excess.

Landau (1983) examined the relationship between the share of government consumption in GDP and the rate of growth of GDP per capita for 96 countries for the period 1961-1976. He presumed that government consumption must come at the expense of capital investment. Indeed, the findings show a negative relationship between government consumption and per capita GDP growth rates.

Easterly and Rebelo (1993) employed historical data of fiscal variables, the level of development and economic growth and found evidence for long-run growth effects of public investment in infrastructure. Aschauer (1989) used a production function approach to consider the relationship between aggregate productivity and different kinds of public investments using data for G-7 countries for 1949-85. They found that military spending has no significant impact on productivity while capital investment in infrastructure has the greatest positive effects on productivity. He argued that investment in infrastructure helps productivity by improving utilisation of inputs and consequently develops the level of technology in the economy.

Kelly (1997) explored the effects of government expenditures on economic growth for a sample of 73 countries over the period 1970-1989. The results supported the hypothesis that social expenditure and public investment positively influence economic growth. In panel data analysis for US states over the period 1970-1986, Evans and Karras (1994) disaggregated government spending into a variety of components such as health, education and highways. Their model supplies a comprehensive idea of the role these expenditures play when determining productivity. They found that education expenditures are productive while capital expenditure actually diminishes productivity.

Baffes and Shah (1998) investigated the effects of different types of investment on GDP per capita for 21 countries over the period 1965-1984. They computed the scale of elasticities of various expenditures and found that most countries have returns to scale greater than 1. Investment in human resources had the highest impact on growth and military spending had a negative impact in most countries. Belgrave and Craigwell (1995) used the analytical framework of Devarajan et al. (1994) to determine which government component in Barbados

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for 1969-1993 are positively or negatively correlated with growth. Once again, the results suggest that government spending on health and education has a positive effect on economic growth in Barbados.

Jung and Thorbecke (2003) applied multisector CGE model to analyse the impact of education expenditure on human capital and macroeconomic performance for two Heavily Indebted Poor Countries (HIPCs), Tanzania and Zambia. The simulation results imply that education outlay can raise economic growth. Nitoy et al. (2003) examined the growth effects of sectoral government expenditure for a panel of 30 developing countries. The primary results showed that education expenditure is the only one that remains significantly associated with economic growth throughout the analysis. Using panel data for 118 developing countries for the period 1971-2000, Baldacci et al. (2008) explored the linking channels between social spending, human capital and economic growth. Incorporating non-linearity in their model, they found that education and health expenditure affect positively education and health capital, and thus enhance productivity and economic growth. This finding backs previous similar investigations (Barro, 1991; Roubini and Sala-i-Martin, 1991; Birdsall et al, 1995).

On the other hand, Blankenaua and Simpson (2004) explored the education expenditure-growth relationship in the context of an endogenous growth model and found that the positive direct effect of education expenditure on economic growth can be negated when other determinants of growth are negatively affected by general equilibrium adjustments. Using a dataset of 19 Caribbean countries over the period 1980-200, Bynoe et al. (2012) assessed the efficiency of public spending on education and health care and found that the effect is insignificant when the spending is focused or primary or secondary school. Moreover, the results of Devarajan et al. (1996) supported a negative relationship between health expenditures and economic growth. Using cross-sectional data for 50 countries, Gupta et al. (2002) also found that contrarily to education expenditure, health expenditure had a negligible impact in improving health outcomes.

Assery and Perdikis (1999) argue these contradicting results might be due to the aggregated nature of the data used. Another explanation according to Ahsan et al. (1992) is the influence of omitted variables. Hence, future research combining bivariate and trivariate models would offer a richer menu of possible causal patterns (Ghali, 1999).

3.4 The Relationship between Government Expenditure and Government Revenue

The literature focusing on the relationship between government revenue and expenditure has emerged prominently over the last three decades in both theoretical and empirical forms; both approaches have evoked mixed views.

3.4.1 The Theoretical Literature

The theoretical literature has identified four main hypotheses to explain this relationship: these hypotheses describe the inter-temporal link and the direction of causality between these two main variables of public finance.

The first hypothesis is the '*revenue-spend*' approach, which suggests that a rise in public revenue will lead to an increase in government expenditure and consequently worsens the public budgetary balance (Nwosu and Okafor, 2014). The main advocate of this school of thought is Friedman (1978, 1982) who claimed that raising taxes would lead to more expenditure. This argument suggests that the government would spend all its revenues, and thus any extra revenue would encourage government to expand its activities. If this hypothesis holds, it suggests a unidirectional causality from public revenue to government expenditure. Hence budget deficits can be avoided by implementing fiscal policies that stimulate public revenue and diversify sources of income of the economy.

The second hypothesis, the *'spend and tax'* hypothesis promoted by Peacock and Wiseman (1961, 1979) arguing that increased taxes arise from increasing government spending and hence public expenditure brings about changes in public revenue (Aregbeyen and Insah, 013). Peacock and Wiseman (1979) claimed that a severe crisis that initially increases government expenditure will eventually change the government behaviour resulting in a permanent increase in government tax. This hypothesis evokes a unidirectional causality from government expenditure to government revenue due to economic or political forces; it is sometimes referred to as the displacement effect (Bhatia, 2003).

The third hypothesis is *'the fiscal synchronization'*, was theorised by Musgrave (1966) and further applied through Barro's (1979) tax smoothing model. In this framework, Meltzer and Richard (1981) explain that spending and taxation decisions are taken simultaneously. In econometric terms, Chang (2009) notes that simultaneous decisions suggest contemporaneous

feedback and bidirectional causality between these two variables. Takumak (2014) claims that the government can be seen as a rational agent who takes decisions by comparing the marginal cost of taxation with the marginal benefit of government spending.

The fourth school of thought is the *'fiscal neutrality'* or *'institutional separation'* hypothesis, proposed by Baghestani and McNown (1984). While asserting that none of the above schools accurately describes the relationship between government revenue and government expenditure, they suggest that government revenue and expenditure decisions are taken independently. Takumak (2014) believes that government expenditure is determined based on public requirement while government revenue depends on the maximum tax burden tolerated by population. Mehrara and Rezaei (2014) add that government expenditure and government revenue are determined separately by the long run economic growth; but they do not affect each other as there is arguably an institutional separation between them. This situation would be characterised by non-causality in the empirical literature (Chang, 2009).

3.4.2 The Empirical Literature

As far as the empirical literature is concerned, the results are also mixed. Among the above-mentioned hypotheses, the most tested was the tax-and-spend hypothesis and it finds much support. Empirical studies focused on a great variety of countries, although little research has focused on the particular issue of oil-rich countries. The most used methodology is the classical cointegration/ECM approach, and Granger causality tests are applied on the resulting ECM.

a) The Revenue-spend Hypothesis

As explained above, the first hypothesis is the 'revenue-spend' hypothesis, which suggests that a rise in government revenue will lead to an increase in government expenditures. Under this perspective, empirical results are expected to show unidirectional causality running from government revenue to government expenditure. Among those studies, Manage and Marlow (1986) noted that U.S federal expenditures have exceeded the federal revenues since 1970. Such fiscal imbalance encouraged them to test the causality direction between federal revenues and expenditures. Their results support the 'revenue-spend' hypothesis.

Westerlund, Mahdavi and Firoozi (2011) re-examined the revenue-spend relationship for a panel of 50 US state-local governed units over 35 years (1963-1997). They used a panel test

that accounts for both the time series and cross-sectional dependencies. They found that expenditures adjust to revenues according to a long-term equilibrium relationship and that in the short-term the direction of causality runs from tax to expenditure.

Moalusi (2004) looked at the causality between government revenue and expenditure using annual data for the period 1976-2000 in Botswana. They specify a multivariate model incorporating GDP and interest rates in addition to bivariate models. The results show that there is a negative unidirectional causal link running from revenue to government spending.

Eita and Mbazima (2008) used Granger causality through a vector autoregression (VAR) to testify this relationship for Namibia over the period 1977-2007 and they provide evidence supporting the revenue-spend hypothesis. Similarly, Tsen and Kian-Ping (2005) used Johansen (1988) and Gregory and Hansen (1996) cointegration methods for Malaysia and found that government revenue and expenditure are cointegrated. Granger causality tests confirm that government revenue Granger causes government expenditure.

In the same line, Maynard and Guy (2009) applied Granger causality tests to determine the causal relationship between government expenditure and tax revenue in Barbados using both bivariate and multivariate cointegration models. The results once again suggest a unidirectional causality running from tax revenue to government expenditure.

As far as oil-exporting countries are concerned, Fasano and Wang (2002) investigated the causality direction between government revenue and expenditure for GCC countries including Oman over the period 1975-2000. They employed an ECM and they found that in general government spending follows oil revenue; thus confirming the tax-spend hypothesis in these oil-dependent countries.

Petanlar and Sadeghi (2012) used oil revenue as a proxy for total revenue and examined its long-run relationship and direction of causality with government expenditure for a number of oil-exporting countries. Although they employed a different model, (using a P-VAR framework), their results provide support for a positive unidirectional causality from oil revenue to total government expenditure.

Dizaji (2014) used VAR and VEC models to study the dynamic relationship between government revenue and government expenditure in Iran. Whilst their tests confirm that

causality is running from government revenues to government expenditures (both current and capital), the impulse response function and variance decomposition indicate that oil revenue shocks are more significant in explaining government expenditures than oil price shocks. This suggests that the relationship may be moderated by the level of the oil price and the volume of oi exports for a given period of time.

Obioma and Ozughalu (2010) employed both the Engel-Granger two-step co-integration and the Johansen co-integration procedures and specified an ECM to study the relationship between government revenue and government expenditure for Nigeria over the period 1970-2007. They also support the tax-spend hypothesis for Nigeria.

Afonso and Rault (2009) investigated the causality between government revenue and spending for EU over the period 1960-2006, using a bootstrap panel analysis allowing for cross-country correlation. The revenue-spend hypothesis is supported for Belgium, Germany, Austria, Finland, the UK and for several recent member states.

Chang and Ho (2002) tested three different hypotheses: revenue-spend, spend-and–tax or fiscal synchronization for Taiwan over the period 1967-1999. Using Granger causality tests based on an ECM, their results suggest unidirectional causality running from government revenue to government expenditures.

In line with this, Darrat (1998) investigated the relationship between government revenue and spending for Turkey using multivariate cointegrating models. The multivariate ECM suggests that government revenue unidirectionally causes negative changes in spending in accordance with the Buchanan-Wagner hypothesis. Therefore, he recommended raising taxes in Turkey to face budget deficits.

Subhani et al. (2012) studied the causality direction between government revenue and expenditure in Pakistan over the period 1979-2010. The results reveal that government revenue Granger causes government expenditure therefore fiscal deficit cannot be reduced in Pakistan by increasing taxes.

Obeng (2015) examined this causal relationship in Ghana using data for the period 1980-2013 using ordinary least squares (OLS) to analyse the long-run relationship and a VAR model to test the short-run relationship. The results suggest that government revenue and expenditure

are strongly related in the short-run and the long-run. The causality tests show that it runs from revenue to expenditure supporting the revenue-spend hypothesis, implying that the government must improve its revenue sources to fund increasing expenditures.

(b)   The Spend-and-tax Hypothesis

The second hypothesis is the opposite of the first one in that it suggests that government revenue follows the behaviour of government expenditure. Hence, empirical results shall exhibit a unidirectional causality running from government expenditure to government tax. There is some empirical evidence from both developing and developed countries supporting this perspective.

Joulfaian and Mookerjee (1991) address the dynamics of government revenue and expenditures for 22 industrial economies, controlling for the effects of output gap and inflation rate using annual data from 1961 to 1986. Applying a VAR analysis, their results provide greater support for the spend-and-tax hypothesis over the other theoretical hypothesis. The results also highlight the importance of comparing the relationship at both central and subnational levels.

Von Furstenberg et al. (1986) used the vector autoregression (VAR) model to analyse the tax and spend approach in the US, using quarterly data over the period 1954-82. Their results support the view that the political system determines how much to spend and then searches for revenue sources to finance this rising expenditure, thus government expenditures Granger-cause government taxes. Similarly using US data, Anderson et al. (1986) reached the same conclusions.

Provopoulos and Zambaras (1991) employed the same models as Anderson et al. (1986) and Manage and Marlow (1986) to study the causal relationship between these two determinants of public deficit in Greece. Their finding supports the spend-and-tax hypothesis. Hondroyiannis and Papapetrou (1996) further back this finding for Greece using the Johansen procedure and Granger causality tests over the period 1957-1993.

Carneiro et al. (2004) established a simple macroeconomic model outlining the hypothesis of a spend-and-tax behaviour in Guinea-Bissau using data for 1981-2002. The Granger-causality tests and the ECM estimates suggest the existence of unilateral causality from expenditure to revenues in Guinea-Bissau.

Unlike previous research on the topic, Saunoris and Payne (2010) used an asymmetric ECM within a momentum threshold autoregressive framework for the UK over the period 1955-2009. Within the MTAR specification, the asymmetric ECM shows that government revenues respond to short-run changes in government expenditures and respond asymmetrically to budgetary disequilibrium. This finding supports the spend-and-tax hypothesis for the UK, contradicting previous research supporting either the tax-spend or fiscal synchronization hypotheses.

Dogan (2013) also employs Granger causality tests in a vector error correction model (VECM) framework to investigate the relationship between government revenue and expenditure for Turkey over the period 1924-2011. He finds a unidirectional causality from government expenditure to government revenue, implying the validity of the spend-and-tax hypothesis.

(c)   Fiscal Synchronization

On the other hand, Meltzer and Richard (1981) believe that the government usually balances the benefits and costs of its activities before conducting a fiscal program, so there is fiscal synchronization. Here the causal relationship is bidirectional between the government revenue and expenditure which means spending and taxation decision are taken simultaneously and thus there is a contemporaneous feedback between the two variables.

Baffes and Shah (1994) examined the relationship between government revenue and government expenditure for three Latin America Countries (Argentina, Brazil, and Mexico) and found strong evidence of bidirectional relationship for Mexico and Argentina. The studies of Owoye (1995), and Kollias and Paleologou (2006) also supported this hypothesis.

Specifically, Owoye (1995) investigated this causal relationship for G7 countries using cointegration and an ECM and found bidirectional causality for most of these countries except Japan and Italy. In Japan and Italy only, the causality runs in one way from government taxes to expenditure.

Kollias and Paleologou (2006) examined this issue for 15 EU members for the period 1960-2002 using a VECM methodology. The fiscal synchronization hypothesis is confirmed for Greece, Ireland, Denmark, Netherlands, Sweden and Portugal, but not for Belgium and Germany.

Li (2001) tested the hypotheses of tax-and-spend, spend-tax, or fiscal synchronization using annual data for China over the period 1950-1997. He suggested a more comprehensive testing strategy for unit roots and cointegration and used Granger causality based on VEC and VAR models. The findings suggested a bidirectional causality relationship between government revenue and spending in China. Chang and Ho (2002) employed the same econometric models for China but for different period (1977-1999) and found similar results.

Maghyereh and Sweidan (2004) tested this relationship for Jordan over the period 1969-2002 by using a multivariate ECM and used GDP as control variable along with real government revenues and real government expenditures. The results also show the existence of bidirectional relationship between government revenue and expenditures. Gounder et al. (2007) used the same methodology to understand the nature of this relationship for Fiji, a country that suffers from persistent fiscal deficits. In the short-run government expenditure causes government revenue, but in the long-run there is evidence of fiscal synchronization, implying that government should conduct expenditure reforms and improve revenue structure at the same time.

Ghartey (2010) examined this issue for three African countries using GDP as a control variable and dummy variable to take into account structural changes in Nigeria and South Africa. The results show that there is long run fiscal synchronization in nominal terms for all three countries. Elyasi and Rahimi (2012) used the bounds testing approach to cointegration to investigate this issue in Iran over the period 1963-2007. The results show that there is a bidirectional causal relationship between government revenue and expenditure in Iran in the short-run and the long run.

Aregheyen and Insah (2013) studied the causal pattern between government revenue and expenditure for Nigeria and Ghana within a Dynamic Ordinary Least Squares (DOLS) proposed by Stock and Waston (1993). Integrated into the Engle-Granger two-step procedure for estimating an ECM, it revealed bidirectional causality.

 Saka et al. (2015) used the DOLS methodology in addition to a Fully-modified Least Square (FMOLS) methodology and Canonical Cointegration Regression (CCR) for Nigeria over the period 1961-2013. The revenue variables were disaggregated into oil and non-oil revenues and expenditures into capital and recurrent expenditures. Although they used a number of

econometric models and different measures of revenues and expenditures, they reached the same conclusion as previous studies on Nigeria: fiscal synchronization.

(d)   Fiscal Neutrality/Institutional Separation

The fiscal neutrality or institutional separation rejects all the above-mentioned hypotheses; however, it is also supported empirically, albeit to a lesser extent. It implies a situation where decisions government revenue and government expenditure decisions are independent; it is empirically characterized by non-causality. In other words, government expenditure and government revenue are determined separately; hence the expression 'institutional separation' is found in the literature.

Chang et al. (2002) examined this causality relationship in ten industrialized countries over the period 1951 to 1996 using Johansen (1988) and Juselius (1990) cointegration test. GDP is included in the model as a control variable along with government tax and expenditures. Cointegration test results show that these three variables are cointegrated for seven countries and no cointegration for Japan, New Zealand and Thailand. The Granger causality test supports strongly the existence of fiscal neutrality for New Zealand and Thailand.

Narayan and Narayan (2006) used the empirical work of Toda and Yamamoto (1995) within a multivariate framework by modelling government revenue and expenditure with GDP to investigate this relationship for 12 developing countries. The results provide support for the fiscal neutrality hypothesis for Peru, South Africa, Guatemala, Guyana, Uruguay, and Ecuador.

In another study, Wolde-Rufael (2008) used the same econometrics technique to investigate the causality pattern for 13 African countries. The causality tests show that the direction of causation is mixed, but there is strong evidence of non-causality in any direction for Botswana, Burundi and Rwanda.

Nyamongo et al. (2013) provides evidence of independence between government revenue and spending in the short-run in South Africa. The paper uses the Hylleberg et al. (1990) method to test for seasonal unit root, Johansen cointegration and VECM causality tests for the period October 1994 to June 2004.

Masere and Kaja (2014) study the nature of this relationship for Zimbabwe for Multicurrency period using monthly data from 2010 to 2012. The results of Granger causality tests and

cointegration models show an independent relationship between government expenditure and government revenue providing evidence for Institutional Separation Hypothesis.

Chapter 4

Dynamic Relationships between Oil Revenue, Government Spending and Economic Growth in Oman

4.1. Introduction

Oil-exporting economies have witnessed multiple oil shocks over the last 50 years. Oil price fluctuation and its impact on output have attracted the attention of many economists who attempted to explain the impact of oil shocks and government expenditure on economic growth (Hamdi and Sbia, 2013). In particular, the transmission channels through which oil shocks may affect the overall economy have been investigated deeply for oil importing countries. The studies of Hamilton (1983), Mork and Hall (1980), Sachs (1981), Rasche and Tatom (1981), Darby (1982), and Burbidge and Harrison (1984) established the foundations for studying the relationship between oil prices and macroeconomic variables.

Sachs (1981) argues that the oil price shock of 1973 had contradictory effects across countries: while it benefited OPEC countries, it generated budget deficits in developed countries. The existence of a negative relationship between oil prices and macroeconomic activities has become widely accepted since the influential paper by Hamilton (1983); who investigated the oil price-output relationship in the US over the period 1948-1980 using a VAR framework. Hamilton's results showed that oil price changes have a strong causal and negative correlation with future real U.S. GNP growth. Following this seminal paper, several studies attempted to extend Hamilton's work in different contexts. Burbidge and Harrison (1984) used different data and methods for the U.S and observed the same negative impact of oil and energy shocks on real activity. Hooker (1996) also used US data for the period 1948-1972 and confirmed that oil price changes have an adverse influence on GDP growth.

More recently, it has been argued that oil prices may have asymmetric effects on economic growth due to variables not taken into account in the pioneering studies of the 1980s. More specifically, oil price volatility may affect output adversely for oil-importing countries for two reasons. First, as argued by Pindyck (1991), oil price changes raise uncertainty and thus cause a decrease in private investment. Second, such changes induce resource reallocation from productive to non-productive sectors which is costly for the economy (Lilien, 1982).

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Consequently, Hamilton's (1983) specification suffers from the omitted variables issue because it does not take into consideration the impact of volatility. Recent studies have used more sophisticated econometric models and included the effects of price volatility in addition to oil price changes. The results reveal that price volatility also has a significant negative impact on output. Ferderer (1996) argued that both oil price changes and volatility have a negative impact on economic growth, but volatility has an immediate impact whereas the effects of oil price changes take longer to occur. In line with this, Gunado and de Gracia (2003) and Jimenez-Rodriguez and Sanchez (2005) have provided evidence of a non-linear relationship between oil prices and output for OECD countries.

It is obvious from the literature that most studies of the relationship between oil prices and – macroeconomic variables have concentrated on developed and oil-importing countries. It has been argued in recent studies that the impact of oil price shocks on economic growth and their transmission mechanism in oil-exporting countries are different from those in oil-importing countries. Among the few studies that have investigated this kind of relationship for oil-exporting countries, the channels by which oil prices may affect economic performance have not been systematically documented. However, Erbil (2011) notes that several studies have argued that variations in the fiscal policies in such countries have exacerbated output cycles. In other words, Erbil (2011) argues that fiscal policy and its pro-cyclicality is one of the main channels of the natural resource curse.

Fasano and Wang (2002) examine the direction of causality between total revenue and total government spending for GCC countries including Oman over the period 1980-2000, using an ECM. The results show that an increase in revenue causes an increase in government expenditure in the first period for all GCC countries; suggesting that government expenditure is pro-cyclical to changes in oil revenue.

Tazhibayeva et al. (2008) used a panel VAR analysis and its derived impulse responses to assess the impact of oil price shocks on the non-oil economic cycle in oil exporting countries. In their model, they capture the transmission of oil shocks to the economy and found that oil shocks affect the economic cycle through fiscal policy.

Bleaney and Halland (2009) investigated the fiscal policy volatility channel by entering primary product exports and volatility together in a growth regression and run the model for 75 countries over the period 1980-2004. They found that the volatility of government consumption is explained by natural resource exports and greater fiscal volatility acts as a transmission mechanism for the resource curse.

Pieschacon (2009) analysed how oil price shocks affect macroeconomic activity in an oil-exporting economy using a DSGE model for Mexico and Norway, two oil-rich countries with different fiscal policies. This study provides evidence suggesting that fiscal policy is the channel which passes the oil shocks to the economy by influencing the output level, output volatility and growth.

Oman is a small oil-exporting country where public spending and public budget are tightly linked to oil revenue. Therefore, the fiscal response to rising oil prices is expansionary and when oil prices fall, the government cut the expenditure. In this context, the role of fiscal policy might be seen as a channel through which the fluctuations in oil prices are transmitted to the rest of the economy. Hence, from a Keynesian perspective, a reduction in public expenditure causes a fall in total demand, consumption and investment; in turn adversely affecting economic growth. On the other hand, when oil prices increase, public spending, investment and economic growth will rise as a result of the spending effect multiplier.

This chapter is an attempt to empirically examine the impact of oil revenue changes on government spending and economic growth in Oman. The chapter focuses on the mechanisms through which the effect of oil revenues on economic growth can be transmitted through government expenditure. I will use time-series analysis to examine how oil revenues affect economic growth both directly and indirectly through the fiscal policy channel. Most studies in the literature use cross-country regressions although there are also some case studies focusing on a single country. In contrast with existing cross-country studies, I use cointegration and Granger causality tests to examine the link between oil revenue and economic performance through the fiscal policy channel with data for Oman.

4.2 Data and Empirical Methodology

4.2.1 The Variables

Three macroeconomic variables are used to analyse the dynamic relationship between oil revenues, government expenditure and GDP for Oman. The variables are real oil revenue (REV), real total government expenditure (EXP), and real gross domestic product (GDP). All the variables are in their natural logarithms to avoid heteroscedasticity. The time period of the study is from 1980 to 2013. Data are sourced from National Statistical Hand Book of Omani economy released by National Centre for Statistics and Information. There are a large number of macroeconomic variables that affect economic growth and may equally be considered, beside oil revenue and government expenditure. Including such variables into the specification may improve the fit of the model, but would decrease the overall degree of freedom. For this reason, the model is restricted to these three variables. Discussions on the variables mentioned above have been covered in Chapter 2.

4.2.2 The Research Methodology

The aim of this chapter is to investigate the dynamics of the relationship between oil revenue, government expenditure and economic growth in Oman using the data for the period 1980 to 2013. The chapter uses the Johansen cointegration technique. Impulse response functions and variance decomposition have also been computed to examine the dynamic effects of oil revenue shocks on the Omani economy. The entire procedure consists of three steps: a unit root test, a cointegration test and finally the ECM is estimated.

4.2.3 The Unit Root Tests

The order of integration for each variable is determined using Augmented Dickey- Fuller (1979) and Philips and Perron (1988) tests. The Augmented Dickey-Fuller (ADF) test is designed to distinguish between stationary either with regards to mean or trend and non-stationary processes (LIoyd and Rayner; 1993). A series Y_t is said to be integrated of order d denoted by $Y_t \sim I(d)$ if it becomes stationary after differencing d times and thus Y_t contains d unit roots (LIoyd and Rayner; 1993). The general form of the Dickey and Fuller test can be written as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^{p} \beta_i \Delta Y_{1-j} + \varepsilon_t \qquad (4.1)$$

The null hypothesis here is that the investigated variable has a unit root. So if the null hypothesis of $\alpha_1 = 0$ is not rejected, it can be said that the series is non-stationary with a unit root. But if it is rejected which means then Y_t is stationary and integrated of order *I(0)*.

4.2.4 Cointegration Test

After establishing that the variables of interest are (unit roots) integrated of the same order *I(1)*, the next step is to check whether there is any long-run relationship between them. The Johansen (1988) procedure is applied to test for the presence of multiple cointegration relationships, *r*, in a single-step procedure. This is to determine whether oil revenue, total government expenditure and GDP are co-integrated. Cointegration explains how a set of economic variables behaves in the long-run equilibrium. If several variables are cointegrated, then they may drift apart in the short-run, however, they will revert back to their equilibrium relationship in the long-run (Yuk 2005, pp. 11).

In general, a set of variables is said to be cointegrated if a linear combination of the individual variables is stationary. So if X_t and Y_t are both non-stationary and integrated of order 1 and if the residuals (e_t) of cointegration regression are stationary [i.e., I(0)], then X_t and Y_t are cointegrated. Pesaran and Pesaran (1997) argued that the Engle-Granger cointegration test is inefficient and can lead to contradictory results, but Inder (1993) mentions that it is a good regression for modelling long-run equilibrium relationship. Holden and Thomson (1992) argue that this approach is efficient because it reduces the problem of multicollinearity. Indeed, most researchers using bivariate systems prefer to use the Engle-Granger two-step approach.

The long run relationships between Oil revenue, government expenditures and Gross domestic product (GDP) are estimated by ordinary least square (OLS) (i.e. cointegrating regression) as following:

$$ln\ GDP_t \ = \ \alpha \ + \ \beta_1 \ ln\ REV_t \ + \ \beta_2 \ lb\ EXP_t \ + \ \varepsilon_t \qquad (4.2)$$

where GDP is real GDP, REV is real oil revenue, and EXP is real total government expenditure as defined above. Equation (4.2) presents an estimation of the long-run relation between the variables.

4.2.5 Error Correction Model (ECM)

After cointegration is confirmed between variables, then the third step is developing a class of models that embodies the notion of error correction. This term is known as the error correction term since the deviations from long-run equilibrium are corrected gradually through a series of short-run adjustments. The whole system is referred to as the Error Correction Model (ECM) and it is used to allow for short-run adjustment dynamics and indicate the speed of such adjustment to the long-run equilibrium state. The ECM is built from the Johansen test can be expressed as follows:

$$\Delta x_t = \mu_x + \alpha_x ECT_{t-1} + \sum_{k=1}^{p} \beta_{xx,k} \Delta x_{t-k} + \sum_{k=1}^{p} \beta_{xy,k} \Delta y_{t-k} + \sum_{k=1}^{p} \beta_{xz,k} \Delta z_t + \varepsilon_{xt}$$

$$\Delta z_t = \mu_{zx} + \alpha_{xz} ECT_{t-1} + \sum_{k=1}^{p} \beta_{zx,k} \Delta x_{t-k} + \sum_{k=1}^{p} \beta_{zy,k} \Delta y_{t-k} + \sum_{k=1}^{p} \beta_{zz,k} \Delta z_t + \varepsilon_{zt}$$

$$\Delta y_t = \mu_y + \alpha_x ECT_{t-1} + \sum_{k=1}^{p} \beta_{yx,k} \Delta x_{t-k} + \sum_{k=1}^{p} \beta_{yy,k} \Delta y_{t-k} + \sum_{k=1}^{p} \beta_{yz,k} \Delta z_t + \varepsilon_{yt} \quad (4.3)$$

where ECT_{t-1} is the first lag of the error correction term, α is the short-run coefficient of the error correction term (-1< α <0), *X, Z, and Y are* the three endogenous variables in the system; and $\beta_{ij,k}$ describes the effect of the *k*th lagged value of variable *j* on the current value of variable *i; i, j=x,y,z*. The ε_{it} are mutually uncorrelated white noise residuals.

The error-correction term represents the long-run relationship. A negative and significant one indicates the presence of a long-run relationship. In addition, the coefficients in front of the lagged explanatory variables indicate the short-run relationship between the examined variables.

4.2.6 Impulse Response Functions (IRF)

As the chapter is interested in checking the dynamic effects of oil revenue shocks on government expenditure and economic growth, IRF are the most appropriate tool to use for

such purpose. Through the use of IRF, it can be observed the effect and statistical significance of each variable's response to one standard deviation increase in oil revenue.

4.2.7 Variance Decomposition Analysis

The relative importance of oil revenue shocks in the VAR system can be traced by using the variance decomposition analysis. It shows the percentage of change in a specific variable in connection with its own shock against the shocks to the remaining variables in the system. The higher the share of explanation of error variance, the more important the variable compared to other variables in the system. The generalised decomposition technique of Pesaran and Shin (2007), which is not sensitive to the order of the variables is used.

4.3 The Estimated Results

4.3.1 Unit Root Tests Results

It is essential to determine the level of the integration of the variables to determine whether it is appropriate to conduct the Johansen cointegration test. The prerequisite for the cointegration test is the non-stationarity of the variables and should belong to the same level of order of integration. Augmented Dickey Fuller (ADF) and the Philips-Perron (PP) tests were used for that purpose. Table 4.1 reports the results for the ADF and the PP tests for the level of integration of the variables. It is evident from the results that all the variables are non-stationary *I(1)* in levels and stationary *I(0)* in first difference. Therefore, it is appropriate to use the Johansen cointegration test in order to explore the long-run relationship between these macroeconomic variables. In addition to the variables above, real oil prices (ROP) are also used as an alternate to the oil revenue in a second model for a robustness check.

Table 4.1 Unit Root Tests				
ADF Test				
Variables	**LGDP**	**LREV**	**LEXP**	**LROP**
Levels	6.302	-0.504	-1.858	-1.501
First Difference	-4.124**	-6.510**	-5.372**	-6.520**
Philips-Perron Test				
Levels	-2.416	-0.437	-1.845	-1.505
First Difference	-4.097**	-6.568**	-5.372**	-6.489**
Notes: ** Signifies rejection at the 5% level. The critical values are -3.67 for ADF and -3.25 for the PP.				

4.3.2 Johansen Cointegration Results

The Johansen cointegration tests, discussed in Section 4.2.4, are carried out on the macroeconomic variables in the model specified in equation (4.2). The results for the two models are reported in Table 4.2. Both the Trace and the Max-Eigen Statistics for the two estimated models show that the null of no cointegration among the variables is rejected in favour of the alternative. The lag length was determined using the information criteria. The optimum lag of 2 was chosen by BIC and AIC and therefore, the lag of two was used.

Table 4.2 Johansen Cointegration Test Results			
Model 1: GDP, REV, EXP			
Hypothesised No. of CE(s)	Trace Statistic	Max-Eigen	Critical Values
None	34.585**	26.497**	30.192
At most 1	8.085	7.378	18.262
Model 2: GDP, REV, ROP			
Hypothesised No. of CE(s)	Trace Statistic	Max-Engen	Critical Values
None	44.729**	26.480**	35.299
At most 1	18.249	11.439	20.893
Notes: ** Denotes rejection of the null hypothesis of no cointegration at 5% level.			

Table 4.3 reports the results for the long-run equilibrium relationship between the variables. The estimated coefficients for the real oil revenues and the real government expenditure (LRGREV and LGEXP) are correctly signed and statistically significant at 5% level. Both variables depict positive relationship with GDP which are 0.672 and 0.871 respectively. This is consistent with the finding of Hamdi and Sabia (2013) for Bahrain. This is the expected result for oil-exporting countries, particularly those depending heavily on oil. On the other hand, for oil-importing countries, a negative sign is expected as recorded for New Zealand by Grounder and Barleet (2007) and Japan by Jin (2008).

Table 4.3 Results of the Long-run Equilibrium Relationship The Dependent Variable is LRGDP		
Regressors	Coefficients	t-Values
LREV	0.672[**]	2.198
LEXP	0.871[**]	2.557
C	4.572[**]	
Notes: ** Denotes significance at 5% level.		

Thus, we can derive the cointegrating equation from the above results with the log of real GDP as a dependent variable and the log of real oil revenue and log of real government expenditure as regressors, as follows:

$$LRGDP_t = 4.572 + 0.672\,LRGREV_t + 0.872\,LRGEXP_t \qquad (4)$$

Looking at the numerical values of the coefficients in equation (4) above, the results show that a 10% permanent increase in oil revenue will cause the real GDP to increase by 6.7%, while an equivalent 10% increase in government expenditure will increase real GDP by 8.7%. This shows that oil revenue should better be transformed into public expenditure to boost GDP growth in the long-run. This is consistent with previous studies (Bleaney and Halland, 2009; Tazhibayeva *et al.,* 2008; and Pieschacon, 2009) arguing that fiscal policy acts as an efficient transmission mechanism for natural resource effects. In addition, the results are also consistent with Hamdi and Sabia (2013) findings for the Bahrainan economy, which is an oil-exporter. Theoretically, for oil-importing countries, a negative sign is expected as recorded for New Zealand by Grounder and Barleet (2007) and Japan by Jin (2008).

Table 4.4 below reports the short-run dynamics of the variables in the ECM. It is evident from the results that over the period the response of real GDP to real oil revenues is significantly negative. The negative effect of oil revenue on economic growth in the short run could be attributed to oil price volatility where most oil-abundant countries are vulnerable to boom-bust cycles leading to economic instability (Mehrara, 2008). Budina and Wijnbergen (2008) stated that managing oil revenue volatility is the main challenge facing oil-rich countries. This appears that Oman needs to use oil funds and fiscal rules to de-link public expenditure from the volatile oil revenue by accumulating large oil fund assets to lower vulnerability to financial crises and debt. In addition, oil-exporting countries have significantly improved their production capacity and technological know-how; this enables their oil sector to be less dependent on volatile oil prices.

The results also exhibit that the error correction term is of the expected sign (negative) and highly significant. This is a sign of robustness of the ECM; when variables are cointegrated, the negative coefficient in front of the error-correction term ensures that the said variables do not drift apart. The coefficient in front of the error-correction terms indicates that the system converges back to equilibrium in about three years whenever it deviates from the equilibrium. The lower part of Table 4.4 reports the diagnostic tests of the model. It is clear from the reported results that the model's residuals are free from serial correlation, heteroscedasticity and are normal; this suggests that the estimated model is adequate.

The ECM for the oil prices used as robustness check is also reported in the table, which has a very small value of -0.014, but highly significant. It is clear that the ECM is of the correct sign, but its relatively small value compared to the oil revenue discussed above, indicates that using the oil revenue is more appropriate than the oil prices. The other short-run coefficients of the model are very small and are insignificant.

Table 4.4		
The ECM Results Model with Oil Revenue		
Regressors	**Coefficients**	**t-Values**
ΔLRGREV(1)	-0.238	-3.696
ΔLRGREV(2)	-0.323	-4.966
ΔLRGEXP(1)	0.120	0.032
ΔLRGEXP(2)	-0.079	-0.701
ECM	-0.299	-4.051
Model with Oil Prices		
ΔLROP(1)	0.004	1.243
ΔLROP(2)	0.007	1.344
ΔLRGEP(1)	0.041	0.151
ΔLRGEP(2)	0.141	1.243
ECM (Oil Prices)	-0.014	-4.817
Diagnostics Tests		
White Test	Chi-Sq.	Prob.
	82.237	0.534
LM Test (Serial Correlation)	LM-Stat.	Prob.
	7.836	0.551
Normality Test	Jarque-Bera	Prob.
	2.397	0.880

4.3.3 Causality Test Results

Table 4.5 below reports the results from the Granger causality test based on the estimated VECM discussed above. The results for the model with the real GDP as a dependent variable indicate that the null: "real government revenue does not Granger cause real GDP" is rejected in favour of the alternative. Similarly, the null: "real government expenditure does not Granger cause real GDP" is also rejected in favour of the alternative. The combined effects of the real revenue and the real government expenditure have a significant impact on the real GDP as the null is rejected in both cases.

However, in the models where the dependent variables are real government expenditure and real government revenue, the null could not be rejected as none of the variables are significant at any conventional level. This is the case with the individual variables and their combined effects.

Therefore, it could be concluded that the causality between these series is unidirectional from real government expenditure and real government revenue to real GDP. As expected in studies of oil-exporting countries, the real government expenditure and the real government revenue would Granger causes the real GDP, but not the other way round. This result is for instance consistent with those of Eltony and Al-Awadi (2001) for Kuwait, and Hamdi and Sbia (2013) for Bahrain.

In relation to the literature on natural resource curse, the results in Table 4.5 and as discussed above suggest that the issue of natural resource curse is not significant in Oman for the sample period covered. This is indicative that government expenditure, which have been seen generally derived from oil revenue has been largely productive in contributing to economic growth in Oman.

Table 4.5 VEC Multivariate Granger Causality Tests			
Dependent	**Independent**	**Chi-Square**	**Prob**
GDP	REV	36.31[**]	(0.00)
	EXP	18.45[**]	(0.00)
	All	8.45[**]	(0.00)
REV	GDP	10.20	(0.12)
	EXP	8.71	(0.19)
	All	14.60	(0.24)
EXP	GDP	6.87	(0.33)
	REV	2.69	(0.65)
	All	9.58	(0.65)
Notes: ** signifies rejection at 5% level of significance.			

4.3.4 Impulse Response Functions

Figure 4.1 reports the impulse response functions, IRFs, of the estimated stationary VAR/VECM explained in Section 4.2.5 above. The IRFs show each variable responds to a shock (an impulse) in each variable. The reported result shows that real government expenditure responded positively to a positive real oil revenue and real GDP shocks immediately after the shock and lasted for about half a year for the former and for about one year for the latter. Importantly, the real GDP has responded positively to a positive change in real expenditure for up to about three years. This and the positive long-run coefficients reported in Table 4.3 indicate that the Omani economy appears to have escaped from the resource curse as suggested by Abidin (2001).

Figure 4.1
The Impulse Response Functions
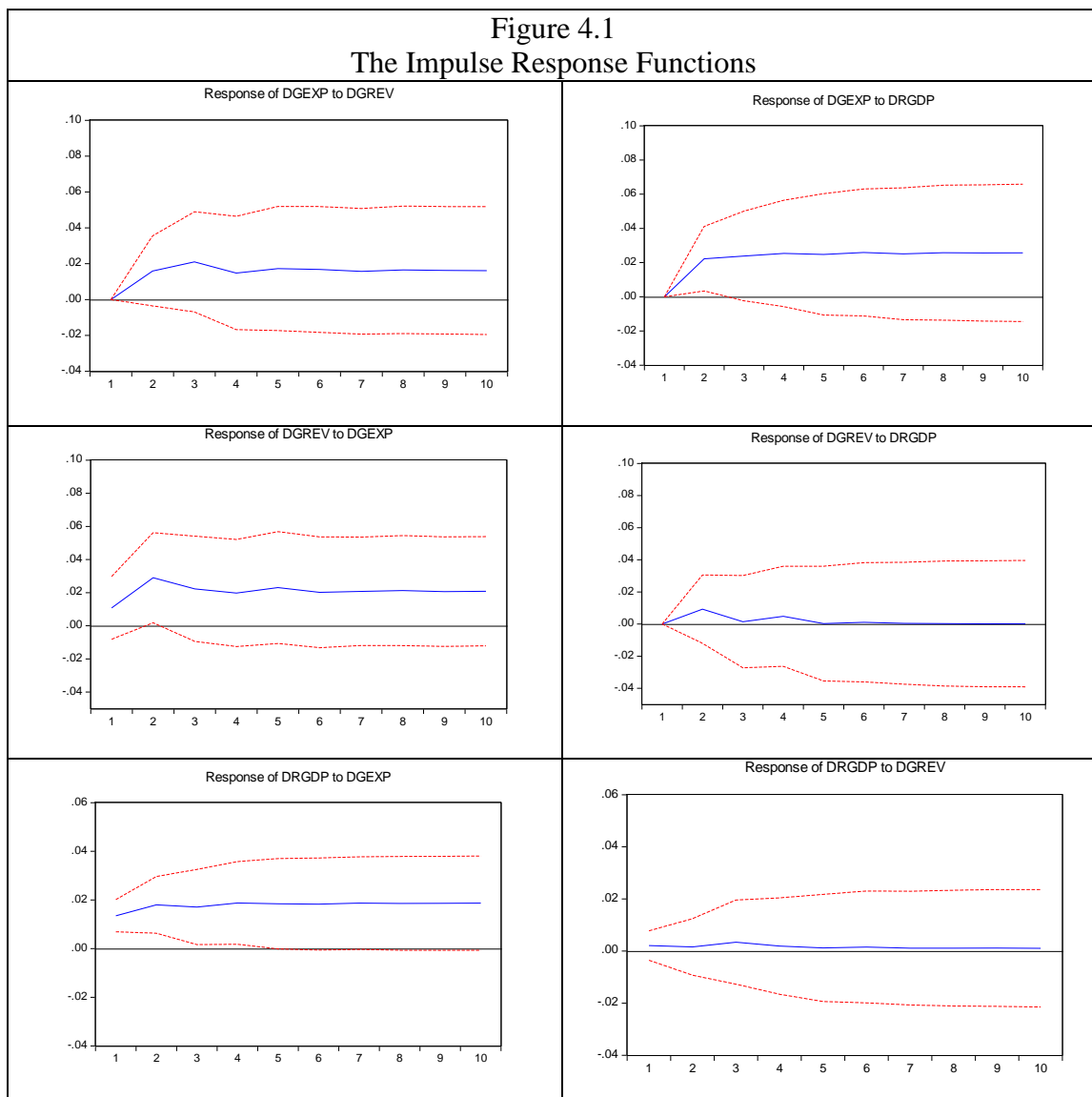
4.3.5 Variance Decomposition

Variance decomposition shows the contribution of each variable to the variations of a variable within the estimated VAR/VECM model. Table 4.6 reports the variance decomposition of the estimated tri-variate model as explained in Section 4.2.7.

- GDP:

The table shows that the variation of GDP is due to itself in the short-run, but oil revenue accounted for about 50% of volatility in GDP by the eighth year and continued to rise up to about 52% by the tenth year.

- Oil Revenue:

The real GDP contributed to about 28% of the oil revenue variations by the second year and its contribution to the changes in the oil revenue declined a little to about 22% by the tenth year. Government expenditure affected oil revenue at long lags, the results shows that in the first year, government expenditure did not contribute to shocks in oil revenue, but then increasing effects continue until it reaches 17% in the eighth year. This might be attributed to public investment in oil production which generates more oil revenue in the long-run through improved productivity and a better allocation of public resources.

- Government Expenditure:

Variations in government expenditure are generally due to variations in real GDP and oil revenue. An interesting aspect of the result is that the effects of oil shocks on government expenditure jump from 2.5% in the first year to 21% in the second year and 39.5% in the fifth, and then they level off around 45%. This confirms the long-term effect of oil price increases on the fiscal policy of oil-exporting countries; thus oil-dependent countries need to introduce a long-term policy of fiscal diversification and fiscal stabilisation policy to avoid oil revenue variability. This result contradicts the study by Farzanegan and Markwardt (2008), who found that oil shocks have insignificant effect on government expenditure variation.

Table 4.6			
Variance Decomposition of GDP:			
Period	S.E.	GDP	GREV	GEXP
1	0.008060	100.0000	0.000000	0.000000
2	0.013015	45.02443	20.43443	34.54114
3	0.014148	41.54781	22.32655	36.12564
4	0.021958	20.36782	35.67907	43.95311
5	0.038771	11.02402	58.20949	30.76649
6	0.064767	6.063702	65.52047	28.41583
7	0.094002	5.318647	67.65083	27.03052
8	0.142977	3.700801	68.44061	27.85858
9	0.201459	3.210906	68.74811	28.04098
10	0.280669	2.595035	68.41065	28.99432
Variance Decomposition of RGREV:			
Period	S.E.	GDP	GREV	GEXP
1	0.050691	24.77306	75.22694	0.000000
2	0.080657	12.90112	68.35207	18.74681
3	0.111955	6.878123	68.75933	24.36255
4	0.152091	4.107299	69.21277	26.67993
5	0.204364	3.655382	68.96581	27.37880
6	0.265775	2.770461	69.10222	28.12732
7	0.320956	2.762000	69.49214	27.74586
8	0.417558	2.651440	70.54183	26.80673
9	0.551752	2.489140	70.36815	27.14271
10	0.739909	2.166446	70.16357	27.66999
Variance Decomposition of RGEXP:			
Period	S.E.	GDP	GREV	GEXP
1	0.041434	3.733903	47.32813	48.93796
2	0.060865	9.390478	56.96460	33.64492
3	0.094179	4.845695	61.25901	33.89529
4	0.128843	3.611785	60.55072	35.83750
5	0.178837	3.248210	64.86352	31.88827
6	0.262376	2.329979	67.30291	30.36711
7	0.359284	2.301907	67.55991	30.13818
8	0.492690	2.373371	68.81117	28.81546
9	0.683048	2.165239	69.09087	28.74389
10	0.914763	2.192654	69.00472	28.80263

4.4 Conclusion and Policy Implication

This chapter investigates the short-run and long-run relationship between three macroeconomic variables in Oman using the Johansen cointegration technique as well as the VECM. The results indicate that there is a long-run relationship between the three macroeconomic variables of interest: real GDP, real government expenditure and real oil revenues. The long-run coefficients indicate that there are positive long-run relationship between the real GDP, real government expenditure and the real oil revenues.

As proposed by Mashaekhi (1998), the government is an important institution in the development process and a good fiscal policy could play an important role in switching the natural resource curse to a blessing. In general, oil revenue is beneficial to economic growth in Oman, but could be more effective if associated with a fiscal policy that dissociates fiscal expenditures from oil revenue to insulate the economy from oil revenue volatility (Mehrara, 2008).

The impulse response functions and the variance decomposition from the estimated model show that these variables are very important to the short-run and long-run dynamics of the Omani economy. Importantly, the real expenditure appears to have positive impact on the real GDP and variations in government expenditure are generally derived by the changes in oil revenue. The oil revenue affects the GDP through government expenditure. Hence, Oman should try to reform its public expenditure by dissociating it from the inherently unstable oil revenues. As currently the trend in other oil-exporting countries, Oman is set to launch a fiscal stabilisation programme aiming at attenuating the predominance of oil revenue as a share of total government revenue. The programme should aim at investing in other productive activities and increase taxation on households and businesses. With the recent dramatic drops in oil prices, it is essential for Oman to consistently pursue the policies to be able to continue defying the so-called "natural resource curse".

Chapter 5

The relationship between Government Spending and Economic Growth in Oman: The Keynesian versus the Wagner Hypothesis

5. 1. Introduction

The continuing growth of government expenditure in developing countries is one of the main features of the contemporary world (Demirbas, 1999). Hence, there has been rising interest in the last two decades on the topic of government expenditure and its long-run effects on economic growth, and vice versa (Loizies and Vamvoukas, 2004). Although there has been little consensus in the literature on this topic, policy-makers in developing countries have increasingly recognised the need for fiscal adjustments and the restructuring of their public sector. These structural adjustments involved crucial choices regarding which components of government spending should be dropped or reduced. From an economic viewpoint, it is important to compare the contribution of each component of fiscal expenditure to economic growth in the long-run (Devarajan *et al.,* 1996).

As the public sector in oil-exporting countries is the main player in the economy, it is paramount to understand that all governmental expenses seem useful from a pure utility viewpoint. Governments create economic infrastructure like communication facilities, build roads, seaports and airports. They also spend a lot in developing human resources through education, training and health services. Governments also participate in capital formation and research and development beside stimulating saving and investment (Tulsidhara, 2006). Above all, the public sector in these countries is a major employer of labour force. By investing heavily in human and technological capital, governments are also able to dramatically influence resource allocation and the efficiency of investments in the long-run.

The essence of government intervention and spending dates back to the theory of market failures. This theory argued that government intervention is necessary for the following reasons: the provision of public goods, addressing externalities, imperfect information and missing markets (Grossman, 1988). The conventional finding is that public investment in human capital and infrastructure is necessary to increase the productivity of private capital and has positive effects on economic growth (Khan and Kumar, 1997). Government is also seen as important to support socially desirable investment and hence harmonize conflicts between social and private interests (Grossman, 1988).

As a result, there are two schools of thought discussing the causative relationship between government expenditure and economic growth: Wagner's Law and the Keynesian hypothesis explained in Chapter 3. The core theme of these schools focuses on the direction of causality between government spending and economic growth; which attempt to unveil whether government expenditure is a cause or an outcome of economic growth (Biswal *et al.,* 1999).

Wagner's Law argues that government expenditure is endogenous and is affected positively by economic growth, the Keynesian approach, on the other hand, considers government spending as an exogenous variable that could be used to enhance economic growth. If the positive features of government intervention are true then the Keynesian hypothesis should hold in the short and long-run relationship between government spending and economic growth (Al-Ansar *et al.*, 1993). Other authors that have developed models to link public spending or its components to economic growth have not succeeded in developing rigorous theoretical models. Most of these models assume that government spending is productive and their empirical application found a positive relationship between public investment and growth rate.[3]

It is theoretically argued that the government is less efficient than the private sector and so the more government intervenes in the economy, the lower is the economic growth will be recorded. In practice, most government operations are conducted by state-owned enterprises that are generally inefficient compared to private companies and hence they reduce the overall productivity of the economy (Khan and Kumar, 1997). Public investment can crowd private investment out by using scarce resources and by doing so adversely affects growth (Khan and Kumar, 1997). Moreover, the expansionary fiscal policies contribute towards distorting economic incentives and leads to sub-optimal economic decisions (King and Rebelo, 1990). Barro (1989) argues that an increase in government expenditure causes an increase in national debt which leads to higher taxes in the future and hence lowering aggregate demand that in turn would lower national output. Therefore, the role of government spending in promoting economic growth remains debatable in both developed and developing countries. Both economic theory and the empirical literature have not yet succeeded in providing a clear cut answer to the question of how public spending affects economic growth (Devarajan *et al.*, 1996).

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[3]See Arrow and Kurtz (1970), Landau (1983), Aschauer (1989), Barro (1990, 1991), Morrison and Schwartz (1991) and Holtz-Eakin (1991)

Within the framework of time series econometrics, investigation of short- and long-run causal relationship between public expenditure and economic growth through Granger causality testing using the co-integration and error-correction approach has been common (Jiranyakul and Brahmasrene, 2007). Indeed, empirical testing and determination of causal direction only became possible within the framework developed by Granger (1969) and Sims (1972) and later adapted by Demribas (1999) to the area of the present chapter. Still, there are some methodological shortcomings that make results in this area rather inconclusive.

This chapter investigates the effects of public spending on economic growth. Two notable past studies are cross-country studies which have included Oman in the sample. Al-Sheikh (2000) investigates the existence of Wagner's Law for 27 countries including Oman using aggregated government spending and national income. He found evidence of Wagner's Law for most countries including Oman. Al-Faris (2002) examined the relationship between disaggregated government expenditures and national output for GCC countries without making a clear distinction between long and short-term relationship. This is a country focused study on the effects of government spending on economic activity in Oman.

The contributions of this chapter to the literature are five-fold. First it focuses on a single oil-exporting country, Oman. Second, it uses time series data for 33 years. Third, it uses disaggregated government expenditure into public investment expenditure and current expenditure and examines their relationship with economic growth. Fourth, in contrast to Al-Faris (2002) it makes a clear distinction between short and long-run causal relationships between the variables. Finally, both real and nominal variables have been used as suggested by Beck (1982).

As a small open economy, Oman is a particularly interesting case study for several reasons. Firstly, the public sector in Oman is a major component of GDP as seen in Chapter 2. Secondly, over the past two decades Oman experienced a decrease in the size of the public sector as a share of GDP, accompanied by an increase in GDP for the same period. Thirdly, 70% of total government expenditure is financed by oil revenues which are dependent on international oil market fluctuations. Generally, the public sector is considered as the leading sector and the

engine of economic growth in oil exporting countries, particularly the GCC countries[4] (Auty, 2001).

5.2. Theoretical Framework

This chapter investigates the dynamic relationships between government spending and economic growth in Oman for the period 1980-2013. The theoretical framework for analysing the relationship between government expenditure and economic growth is based on testing two alternative theories. The first one is based on Wagner's law which states that government expenditure can be estimated as a function of economic growth. Whereas the second theory is the Keynesian hypothesis which argues that the expansion of government expenditure boosts and accelerates economic activity. In part A, we employed the functional forms of Wagner's law to check the existence of Wagner's proposition. In Part B, our model expresses economic growth as a function of government expenditure as proposed by the Keynesian school of thought.

5.2.1. The Versions of Wagner's Models:

Wagner's law emphasizes that, in the process of economic development, government spending increases relative to economic activity. There have been many formal interpretations of Wagner's law which have resulted in different empirical models. Since there has been no agreement on the economic interpretation of Wagner's law, various specifications have been applied to different countries (Halicioglu, 2003). According to Demirbas (1999), there are at least six versions of Wagner Law discussed in the literature review:

$$E = F(GDP) \tag{5.1}$$

$$CE = F(GDP \tag{5.2}$$

$$E = F\left(\frac{GDP}{P}\right) \tag{5.3}$$

$$\frac{E}{GDP} = F\left(\frac{GDP}{P}\right) \tag{5.4}$$

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[4] These countries are Bahrain, Kuwait, UAE, Saudi Arabia, Qatar and Oman

$$\frac{E}{P} = F\left(\frac{GDP}{P}\right) \qquad\qquad\qquad (5.5)$$

$$\frac{E}{GDP} = F(GDP) \qquad\qquad\qquad (5.6)$$

where E represents the total government expenditure, P is the population, GDP is the gross domestic product, CE is the government consumption expenditure.

Principally, all these models discussed above can be collapsed into two: an estimate with aggregated government expenditure on the GDP and a model that disaggregates the government expenditure into consumption and capital expenditure. The latter will enable the analysis to disentangle which of the two government expenditure has more productive effect on the economy. The chapter uses both these models.

The earliest and most common version of Wagner's law was suggested by Peacock and Wiseman (1961). According to them, real government expenditure is dependent upon the real economic growth. In this study we take into consideration disaggregation of government expenditure and so our equation involves the estimation of the following regression in order to establish the relationship between the variables involved (GDP and the various components of government expenditure):

$$G_{it} = \alpha_0 + \alpha_1 GDP_t + e_t \qquad\qquad\qquad (5.7)$$

where G_{it} is the ith component of government spending (recurrent and capital expenditure), GDP is the Omani domestic product and e_t is an error term.

5.3. The Data and The Econometric Methodology

5.3.1 The Data Sources and Descriptions

The core variables are total expenditure which include all government expenditures and Gross Domestic Product (GDP) both in real and nominal form. Government expenditure is further disaggregated into current and investment expenditure. In particular, the current expenditure includes expenditure of Civil Ministries, Defence and National Security, interest paid to loans and all other items. On the other hand, investment expenditure is made up of National Gas exploration, development expenditure to the Public Petroleum Company, civil ministries

investment expenditure and contributions to the private sector. All these categories of government expenditures are collected from: (a) the Ministry of National Economy- Statistical Year Book various issue and (b) World Development Indicators (WDI) 2008.

When government expenditure is considered as the outcome, the dependent variables are made up of three varieties of government expenditure: total government expenditure (EXP); government investment expenditure (IV); and government current expenditure (CU). All these are considered in both real and nominal values. Similarly, when government expenditure is considered as a cause, GDP is our dependent variables. In addition to real and nominal GDP, total GDP and per capita GDP have also been considered.

Figure 5.1 summarises the trends in the main variables for the real data. Besides total government expenditure, the government expenditure is further broken into government current and investment expenditure. As could be observed from the figure, during the period 1980-1986, the Omani GDP[5] was on the rising trend mainly due to oil price rises.
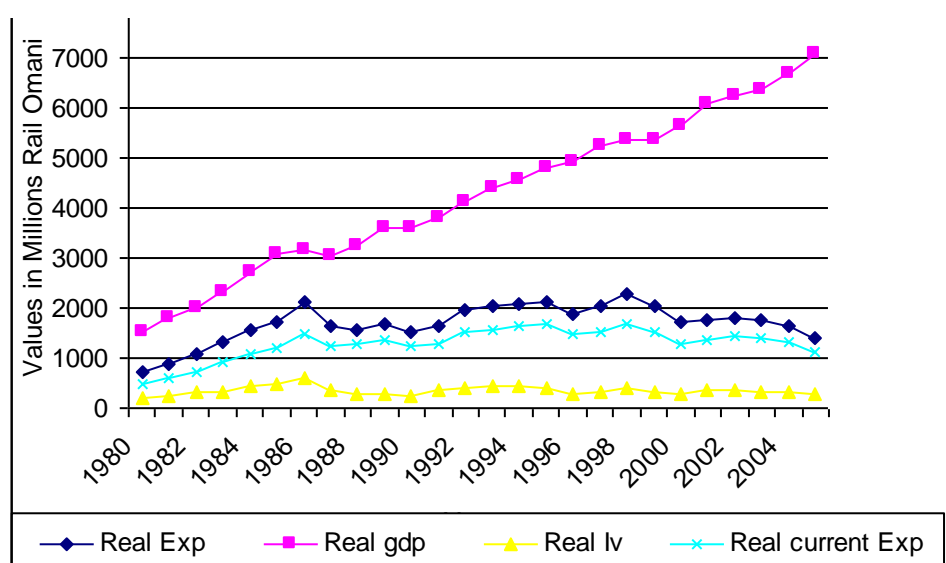
Figure 5.1. Trends and patterns in real terms, 1980-2005
Source: Authors own compilation from the Data

From the early 1980s to the mid-1980s, oil prices declined and then picked up at the end of the 1980s. This is reflected in a slight fall in real GDP during the mid-1980s, and a recovery towards the late 1980s. On the other hand, government expenditure has been fluctuating around the same level throughout the entire sample period. However, the government expenditure has not been rising along with the rise in the GDP. Disaggregating public expenditure in absolute

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[5] As the original variables are nominal in values, they are deflated using the GDP deflator to convert them to real.

value indicates that while public investment has been low and fluctuating, current expenditure has been high and steady. This may be due to political and social factors, it is the investment expenditures which suffered most compared to current expenditure.

Oil prices rose in the 1990s and as a consequence the Omani GDP followed the same trend. However, government expenditure did not follow the pattern at all and has remained rather steady since then. This coincides with the period that Oman had started to open up its economy to private investment and privatisation of various public enterprises. As a result, as shown in Figure 5.2, the ratio of government expenditure to GDP has been falling from the mid-1980s onwards compared to the early period where it was rising. It is thus obvious from Figure 5.2 that the relative share of public expenditure in GDP increased sharply by nearly 43% in 1980 to 60% in 1986 and then fell steadily to drop to around 38% in 2003.
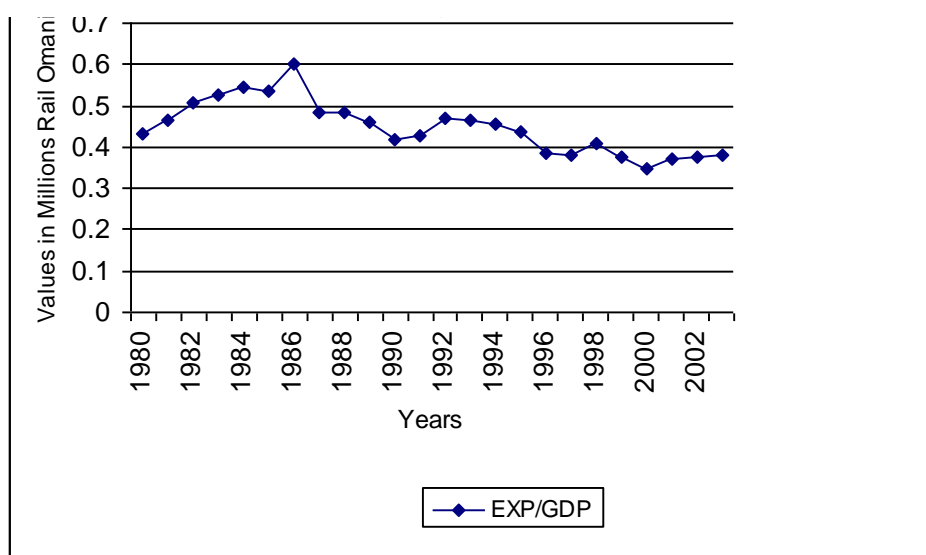
Figure 5.2. Ratio of Government Expenditure to GDP, 1980-2003
Source: Authors own computation from the Data

The same trend can be observed in the variables when nominal data are used instead of real data, except for the seeming correlation between government expenditure and the nominal GDP. Indeed, the graphical analysis indicates some kind of correlation between nominal government investment expenditure and the nominal GDP; at least in the long run.

5.3.2 The Econometric Methodology

The Engle-Granger cointegration test is used to establish the long-run relationship between the variables in the model specified in equation (5.7). The Engle-Granger is preferred here to

Johansen as the model tested is bivariate making implementation of the model straightforward. Secondly, Engle-Granger method has additional advantages that include using a criterion of minimum variance in contrast of the Johansen criterion of maximum stationarity, which is very appropriate to a small sample size like the one used in this chapter (Alexander, 1999). The results suggest the rejection of the null of no cointegration in favour of the alternative.

Thereafter, Granger causality was used to detect the direction of causality between the variables. Causality means that the effect cannot come before the cause, implying that for GDP to have an effect on public expenditure, an increase in GDP should provide good prediction of public expenditure growth. According to the concept of Causality (Granger, 1969), a variable A is caused by a variable B if A can be predicted better from past values of both A and B than from past values of A alone.

Standard Granger Causality testing in first differences is applied to detect the direction of causality between variables. The optimal lag length for the causality test is determined by the Schwarz Bayesian Criterion (BIC or SBIC) and Akaike Information Criterion (AIC). The Granger Causality regression can be formulated to test for causality as in the following:

$$\Delta EXP_t = \alpha_1 + \sum_{i=1}^{p} \beta_{i1}\Delta EXP_{t-i} + \sum_{i=1}^{q} \lambda_{i1}\Delta GDP_{t-i} + \mu_t \qquad (5.8)$$

$$\Delta GDP_t = \alpha_2 + \sum_{i=1}^{p} \beta_{i2}\Delta EXP_{t-i} + \sum_{i=1}^{m} \lambda_{i2}\Delta GDP_{t-i} + \varepsilon_t \qquad (5.9)$$

Granger causality test examines the null hypothesis that GDP_t does not Granger-cause EXP_t which is rejected if the coefficient λ_t in equation (5.8) is significant and hence conclude that GDP_t is Granger cause EXP_t. The same applies to GDP_t with respect to EXP_t in equation (5.9) if β_2 is significant.

The null hypothesis of non-causality is tested using t-statistics and results are shown in Table (5.1) for real data. There are four possible patterns of causality possible:

1. Unidirectional causality from GDP_t to EXP_t if $\lambda_1 \neq 0$ and $\beta_2 = 0$ (Wagner law is valid)
2. Unidirectional causality from EXP_t to GDP_t if $\beta_2 \neq 0$ and $\lambda_1 = 0$ (Keynesian Hypothesis is valid)

3. Bi-directional causality between EXP_t and GDP_t if $\lambda_1 \neq 0$ and $\beta_2 \neq 0$ (Both Wagner law and Keynesian Hypothesis are valid)

4. No Causality if $\lambda_1 = 0$ and $\beta_2 = 0$ (None of them is valid).

5.3.3 The Estimated Results

Table 5.1 reports the results for unit root test and Engle-Granger cointegration tests. It is evident from the table that the null of a unit root could not be rejected on levels, but rejected on first difference for all the variables. This means that the variables are non-stationary $I(1)$ in levels but stationary I(0) in first differences and therefore appropriate for Engle-Granger cointegration analysis. Results for the cointegration analysis are reported in the lower part of the table, which also rejected the null of no cointegration with a suggestion of the presence of at least one stochastic trend in the model.

Table 5.1				
Unit Root Test: The ADF				
Variables	Levels		First Difference	
TG_EXP	2.952		-5.567**	
TRG_EXP	2.945		-5.786**	
GDP	1.557		-4.984**	
RGDP	-1.502		-4.984**	
Engle-Granger Cointegration Test				
	Tau-statistic	Prob	z-statistic	Prob
TG_EXP	-3.271**	0.174	-12.503**	0.431
GDP	-4.134**	0.991	-5.380**	0.992
No. of stochastic trends: 1				
TRG_EXP	-4.276**	0.125	-20.141**	0.137
RGDP	-3.844**	0.132	-17.585**	0.412
Error Correction Model				
GDP			Error Correction Term	
2.148 (11.955)			-0.67 (-5.171)	
** signifies rejection of null at 5% level of significance. The critical values based on Mackinnon (1996) for 1%, 5% and 10% are -3.433, -2.862 and -2.567, respectively. Figures in brackets are t-statistics				

The lower part of Table 5.1 reports the error correction model and the error correction term is of expected sign and highly significant. The error correction term is also relatively high, which suggests that the system goes back to equilibrium very quickly whenever there is a deviation from the long-run path.

As far as unidirectional causalities are concerned, the null hypothesis of "real GDP does not Granger cause total government expenditure" is rejected at 5% percent level of significance for Wagner's version. Also, the null hypothesis of government expenditure does not Granger cause the real GDP is rejected, but the causation from the total real government expenditure to RGDP is significant at the 10% level only.

The results also indicate that the null of bi-directional causality between total government expenditure and real GDP cannot be rejected at 10% level only. In other words, real GDP Granger causes total government expenditure and total government expenditure Granger causes GDP. However, it should be noted that the causation from total government expenditure to RGDP is only significant at the 10% level, suggesting that the significance of the Keynesian hypothesis is lower than that of Wagner's.

Table 5.2 The Wagner Hypothesis Tests		
Null hypothesis	**Prob.**	**F-statistic**
TRG_EXP $\neq\rightarrow$ RGDP	0.078	2.266*
RGDP $\neq\rightarrow$ TRG_EXP	0.000	6.985**
GRC_EXP $\neq\rightarrow$ RGDP	0.009	4.607**
RGDP $\neq\rightarrow$ RGC_EXP	0.132	2.016
GRR_EXP $\neq\rightarrow$ RGDP	0.331	1.203
RGDP $\neq\rightarrow$ GRR_EXP	0.000	7.149**
Note: ** and * Signify rejection at 5% and 10% significant level, respectively.		

A cointegration test has also been run on the disaggregated data to check for the long-run relationship between the series. Johansen cointegration test is used to that end as the model run consists of three variables unlike the bi-variate model estimated with the aggregated data. The results are represented by Table 5.3, where the null of no cointegration has been rejected in favour of the alternative.

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Table 5.3 Cointegration Test on Disaggregated Data				
Hypothesised No. of CEs	Trace	Critical Values	Max-Eigen	Critical Values
None	48.699**	29.797	36.077**	21.130
At most 1	12.112	15.495	9.464	14.264
** Denote significant at 5% level.				

In addition, the two bottom rows report the results of the tests performed with disaggregated government expenditure. Total government expenditure is disaggregated into capital expenditure (GRC_EXP) and recurrent expenditure (GRR_EXP). The results suggest that there is a unidirectional causality from government capital expenditure to real GDP, but the opposite for recurrent expenditure, i.e. GDP Granger causes recurrent expenditure.

The main results of the causality test of real data from Table (5.2) can be summarized as follows:

The null hypothesis of the real GDP does not Granger cause total government expenditure is rejected at 5% percent level of significance for the Wagner's version. Also, the null hypothesis of government expenditure does not Granger cause the real GDP is rejected, but the causation from the total real government expenditure to RGDP is significant at only 10%. Thus, there is a Bi-directional causality between the total real government expenditure and the real GDP. This result supported the existence of both Wagner proposition and the Keynesian Hypothesis for the relationship between total expenditure and the real GDP.

Where Capital expenditure (i.e., as dependent variable) is tested for causality relation with real GDP, there is a presence of causality from public investment to the real GDP (the Keynesian hypothesis), but not from the real GDP to public investment (the Wagner's law). Thus, the unidirectional causality from real capital expenditure to real GDP is significant at the 5% level, supporting the Keynesian hypothesis for capital expenditure.

When recurrent expenditure is tested with real GDP, there is a unidirectional causality from the real GDP to government recurrent expenditure; which is significant at 5% level. This result supports the existence of Wagner's law for recurrent expenditure.

Therefore, the results support the existence of both Wagner's law and the Keynesian hypothesis in Oman for total government expenditure, implying that economic growth leads to an increase in total government expenditure and also total government expenditure can induce economic growth.

The results provide support for the Keynesian hypothesis between capital expenditure and GDP in Oman seems to suggest that effective public investment in capital can be used as an instrument of stabilisation as suggested by the Keynesian theory. Recurrent expenditure, on the other hand, does not have much effect on economic growth. Therefore, the government should try to rationalise its recurrent expenditure, which will have less negative effects on economic growth in the long-run and re-allocate part of the current expenditure to invest in human and technological capital. This has implications given the current situation of falling oil prices and budget deficits.

This suggests that there is a need to precisely identify the impediments that makes government recurrent expenditure ineffective in boosting economic growth. In addition to the privatisation of some sectors, Oman like many oil-rich countries needs reforms in its fiscal system, labour market and financial sectors. Part of the reason for an absence of an effect of recurrent government expenditure on growth might be the excessive amount of expenditure that makes spending unproductive (Devarajan *et al*. 1996), thus Oman should encourage privatisation programs that reduce the government's size to an optimal level conducive to economic growth. Private sector involvement can increase total productivity and raise allocational efficiency as well as decreasing government size (Khan and Kumar; 1997).

In contrast to these findings, Al-Shaikh (2000) found only the existence of the Wagner's Law between aggregated government expenditure and the GDP for Oman in the long-run, but this study supports the existence of both the Keynesian hypothesis and the Wagner proposition for total government expenditure. This might be due to differences in the period covered. His sample covered the period 1963-1988 which corresponds to the period of oil discovery. Oman was then in its early stages of economic development and hence the government had just started implementing its developmental projects. Ansari (1993) observes that the Wagner's law is

more relevant to countries during their early stages of growth and development. Al-Faris (2002) found the existence for Wagner's law for aggregate government expenditure and not for capital expenditure nor current expenditure, which is in contrast to the findings of this chapter.

5.4 Conclusion

There are two schools of thought in the relationship between government expenditure and economic growth. The Wagner's law that treats government expenditure as an increasing function of a country economic growth: so the causation runs from economic growth to government expenditure. In contrast, the Keynesian theory regards fiscal policy as an instrument for macroeconomic stabilization: hence the causality runs from government expenditure to economic growth.

This chapter investigated whether the Omani government expenditure (both at aggregate and disaggregate level) is consistent with the Keynesian Hypothesis or the Wagner's Law over the period 1971-2012. The Engle-Granger cointegration test and Granger causality techniques have been applied to analyse the long-run as well as to examine the causal relationship between the government expenditures and the GDP in Oman. The results indicate support for the validity of the Wagner's Law and the Keynesian hypothesis for total government expenditure when aggregated government expenditure were used. However, when disaggregated data are used, the causality tests suggest a unidirectional causality running from the real GDP to the recurrent expenditure.

To conclude this chapter, the key finding is surely that capital investment boosts economic activities in Oman whereas recurrent expenditure does not seem to have much an impact on GDP. This could have many implications for oil-rich countries such as Oman. It means that Oman can reduce its current expenditure at times of oil price declines without endangering its long-run economic development.

Chapter 6

The Impact of Government Spending on Economic Growth: Disaggregated Approach using the ARDL Model

6.1 Introduction

Government expenditure in Oman has continued to rise in the last three decades due to increasing oil revenues and increased public demand for energy, communication, education and health services, etc. Also there is a big jump in defence expenditure during this period. The dramatic decline of oil prices since mid of 2014 put the government under pressure of searching for new public revenues and cut unneeded expenditure to control the budget deficit. The government plans to reduce total government expenditure by 10% because of dramatic declines in oil prices. A crucial question is which component of government expenditure should be cut without affecting the economic growth of Oman. This chapter attempts to provide an answer to this question by empirically estimating the effects of three main government expenditures (education, health, and military) on economic growth in Oman. The government hopes that effective use of limited public resources would result in decreasing government size without affecting economic performance.

There are a number of empirical studies on how the composition of public expenditure affects economic growth and also how to distinguish between productive and unproductive expenditures (representative works in this line are Aschauer, 1998, Devarajan et al., 1996, Nurudeen et al., 2010 and Sugata et al., 2008). This area of research is particularly important today as many oil-dependent countries are trying to adjust their fiscal situation by cutting components of expenditures that are considered to be less efficient, or less likely to affect economic growth.

The impact of total government expenditure on economic growth is not conclusive. This leads to the argument that not all components of public expenditure are expected to influence the economy equally. Some types of expenditure such as health and education are expected to improve the total productivity and so positively affect the growth, while others may not be productive. Theoretical work by Aschauer (1988) and Barr (1990) indicate that government expenditure on productive activities have a positive association with economic growth, while government consumption is negatively related to economic growth. Empirical studies on the impact of various government components on economic growth have been undertaken by

Derajavan et al. (1996), Feder (1983), Landua (1983), and Afonso and Jalles(2013) for both developed and developing countries with mixed results. Little work has been undertaken for the Gulf Corporation countries in general and Oman, in particular.

This chapter analyses the impact of the three main government expenditure on Omani economic growth. In studying such impacts of disaggregated government expenditures on economic growth, Ram (1986) model is used in which total government expenditure is disaggregated into expenditure on education, the military and health. This is valuable from a policy perspective as it provides important information for the usage of limited public resources. The study provides evidence based information to the government, which helps it in decision making on how best to allocate scarce resources effectively without adversely affecting the country's economic growth.

6.2 The Model Specification and the Theoretical Framework

The theoretical framework for analysing the relationship between government expenditure and economic growth is based on the Keynesian model. The Keynesian model argues that an expansion of government expenditure boosts and accelerates economic activities. The argument that government spending enhances economic growth has gained additional support with the introduction of new growth theories. Although endogenous growth models do not assign any important role to government spending in the growth process Barro (1990), Esterly and Rebelo (1993) and Salai-Martin (1992) emphasized the importance of government expenditure in economic growth. Kneller and Gemmell (1999) argue that the composition of government expenditure might exert more effect compared to the level of government expenditure on economic growth. Therefore, to capture the impact of government expenditure on economic growth, the model expresses economic growth as a function of disaggregated components of public expenditure.

Ram (1986) estimated a growth function using data for 115 countries for the period 1960-1980. He derived his growth equations from two separate production functions, one for the government sector and the other for the non-government sector. Ram's (1986) model has been used widely (Maku, 2009) because it has a strong theoretical foundation (Rao, 1989). Ram (1986) employed the two production function framework as follows:

$$P = P(K_p, \quad L_p, G) \tag{6.1}$$

$$G = G(K_g, L_g) \tag{6.2}$$

where P is non-government sector output, G represents government sector output, K denotes capital input and L is labour input.

The total national output as defined by Ram (1986) is:

$$Y = P + G \tag{6.3}$$

Ram (1986) assumed that marginal productivities of capital and labour in government sector (G) are $(1+\alpha)$ the corresponding factor productivities in private sector (P), thus after taking the total differentials for G and P it becomes:

$$dY = Pk\, dK + PL\, dL + \left(\frac{\alpha}{1} + \alpha\right) dG + Pg\, dg \tag{6.4}$$

Substituting marginal productivities with β_i, equation (6.4) can be rewritten as:

$$\frac{dY}{Y} = \beta1\frac{dK}{Y} + \beta2\frac{dL}{L} + \beta_3\left(\frac{dg}{G}\right)\left(\frac{G}{Y}\right) \tag{6.5}$$

Equation (6.5) can further be simplified as:

$$\frac{dY}{Y} = \beta1\frac{dk}{Y} + \beta2\frac{dL}{L} + \beta3\frac{dG}{G} \tag{6.6}$$

where $\beta_2 = Pg\ (G/P)$ and $\beta_3 = \alpha/1 + \alpha$.

To test equation (6.6), the empirical form is given as:

$$\frac{dY}{Y} = \beta0 + \beta1\frac{dK}{Y} + \beta2\frac{dL}{L} + \beta3\left(\frac{dG}{G}\right) + \varepsilon \tag{6.7}$$

It is clear from equation (6.7) that government spending is an important variable affecting economic growth. In accordance with (6.7), economic growth is expressed as a function of components of government expenditure (education, health and military expenditures) as follows:

$$RGDP = f(Education, Health, Invetment, and\ Military\ expenditures) \tag{6.8}$$

Taking the natural logarithm of both sides of equation (6.8)[6] and rewriting the model in linear form provides:

$$logGDP = B_0 + B_1 Edu_{Exp} + B_2 Health_{Exp} + B_3 Mil_{Exp} + Inv_{Exp} + u \quad (6.9)$$

6.3 Methodology and the Estimated Results

6.3.1 ARDL Cointegration Test

The series were subjected to the unit root tests and results indicate that education expenditure and military expenditure are I(0) in levels as shown in Table 6.1. This mixture of stationary and non-stationary variables makes the Johansen Test inappropriate for cointegration. However, the ARDL model of Pesaran (2001) is flexible enough to accommodate analysis with variables of different orders of integration, provided none of the variables are *I(2).* It is evident from the unit root tests this is not the case and therefore, the analysis can be carried out using the Bound Test. Therefore, the ARDL model specification is used to examine the long-run relationships and dynamic interactions between different components of public expenditure and economic growth using Autoregressive Distributed Lag (ARDL) bound test.

		Table 6.1			
		Unit Root Tests			
Variables	**ADF Test**		**Philips-Perron Test**		
	Level	**First Difference**	**Level**	**First Difference**
RGDP	-1.84	-4.67**	-2.77	-4.59**
Edu_Exp	-4.16**	-6.16**	-9.01**	-6.16**
He_Exp	-2.73	-6.24**	-2.67	-6.23**
Mi_Exp	-3.00**	-6.12**	-3.03**	-6.11**
Gtotal_Exp	-1.20	-6.06**	-0.88	-7.54**
Openness	-0.39	-7.55**	0.33	-7.57**
Note: ** Signifies rejection at the 0.05 level.					

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[6] Ideally, the model should also have a measure of labour supply. However, due to its non-availability, the model was estimated as stated. This is an apparent limitation and called for further research when the variable becomes available.

The final empirical model estimated is expressed as follows:

$$RGDP_t = \beta_0 + \beta_1 Ed_{Exp_t} + \beta_2 He_{Exp_t} + \beta_3 Mi_{Exp_t} + \beta_4 Open_t + \beta_5 Total_{Inv_t} + RGDP_{t-1}$$
$$+ \varepsilon_t \qquad (6.10)$$

where $RDGP_t$ is the real output, Ed_Exp_t is the real government expenditure on education, He_Exp_t represents real government expenditure on health, Mi_Exp_t denotes real government expenditure on military, $Open$ is index for openness, $Total\_Inv$ and ε_t is a random error.

An ARDL representation of the model in equation (6.10) can be written as:

$$\Delta RGDP_t = \beta_0 + \sum_{i=0}^{p} \beta_1 \Delta Ed\_Exp_{t-i} + \sum_{i=0}^{p} \beta_2 \Delta He\_Exp_{t-i} + \sum_{i=0}^{p} \beta_3 \Delta Mi\_Exp_{t-i} +$$
$$\sum_{i=0}^{p} \beta_4 \Delta Open_{t-i} + \sum_{i=0}^{p} \beta_5 \Delta Total\_Inv_{t-i} + \delta_1 RGDP_{t-1} + \delta_2 Ed\_Exp_t + \delta_3 He\_Exp_{t-1} +$$
$$\delta_4 Mi\_Exp_{t-1} + \delta_5 Open_{t-1} + \delta_6 Total\_Inv_{t-1} +$$
$$\varepsilon_t \qquad 6.11)$$

where the variables are explained in equation (6.10). According to the ARDL model, the null of no cointegration is tested:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0 \qquad (6.12)$$

against the alternative:

$$H_0: \delta_1 \neq 0, \quad \delta_2 \neq 0, \quad \delta_3 \neq 0, \quad \delta_4 \neq 0 \qquad (6.13)$$

The test is carried out using the F-test, a test whose asymptotic distribution is non-standard. The test can be carried on whether the variables are I(1) or I(0) as mentioned earlier. The estimated F-statistics are compared with two sets of critical values provided by Pesaran (2001). One set assumes all the variables are I(1) and another that treats all the variables as being I(0). These give a group covering all possible taxonomy of the variables into I(0) and I(1) or even fractionally integrated. If the calculated F-statistic lies above the upper level of the band, the null is rejected in favour of the alternative. In this case, cointegration exists between the variables. If the F-statistic falls below the lower critical bounds value, it suggests failure to

reject the null, which means there is no cointegration among the variables. If the F-statistic is between the bounds, the test is inconclusive.

The bound testing (ARDL) model is used to examine the long-run and short dynamic interactions between different measures of government expenditure and the real GDP. Table 6.2 below reports the results from the Bound Test for cointegration as proposed by Pesaran (2001). The result indicates rejection of the null of no cointegration in favour of the alternative of presence of cointegration. This shows that there is a long-run relationship between real GDP and the disaggregated real expenditure in Oman.

The analysis was done on three components of the government expenditure, military, health and education. The other two important sectors left out are transport and power, which was due to the non-availability of the data. This is an obvious limitation of the analysis, which calls for future analysis when the data become available.

Table 6.2 Bound Test for Cointegration Unrestricted intercept with no trend	
F-Tset	4.900**
** signify rejection of the null at 5%. The critical values for upper and lower bounds are 3.422 and 4.837 at 5% level.	

Table 6.3 below exhibits the results of the short-run dynamic coefficients of the ARDL model, in other words the impact of each variable on real GDP in the short-term. On the one hand, education expenditure and openness have a highly significant impact (+0.407, +0.251 respectively) on economic growth in the short-run. On the other hand, health expenditure and total investment are significant, but signs are negative in the short-run. This may mean that health expenditure and total investment seem to have an adverse effect on the economy in the short-run, although they might positively impact the real GDP in the longer-run. Finally, military expenditure is not statistically significant. The lag dependent variable is positive, but insignificant.

An information criteria was used to determine the optimum lags to be used for the model. Both BIC and AIC suggest 2 lags, which have been used for the analysis.

Table 6.3 Short-run Coefficient Estimates	
Regressors	Coefficients
Ed_Exp_t	0.407** (0.069)
He_Exp_t	-0.422** (0.077)
Mi_Exp_t	0.500 (0.116)
$Open_t$	0.251** (0.089)
$Total\_Inv_t$	-0.249** (0.061)
$RGDP_{t-1}$	0.142 (1.210)
Note: ** signify rejections at 5% level. The figures in brackets are standard errors.	

6.3.2 Long-Run Results

Table 6.5 below displays the estimated long-run coefficients using the ARDL approach with Real GDP as the dependent variable. As seen above, the bound test suggested that the variables of interest put in the framework are bound together in the long-run. Table 6.5 shows the impact of each type of expenditure on real GDP in the long-run.

First, the impact of total Investment is the most significant in the long-run. Both the coefficient (3.4) and t-ratio (32.8) show the predominant impact of investment in Oman over the years 1973-2012. Second, Openness comes next in the long-run with a coefficient of 0.44 (t-ratio = 9.7). This result shows that the most important factors for Oman's economic activities were the total investment and the index of openness.

Table 6.5
Estimated Long Run Coefficients using the ARDL Approach

Variables	Coefficients	t-ratio
Ed_Exp	0.362** (0.049)	7.359 [0.00]
He_Exp	0.205** (0.061)	3.349 [0.002]
Mi_Exp	0.013 (0.096)	0.133 [0.895]
Open	0.445** (0.046)	9.734 [0.00]
Total_Inv	3.406** (0.104)	32.852 [0.000]
Note: Figures in () and [] are standard errors and probability, respectively. ** signify rejection at 5% level.		

Third, Education expenditure comes next with a long-run coefficient of 0.36 (t-ratio = 7.4). Fourth, Health expenditure is the least important factor but still highly significant with a coefficient of 0.20 (t-ratio = 3.3). Finally, military spending was not significant as expected.

6.3 Conclusion and Policy Implications

Using an ARDL model, which is very flexible that can accommodate a mix of *I(0)* and *I(1)* variables. The chapter explores the long-run relationship between the Omani GDP, disaggregated public expenditure and other macro variables. The Bound tests confirmed the presence of cointegration between the variables in the model. The short-run and long-run coefficient of the ARDL model are then analysed.

The index of openness of the economy and education expenditure have significant immediate effects on real GDP in both the short-run and the positive effects are much more significant in the long-term. This implies that opening the economy and spending on the health system may have boosted the effect for the GDP in the short-run. Conversely, total investment and health expenditure had adverse effects in the short-run. This may mean that investing in hospitals and healthcare will immediately improve the health of the workforce in the short-run and hence improve the productivity of the labour factor in the long-run; whilst investing in education will take years to have positive effects on the GDP.

Similarly, whilst total investment in infrastructure and capital will take years to boost GDP, opening the economy and its different industries to foreign direct investment will have immediate positive effects. This may also mean that opening the economy will attract foreign capital and technological know-how and also improve the health system. These factors together seem to be capable of boosting the GDP in the short-run. Also, openness may give a positive signal to the largely unproductive public sector that it may be privatised and hence helps improve its productivity.

As far as long-run effects are concerned, it is obvious that total investment is the most significant variable which positively impacts the real GDP. The coefficients are highly significant. For policy implications, this means that investing in infrastructure and capital must be the priority despite the apparent adverse effects in the short-term. Although total investment must be the priority, investing in the health and education system and opening the economy have to be sustained in the long-run as they also have significant impact on the Omani GDP.

Finally, whilst military budgets are very high in Oman, it has no much significant effect on the GDP as revealed by the results. This means that at times of oil price slump, the priority must be to cut the military expenditure. Furthermore, the Omani government must face such recession with care as cutting investment may have serious adverse effects for the future of the countries. Consequently, the optimal strategy is to open the economy, reduce military budgets as much as possible; and in the last resort a slight reduction in health and education expenditure.

Ahsan *et al.* (1992) observed that additional variables to government expenditure and GDP relationship do matter. The introduction of more variables to our simple system might alter the magnitude of estimates and help to find another cointegration between the variables (Ghali, 1998). This is highly recommended to adjust for the cointegration result in the case of tri-variate framework by adding more monetary and fiscal variables. Data limitation, however, did not allow us to add more variable to our model. The Omani development model that relies on oil revenues and state economic activities may be interesting explanatory variables for government expenditure growth in future research.

Chapter 7

Government Expenditure and Oil Revenue in Oman

7.1. Introduction

Fiscal policy is one of the macroeconomic policy instruments used to induce output, income and employment to move an economy to its optimal level (Zagler and Dürnecker, 2003). However, for a sound fiscal policy, an understanding of the relationship between government expenditures and revenues is a fundamental requirement in the formulation of appropriate fiscal policy to prevent fiscal imbalances (Eita and Mbazima, 2008). Fiscal imbalance may happen when government expenditure exceeds public revenue (expansionary) resulting in budget deficit, or vice versa when the government spends less than its revenues (contractionary); leading to budget surplus. Petanlar and Sadeghi (2012) states that fiscal imbalance usually leads to shortage in national saving and decreasing economic growth, so addressing such imbalance would stimulate economic growth and enhance national saving.

Narayan and Narayan (2006) state that the nature of the relationship between government revenue and expenditure is essential for three policy reasons. First, if the tax-spend hypothesis holds, budget deficits can be handled by implementing policies that stimulate government revenue. Second, if government expenditure causes government revenue, it suggests that government spends first and compensates later through raising taxes. Third, if the 'fiscal synchronization hypothesis' does not hold, it means that government expenditure decision are made independent from government revenues which may lead to serious budget deficits if the government expenditure increases faster than the government revenue.

The study of the causal relationship between government expenditures and revenues has resulted in four hypotheses being proposed in the theoretical literature. First, the tax-spend hypothesis was proposed by Buchanan and Wagner (1977) and Friedman (1978). According to this approach, changes in government revenue bring about change in government expenditure. Second, the spend-tax hypothesis by Peacock and Wiseman (1961, 1979) and Barro (1974) argues that a crisis that initially makes government expenditure superior to tax has the potential to change public attitudes about the proper size of the government. The third hypothesis advocated by Mugrave (1966) and Meltzer and Richard (1981) is the fiscal synchronization theory. It is based on the belief that governments change taxes and expenditure concurrently

which means that there is a bi-directional relationship between government taxes and expenditure. Fourth, the fiscal independence or institutional separation approach presented by Baghestani and McNown (1994) and claimed that government expenditure and revenue are independent of each other. One can argue that there is a practical and institutional separation between government revenues and expenditure therefore non-causality is what characterises the best this relationship (Chang and Chiang, 2009).

Over the past three decades, a large number of studies have investigated the links between government revenue and government expenditure in developed countries using different econometric methodologies, but only a few have studied the relationship in oil-abundant economies where the oil revenue is the main source of income. In most oil-exporting countries, oil revenues are paid directly to the government and hence the government becomes the channel through which the oil revenue flows into the economy. If this channel is properly connected to the economy, the natural resource curse observed in the literature would turn out to be a blessing (Bleaney and Halland, 2009)

While there may be studies that looked into the relationship between total revenue and expenditure, this study makes a contribution to the literature as it deals with dynamic interrelationships between oil revenue (not total government revenue as most studies did) and government expenditure. The investigation is crucial for Oman from a policy point of view since Oman depends heavily on oil revenue as seen in Chapter 2 and as oil prices are highly variable due to responses to the changes in demand and supply in international markets. In addition, as oil is a non-renewal resource it is susceptible to being depleted in the long-run. Secondly, this chapter not only models oil revenue and total government expenditure, but also considers the link between the two using disaggregated data on government expenditure. More specifically, it models the impact of oil revenue on various components of government expenditure (health, education, and military) and examines the behaviour of each component in the event of an oil revenue shock.

The main purpose of this study is to investigate the relationship between oil revenue and government expenditure in Oman for the period 1980-2013. This is in order to determine which one of the four hypothesises about the relationship between government revenue and expenditure is applicable to Oman. The determination of the directions of the relationship between these macroeconomic variables would help policy makers explore the origin of fiscal imbalances (Petanlar and Sadeghi, 2012).

7.2 Oil Revenue and the Omani Public Expenditure: An Overview

As the chapter tries to explain the behaviour of various components of Omani government expenditure and how they respond to oil revenue fluctuations in the face of dwindling revenues, it uses disaggregated public expenditure: education, health and military expenditures and investigate their individual response to oil revenue fluctuations.

Period	Average Growth Rate of Expenditure (%)	Average Growth Rate of Revenue (%)
1980-1985	15.42	12.13
1985-1990	11.61	8.16
1990-1995	6.06	6.22
1995-2000	3.00	5.49
2000-2005	10.98	16.76
2005-2010	13.48	12.60

Table 7.1. Average Growth Rates of Expenditure and Revenue

Table 7.1 above shows the average growth rates of total government expenditure and total government revenue in Oman over the period 1980-2012. The table reveals that the average growth rate of government expenditure is approximately similar to government revenue growth rates. The total revenue has witnessed an average growth rate of 9.95% within the period studied, while total expenditure average growth rate is 9.22%, which means that on average total expenditure and revenue increased by almost the same rate. The sharp drop in the world oil prices in the 1990s affected the growth of total average government revenue that reached its lowest average growth rate of 5.49% between 1995 and 2000. The highest average growth rates of government revenue were recorded during the periods 2000-2005 and 2005-2010 with 16.76% and 12.60% respectively. These high growth rates of government revenue are due to oil price booms during those periods.

On the other hand, government expenditure recorded the highest average growth rates in the period 1980-1985 as a result of the oil price boom from 1978 and more importantly the increase in domestic oil production. The average growth rate of government expenditure for this period

was 15.42% while the revenue growth rate was 12.13%. In fact, it is observable that when oil revenue increases, government expenditure increases in a more accelerated rate. For example, during 2005-2010 when government revenue increased by 12.60% due to a sharp oil price increase, government expenditure also increased dramatically in that period and reaching 13.48% on average. In general, Oman's government has spent more than what it has earned and thus the government has recorded budget deficits in most periods.
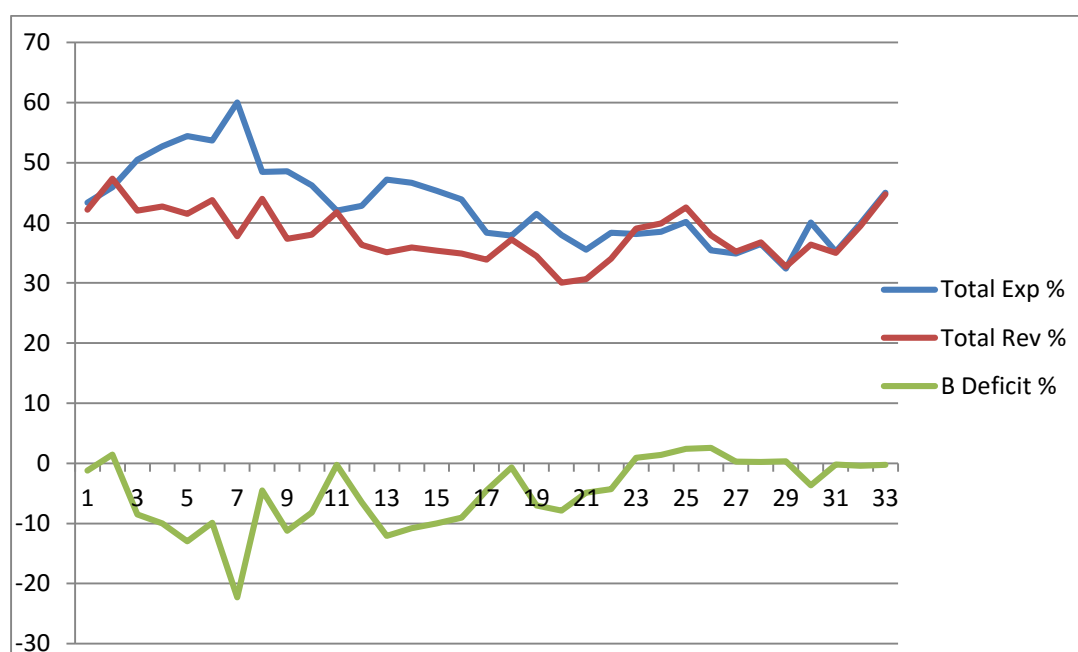

Figure 7.1: The Percentage of Exp, Rev and Deficit of GDP

Figure 7.1 above shows the ratio of total government expenditure, government revenue to real gross domestic product as well as the government budget deficits/surplus for the period 1980-2012. It can be noted from the graph that the ratio of expenditure to GDP has exceeded revenue ratio to GDP in most periods. Also the graph reveals that government expenditure and revenue have fall and similar patterns which suggests that government expenditure responds to changes in total revenue. Both government expenditure and revenue series have a downward trend indicating a decreasing government size in the Oman economy. With respect to the budget deficit, the deficit rate has decreased over time which suggests that the Omani government is making efforts to control its expenditure and diversify the sources of income.

Figure 7.2 below shows the relative importance of oil revenue and different government expenditure components of the GDP for the period 1980-2012. It is clear from the graph that health and education expenditures ratios are persistent regardless of oil revenue volatilities.

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The government has not adjusted health spending nor increased its ratio when oil prices increased. It settled at around 2% on average during the whole period. The education ratio had increased gradually from 1.7% in 1980 to 4.4% in 1997, and then it has levelled off around 5%.

By contrast, military expenditure is sensitive to oil revenue fluctuations. It was very high in the beginning of the eighties because of allocation of huge revenues to the military during that period. At the early eighteens, military expenditure was much higher than education and Health expenditures, but then it has downward trend following oil revenue fluctuations. The ratio halved from 20.7% in 1982 to 10.8% in 2000.

Figure 7.2
Relative Importance of Oil Revenue and components of Expressed as a ratio of GDP
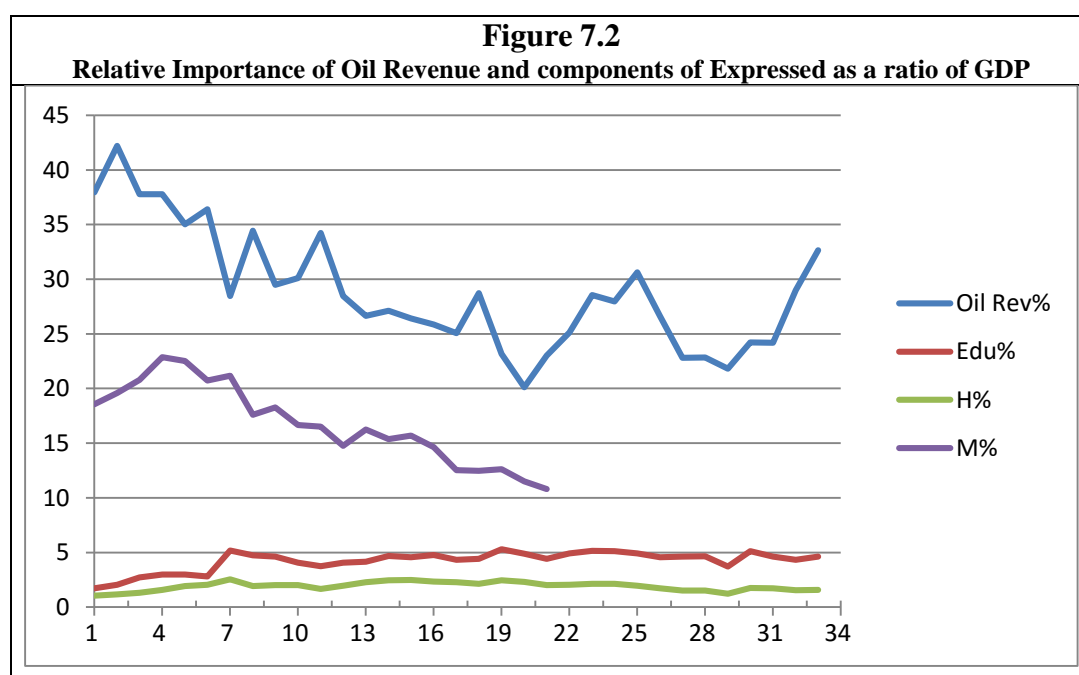
7.3 Empirical Methodology and the Estimated Results

The methodology used in this chapter follows a stationary VAR that was explained in Chapter 4. The series used for the analysis is comprised of Omani's total oil revenue and total expenditure in Model 1 and Model 2 and used disaggregated expenditure: education, health and military. The series are subjected to stationarity test in order to determine their level of integration. The results reported in Table 6.1 indicate that they are all non-stationary *I(1)* in levels and stationary, *I(0)* in first differences. Therefore, the VAR is estimated using the first differences. As already observed in Chapter 4, the VAR is sensitive to the lag length and therefore, information criteria have to be used to determine the optimum lag length. Accordingly, 2 lags were chosen.
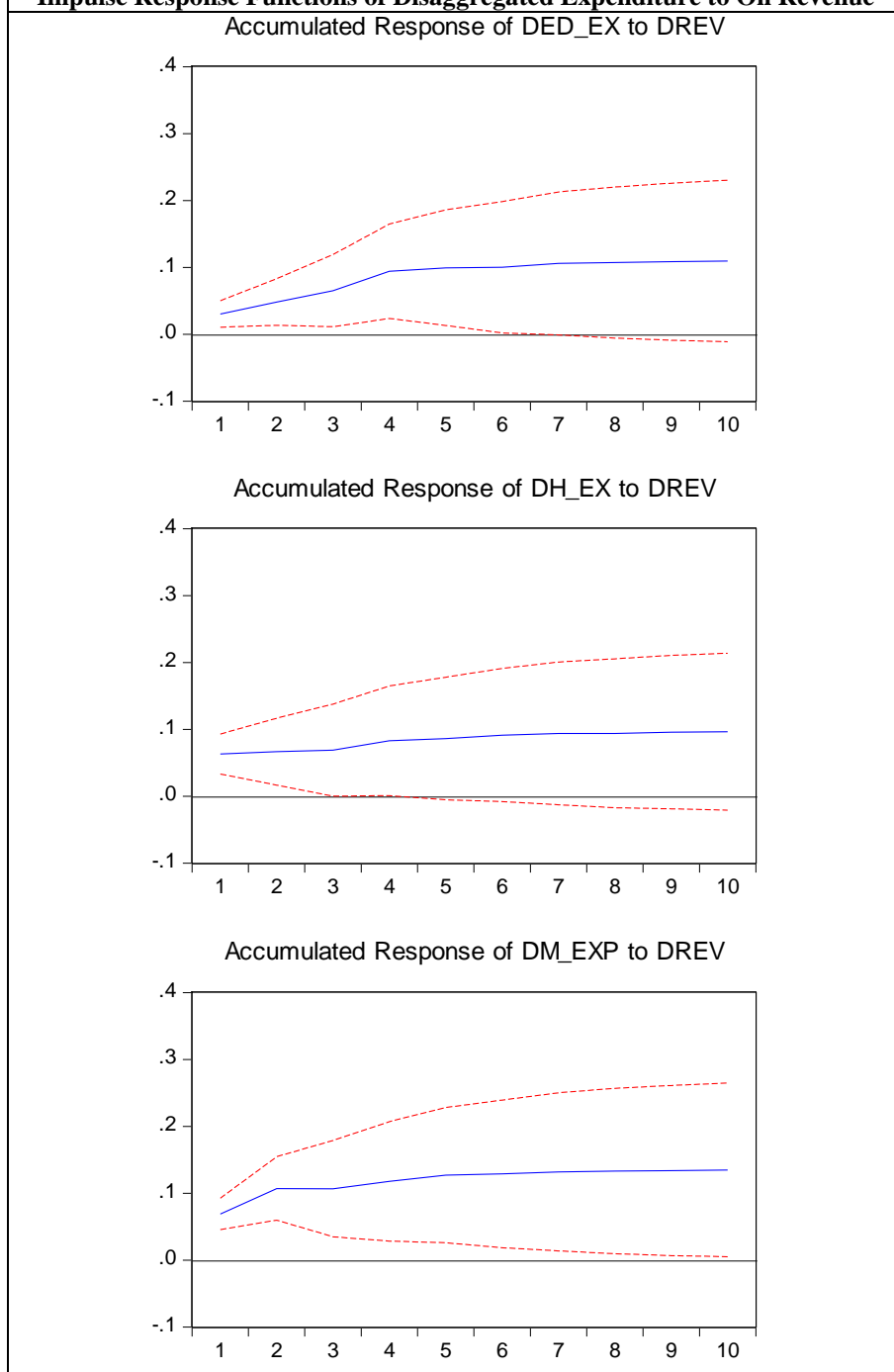
Based on the estimated VAR, impulse responds functions, IRFs, and variance decompositions of the endogenous variables. The IRFs show the effect of one variable on another while variance decompositions show contributions of each variable in the system to the variation of the variable of interest within a given horizon. The IRFs are computed using the generalised method of decomposition, which is not sensitive to the order of the variables unlike the Cholesky decomposition as demonstrated by Pesaran and Shin (2007).

Figure 7.4 reports the computed IRFs, which indicate that education expenditure responded positively to a positive oil revenue shock, contemporaneously and lasted for over five-year period before becoming insignificant. The response of health expenditure to a positive oil revenue is also positive, but lasted only for about two-and-a-half-year period, about 50% less than that of education. However, the response of military expenditure to a positive oil revenue shock recorded both the largest magnitude and also stayed significant for up to the ten-year period plotted.

Figure 7.5 represents IRFs obtained using the total expenditure and it depicts responses of total expenditure to a positive oil revenue shocks. The results indicate that positive oil revenue shocks leads to positive and significant responses by total expenditure from immediately after the shock and remain persistently positive up to the ten period plotted. The results are consistent with those reported in Figure 7.4.

It could be deduced from the results that, although, the Omani government expenditure on education, health and military have all responded positively to positive oil revenue shocks, but military expenditure seems to have a more significant response followed by education.

Figure 7.4
Impulse Response Functions of Disaggregated Expenditure to Oil Revenue

Accumulated Response of DED_EX to DREV

Accumulated Response of DH_EX to DREV

Accumulated Response of DM_EXP to DREV

Overall, the results indicate that the Omani government expenditure is positively related to its oil revenue: it increases its total expenditure in the face of rises in its oil revenue. This has two policy implications. First, it makes the economy very vulnerable to shocks as oil revenue is

largely dependent on global oil prices that are highly volatile. Second, as increases in oil revenue are spent, it has left the government with very little fiscal space in the event of a negative oil revenue shock.

Figure 7.5
Impulse Response Functions of Total Expenditure to Oil Revenue
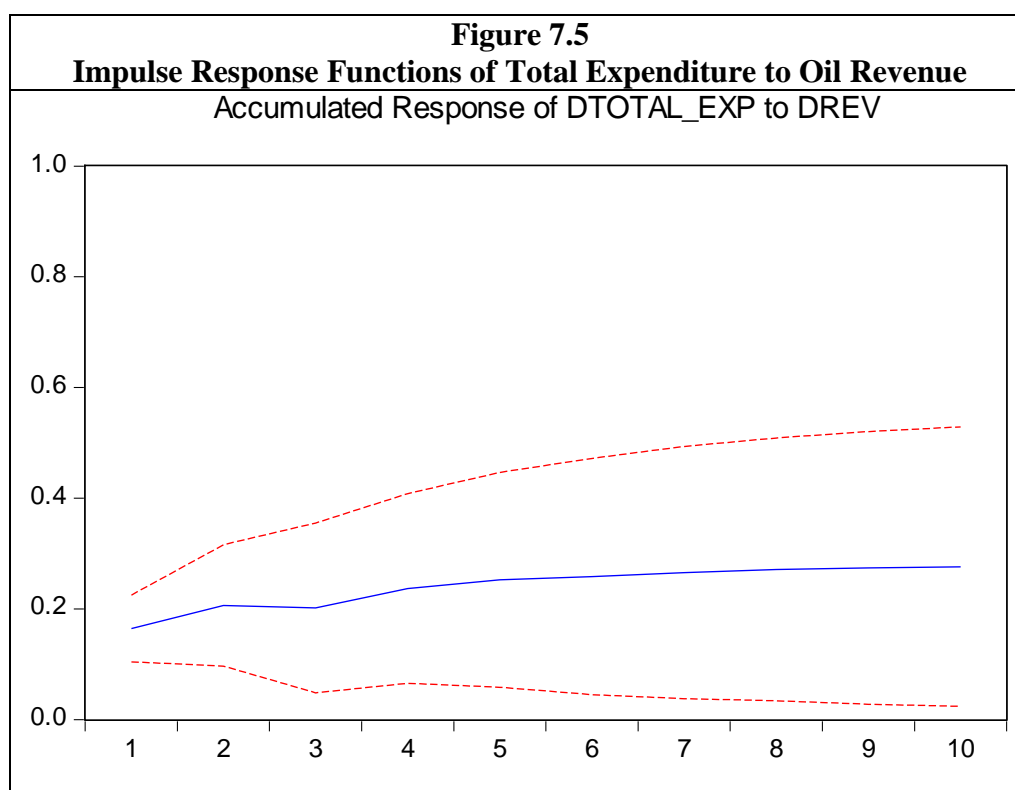
Accumulated Response of DTOTAL_EXP to DREV

Table 7.2 reports the variance decomposition for the total expenditure and the revenue computed based on the estimated VAR and it shows that the expenditure is generally explained by itself with less than 10% from the revenue. However, variation in the revenue is explained by both the revenue and expenditure.

Table 7.2			
Variance Decomposition of DTOTAL_EXP:			
Period	S.E.	DTOTAL_EXP	DREV
1	0.221297	100.0000	0.000000
2	0.237749	98.49302	1.506980
3	0.255336	90.71585	9.284148
4	0.258799	90.90381	9.096185
5	0.261901	90.69103	9.308970
6	0.262786	90.56640	9.433597
7	0.263300	90.54734	9.452658
8	0.263526	90.54881	9.451195
9	0.263652	90.53553	9.464467
10	0.263703	90.53356	9.466440
Variance Decomposition of DREV:			
Period	S.E.	DTOTAL_EXP	DREV
1	0.253949	55.31389	44.68611
2	0.284373	48.53892	51.46108
3	0.288152	47.68706	52.31294
4	0.291305	48.43580	51.56420
5	0.292606	48.67386	51.32614
6	0.293072	48.65694	51.34306
7	0.293256	48.72037	51.27963
8	0.293366	48.75147	51.24853
9	0.293416	48.75768	51.24232
10	0.293437	48.76316	51.23684

Table 7.2 reports variance decompositions of total government expenditure and revenues. The upper part of the table indicates that the main contributor of the variation in expenditure is itself, as up to the tenth period, total revenues accounted for less than 10% of the total expenditure variation. However, on the contrast, the lower part of the table shows that the contributions of the two series to the volatility of total revenues are almost similar in magnitude.

Table 7.3					
Variance Decomposition of DREV:					
Period	S.E.	DREV	DED_EX	DH_EX	DM_EXP
1	0.249247	100.0000	0.000000	0.000000	0.000000
2	0.305013	66.77709	5.906126	1.997570	25.31921
3	0.307096	65.89929	6.234589	2.288694	25.57742
4	0.313271	66.64738	6.060644	2.699162	24.59282
5	0.317796	64.76712	6.073191	2.789986	26.36971
6	0.318011	64.74857	6.124603	2.787839	26.33899
7	0.318213	64.73842	6.132946	2.819961	26.30867
8	0.318449	64.64593	6.137771	2.819807	26.39650
9	0.318501	64.65004	6.136704	2.818888	26.39437
10	0.318529	64.64091	6.137945	2.822993	26.39815
Variance Decomposition of DED_EX:					
Period	S.E.	DREV	DED_EX	DH_EX	DM_EXP
1	0.065807	21.05781	78.94219	0.000000	0.000000
2	0.075032	21.95256	65.23857	0.051336	12.75754
3	0.088464	19.39468	49.53440	1.786223	29.28470
4	0.093758	26.88406	44.32803	1.937252	26.85065
5	0.096288	25.78717	43.18449	2.636367	28.39197
6	0.096538	25.65951	43.17434	2.622785	28.54336
7	0.096767	25.88911	43.02305	2.679357	28.40848
8	0.096950	25.80968	42.89655	2.705740	28.58803
9	0.096971	25.81462	42.89493	2.705647	28.58481
10	0.096984	25.82376	42.88783	2.710045	28.57836
Variance Decomposition of DH_EX:					
Period	S.E.	DREV	DED_EX	DH_EX	DM_EXP
1	0.103236	37.18129	21.74749	41.07122	0.000000
2	0.113033	31.11371	20.12506	34.64177	14.11946
3	0.115249	29.96502	22.64789	33.73365	13.65345
4	0.116225	30.92914	22.30635	33.28328	13.48123
5	0.117591	30.29115	22.14550	32.81106	14.75228
6	0.117734	30.41957	22.12444	32.73155	14.72444
7	0.117856	30.39861	22.13556	32.71898	14.74685
8	0.117902	30.37495	22.12917	32.69430	14.80158
9	0.117921	30.39010	22.12620	32.68655	14.79715
10	0.117932	30.38619	22.12428	32.68301	14.80652
Variance Decomposition of DM_EXP:					
Period	S.E.	DREV	DED_EX	DH_EX	DM_EXP
1	0.087967	61.37233	3.395849	4.209253	31.02257
2	0.102611	58.82241	5.141177	4.280742	31.75567
3	0.107832	53.26406	7.572438	4.380689	34.78281
4	0.108548	53.59339	7.668502	4.348334	34.38977
5	0.109557	53.32084	7.710308	4.618326	34.35053
6	0.109902	53.01811	7.772093	4.615339	34.59445
7	0.109970	53.02642	7.801893	4.619524	34.55216
8	0.110020	52.98959	7.809913	4.629908	34.57059
9	0.110035	52.97876	7.813884	4.629997	34.57736
10	0.110043	52.98150	7.814641	4.630795	34.57306

Table 7.3 reports variance decomposition for disaggregated government expenditure and it is evident that oil revenue explains most of the variations in the expenditure up to the period of ten horizons. Over all, the results are partly consistent with both tax-spend and hypothesis and government expenditure stimulates revenue arguments (Narayan and Narayan, 2006; Bleaney and Holland, 2009).

7.4 Conclusion

This chapter looked at the relationship between the structure of the Omani government expenditure and the oil revenue. The chapter has used the VAR methodology from which impulse response functions and variance decomposition were computed.

The results indicate that all the three components of the government expenditure: health, education and military have positively and significantly responded to a positive oil revenue shock. However, the response of the military expenditure recorded the highest response in both magnitude and persistence.

Chapter 8

Current Account and Fiscal Deficits in Oman: Twin Deficits or Twin Divergence

8.1. Introduction

For the last twenty years developed countries and particularly, the US, have recorded both current account and fiscal deficits. This prompted interest in the study of the relationship between the two accounts. However, as explained in Chapter 3, most of these studies are on developed countries with relatively few exceptions such as Ahmad, Aworinde and Martin (2015) and Ahmad and Aworinde (2015). The developing countries generally depend on commodities for their export earnings and their domestic economic needs heavily relied on imports. This is particularly the case with the Middle East countries, which greatly depend on oil revenue and the oil price is exogenously determined by the global forces of demand and supply.

This chapter studies the relationship between the current and fiscal deficits in Oman as have shown in the preceding chapters relies on the oil revenue and also depends on imports for its essential machineries and intermediate goods. The preceding chapter also shows how the country recorded fiscal deficits for most of the sample period, which is a major motivation for this chapter.

The rest of the chapter is organised as follows. Section 8.2 discusses the theoretical underpinning of the relationship between the two deficits. Section 8.3 presents the econometric model used in the study and Section 8.4 provides discussion on the data and the estimated results while Section 8.5 concludes.

8.2. Theoretical and Empirical Works on the Current Account and Fiscal Deficits

As argued by Ahmad and Aworinde (2015), the theoretical literature on the relationship between the current account and fiscal deficits can be grouped into four. Keynesian absorption theory was the basis used by the first group to demonstrate the relationship between the current account and the fiscal deficits. The main argument of the group is that fiscal deficit would lead to domestic absorption, which in return expands the economy's imports and this would result in the current account deficit. From the perspective of this literature, to address the current account deficit, an economy should avoid the fiscal deficit as it is viewed that causation runs from the fiscal deficit to the current account deficit.

The Mundell-Fleming model was used by the second group to indicate how fiscal and current account deficits are related. It argues that fiscal deficits increase interest rates, which will attract inflows of capital and as a result, the domestic currency appreciates. Exchange rate appreciation would lead to increases in imports and discourages exports because of loss of international competitiveness. The consequences would be the current account deficits.

The third group views the relationship between the two deficits from the risk premium hypothesis perspective. The proposition of this group is that an appreciation of the domestic currency raises the value of the purchasing power of domestic income relative to the foreign one. This will be reflected in the value of the financial and real estate assets in particular. According to this literature, as a consequence, domestic savings fall and domestic consumption rises, which will impact on the domestic price level that will lead to loss of competitiveness (Bachman, 1992).

The last group discusses the relationship between the two deficits based on the Ricardian Equivalence. Hypothesis of Barro (1974, 1989). This literature argues that there is no relationship between the current account and fiscal deficits. It suggests that an increase in either will not affect the other.

The empirical literature in this area has reported mixed results. On one hand, there are those who reported evidence that supports the twin deficits hypothesis that include Abell (1990), Corsetti and Muller (2006), Egwaikhinde (1999) and Ahmad and Aworinde (2015). While on the other hand, Enders and Lee (1990), among others, found no link between the two deficits. There is also a third group that reported evidence that fiscal deficits improve the current account balance. For example, Kim and Roubini (2008) argued that for the sample period covered by their analysis, the US fiscal deficits resulted in improving the country's current account balance.

8.3 The Empirical Methodology

As stated above the main objective of this chapter is to examine the relationship between the fiscal deficit and current account deficit in Oman. The chapter uses the Enders and Siklos (2001) threshold technique that can establish a long-run relationship between the series and also detect if adjustments in the series are symmetric or asymmetric. Holmes (2011), Pragidis, Gogas, Palakandras and Papadimitriou (2015), Holmes and Pangiotidis (2009) and Ahmad,

Aworinde and Martin (2015) found that adjustment between the current account and fiscal deficits is asymmetric, which the authors have attributed to the contingent nature of fiscal adjustments. Ahmad et al (2015), in particular, argue that the lesser development of financial markets in the developing countries that they have studied would also lead to asymmetric adjustment in fiscal deficits. Both these arguments are relevant to Oman, which makes the methodology more appropriate than using only symmetric models.

The empirical literature on twin deficit hypothesis states the relationship between the current account and fiscal deficits as:

$$Cab_t = \alpha + \beta Fd_t + e_t \hspace{4cm} 8.1$$

where *Cab* denotes the current account and *Fd* represents the fiscal deficits and ε is an error term. The estimated error term, which are subjected to a unit root test to find out if the series are stationary *I(1)* or not and the test is represented as:

$$\Delta e_t = \rho e_{t-1} + \varepsilon_t \hspace{4cm} 8.2$$

where e_t represent residuals in equation (8.1) and ε_t is a disturbance term that is independently distributed with zero mean. If the null of $\rho = 0$ is rejected, that suggests that *e* is stationary I(0) and there is long-run relationship. The model in equation (8.2) suggests symmetric adjustment. That is, change in e_t is ρe_{t-1} whether e_{t-1} is positive or negative. However, as noted above adjustment between the series could be asymmetric as documented by the literature, which will render the model specified in equation (8.2) as mis-specified. To overcome this problem, Enders and Siklos (2001) developed two tests of asymmetric adjustments. These are the threshold autoregressive, TAR, and momentum threshold autoregressive, M-TAR models. The TAR model can be written as:

$$\Delta e_t = I_t \rho_1 e_{t-1} + (1 - I_t)\rho_2 e_{t-1} + \varepsilon_t \hspace{3cm} 8.3$$

where e_t is the error term that represents residuals in equation (8.1). I_t is the Heaviside indicator factor and ε_t is a white noise error term. The Heaviside indicator function takes the following form:

$$I_t = \begin{cases} 1 & if \; e_{t-1} \geq \tau \\ 0 & if \; e_{t-1} < \tau \end{cases} \qquad\qquad 8.4$$

where τ denotes the value of the threshold that is unknown and endogenously determined.

The threshold cointegratiton test follows a non-standard F-statistics, which are provided by Enders and Siklos (2001). Based on the F-statistics, the $\rho_1 = \rho_2 = 0$ is tested against the alternative.

Chan (1993) technique is used to obtained a model with a consistent threshold. Chan (1993) contends that 15% of the smallest and the largest values should be trimmed off, which will yield a consistent threshold. The technique organises the values of e_t and Δe_t for TAR and M-TAR models.

The M-TAR model could be written as:

$$\Delta e_t = M_t \rho_1 e_{t-1} + (1 - M_t)\rho_2 + \varepsilon_t \qquad\qquad 8.5$$

where M_t is Heaviside indicator function, which is given as:

$$M_t = \begin{cases} 1 & if \; \Delta e_{t-1} \geq \tau \\ 0 & if \; \Delta e_{t-1} < \tau \end{cases} \qquad\qquad 8.6$$

Petrucelli and Woodford (1984) show that $\rho_1 < 0, \rho_2 < 0$ and $(1 + \rho_1)(1 + \rho_2) < 1$ should hold in order for e_t to be stationary. When e_{t-1} is above the equilibrium, the adjustment rate is ρ_1 while e_{t-1} is below the equilibrium, the adjustment rate is ρ_2. The adjustment is symmetric when $\rho_1 = \rho_2$. The M-TAR model is preferred when momentum differs in one direction or another. That is, if the adjustment is quicker either above or below the equilibrium. Information criteria are used to determine which of the models to use.

Enders and Siklos (2001) suggest two tests for both TAR and M-TAR models with the null hypothesis $H_0: \rho_2 = \rho_2$ in equations (8.3) and (8.5). As stated above, the F-statistics do not follow a standard distribution, $\emptyset_u$ is estimated from the TAR model is compared with $\emptyset_u^*$ in Enders and Siklos (2001).

If, however, the models specified in equations (8.3) and (8.5) are serially correlated, the models are re-specified as follows:

$$\Delta e_t = I_t \rho_1 e_{t-1} + (1 - I_t)\rho_2 e_{t-1} + \sum_{i=1}^{p} \beta_i \Delta e_{t-1} + \varepsilon_t \qquad \text{8.7}$$

and

$$\Delta e_t = M_t \rho_1 e_{t-1} + (1 - M_t)\rho_2 e_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta e_{t-1} + \varepsilon_t \qquad \text{8.8}$$

These equation (8.7) and (8.8) represent the modified TAR and the M-TAR models, respectively.

8.4. The Data and the Estimated Results

8.4.1. The Data

The data-set used for this analysis comprises quarterly series of the fiscal deficit, Fd and the current account deficit, *Cab*. The *Fd* is measured as the difference between the total central government revenue and its total expenditure expressed as a percentage of the GDP. The *Cab*, on the other hand, is measured as the sum of the balance of trade (that is total exports minus imports of goods and services), net factor payment that include interest and dividends, net transfer payments, such as foreign aid expressed as a percentage of the GDP. Figures 8.1 and 8.2 represent the series for the sample period, 1980:01 – 2015:04. Positive figures denote surpluses while negative ones represent deficits.
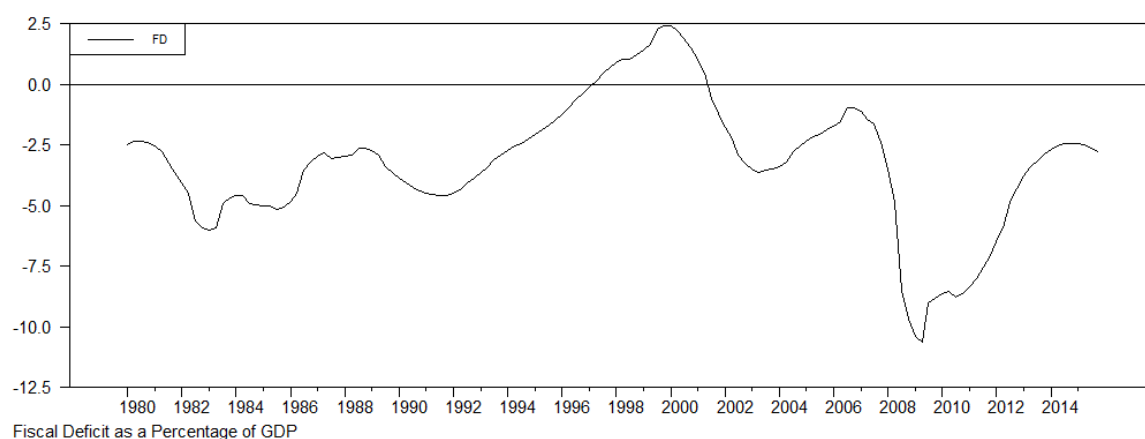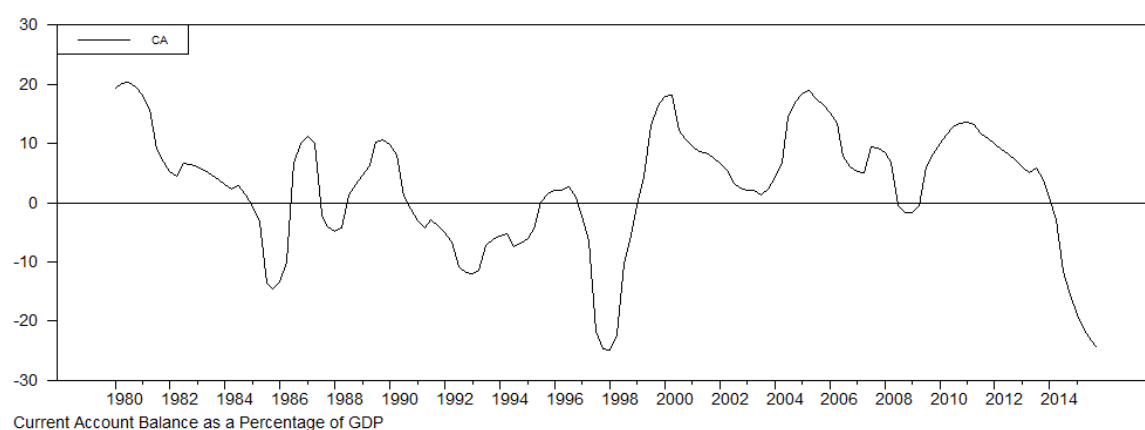
Figure 8.1

Fiscal Deficit as a Percentage of GDP

Figure 8.2

Current Account Balance as a Percentage of GDP

It is evident from Figure 8.1 that, apart from the brief period of the late 1990s and the 2000s, when surpluses were recorded, the country experienced fiscal deficits. However, Figure 8.2 has recorded more surpluses during the sample period than deficits.

Table 8.1 reports the summary statistics of the series. The current account has higher mean and also higher standard error. The fiscal deficit variable depicts lower mean as well as other measures reported, that is standard error, minimum and maximum.

Table 8.1 Summary Statistics					
Series	**Obs**	**Mean**	**St. Error**	**Min**	**Max**
CA	144	2.580	10.255	-24.805	20.281
FD	144	3.206	2.649	-10.616	2.403

8.4.2. Unit Root and Cointegration Results

Table 8.2 reports the unit root test results for the fiscal deficit and current account deficit. Three tests have been run: Augmented Dickey Fuller, Phillips Perron, PP and Kwiatkowski Phillips Schmidt and shin, KPSS. The results indicate that the series are non-stationary, *I(1)* and stationary on first differences, *I(0)*. This means that the series are appropriate for cointegration analysis using both the Johansen and Engle-Granger tests. These tests are carried out and the results are reported in Table 8.3.

Table 8.2 Unit Root Tests Results			
Test	**Variable**	**Level**	**First Difference**
ADF	FD	-1.94	-3.63**
	CA	-1.97	-5.01**
PP	FD	-2.42	-5.35**
	CA	-2.15	-6.34**
KPSS	FD	0.58**	0.08
	CA	0.62**	0.07**
Note: The null for ADF and the PP is that the series has unit root whereas the null of KPSS is that the series is stationary. ** signify rejection of null at 5% level of significance.			

As the VAR is sensitive to lag length, it is essential to check for the optimum lag length using the information criteria. The results indicate that BIC chose 2 lags while the AIC preferred 3 lags. However, the Johansen test has utilised both 2 and 3 lags, which are reported in the table. The cointegration results from both Johansen and the Engel-Granger rejected the null of no cointegration between the series at 5% level of significance. Also the Johansen test failed to reject the null of two cointegrating vectors.

Table 8.3 Symmetric Cointegration Tests			
Lag Length	BIC		AIC
	2		3
	Test with 2 lags		
Johansen Test	H_0	Trace	Maximum Eng.
	$r \neq 1$	20.16	16.04
	$r \neq 2$	5.	5.69
	Test with 3 lags		
	$r \neq 1$	21.01	21.01
	$r \neq 2$	7.75	7.75
Trace critical value at 5% is 20.16 for r≠1 and 9.14 for r≠2.			

Table 8.4 contains results for threshold cointegration test using Enders and Siklos (2001) technique. The results reported from both TAR and MTAR models indicate rejections of the null of no threshold cointegartion in favour of its alternative. That is the results suggest existence of asymmetric adjustments between the series for the sample period: positive adjustments are quicker than negative adjustments. This is consistent with the central government behaviour where increases in fiscal policy is more rapid in face of a rise in revenues than reductions in government spending in the face of negative revenue shocks.

The coefficients of -0.056 for TAR and -0.086 for MTAR are higher than the second ones reported for the two models. This indicates that adjustment above the equilibrium is quicker than adjustment below the equilibrium. The results show that fiscal expansion seems to take place as quickly as more revenue are recorded as a results of the current account surplus. However, on the contrary, reduction of fiscal expenditure in the face of current account deficit appears to be very slow. This is consistent with the behaviour of most governments, especially in developing countries where there is more social pressure to resist cut in public expenditure.

Table 8.4 Threshold Cointegration Tests and Asymmetric Adjustments				
	ρ_1	ρ_1	$\emptyset$	F-Stat
TAR	-0.056** (0.002)	-0.042** (0.005)	5.324**	0.087
MTAR	-0.086** (0.004)	0.008** (0.001)	7.723**	3.723**
Both $\emptyset$ and F-stat follow a non-standard distribution. Therefore, the test statistics are compared with the table given in Enders and Siklos (2001). ** indicate significance at 5% level.				

The reported results are generally in a similar pattern to those reported by Ahmad and Aworinde (2015) and Ahmad et al (2015). It is note-worthy that African economies also depend on a few commodities for their exports and also heavily rely on imports for machineries and other equipment like Oman.

It is note-worthy that as reported in Table 8.3, there was no evidence of symmetric cointegration, a symmetric error correction model was not estimated. Also related here is that adjustment coefficients for the asymmetric cointegration not only reveal the level and speed of adjustments in the model, but also shows how asymmetric the adjustments are when the system is above or below equilibrium. This, therefore, renders error correction redundant, hence not reported here.

8.5 Conclusion

This chapter investigated the relationship between the current account and fiscal deficits in Oman. It uses the threshold cointegration methodology of Enders and Siklos (2001) that allows asymmetric adjustments between the series. It suits the ad hoc nature of fiscal policy, particularly in developing countries like Oman, where there is no fiscal rule is generally adhered to. Secondly, Financial markets of these countries, including Oman, are, at best, at infancy level. Therefore, using a flexible technique that accommodates non-linearity and asymmetric adjustment becomes not only desirable but essential.

The results indicate support for the twin deficits hypothesis. That is, the current account and fiscal deficits are related in Oman for the period covered. The study also found adjustments between the series are asymmetric where positive adjustments are quicker than negative adjustments, which is consistent with results reported for other developing countries similar to Oman.

Chapter 9

Conclusions, limitations and General Policy Implications

Although the first articles on the topic date back to the 1980s, the relationship between oil revenues and macroeconomic growth in developing countries is still subject to controversy. The hypothesis of a natural resource curse is supported by several recent studies although there is a lack of investigation of the dynamic relationships between the macroeconomic variables of interest. In particular, this thesis has debated whether fiscal policy and its pro-cyclicality is one of the main channels of the natural resource curse.

Oman is a good example of a small oil-exporting country where public spending is closely linked to oil revenue. When oil prices rise, the fiscal policy is expansionary and when oil prices decline, the public expenditure is reduced. From a Keynesian perspective, a reduction in public expenditure causes a fall in total demand, consumption and investment; thus adversely affecting economic growth. Conversely, when oil prices increase economic growth will recommence as a result of the spending effect multiplier.

The first and second empirical chapters, i.e. Chapter 4 and Chapter 5 focused on the effect of oil revenue on economic growth and the mechanisms through which oil price shocks can be transmitted to economic growth through government expenditure. Using time-series analysis with cointegration and Granger causality tests, the chapters examine how oil revenues affect economic growth directly and indirectly through the fiscal policy channel. The results indicate that there is a long-run relationship between the three macroeconomic variables of interest: real GDP, real government expenditure and real oil revenues.

The results reported show the real government expenditure has a positive impact on the real GDP and variations in government expenditure are predominantly caused by changes in oil revenue. The government is an important institution in the development process and a good fiscal policy plays an important role in switching the natural resource curse to a blessing. In fact, oil revenue is beneficial to economic growth in Oman, but could be more effective if associated with a fiscal policy that dissociates fiscal expenditures from oil price volatility.

Oman is set to launch a fiscal stabilisation programme aiming at attenuating the predominance of oil revenue as a share of total government revenue. The programme aims at investing in

other productive activities and increased taxation on individuals and businesses. With the recent dramatic drops in oil prices, it is likely that with such a consistent effort Oman will be able to defy the so-called natural resource curse.

The rising interest in the last two decades on the topic of government expenditure and its effects on economic growth has not led to a real consensus in the literature. Policy-makers in developing countries have faced crucial trade-offs regarding which components of government spending should be dropped or reduced in volume. From a policy-making perspective, it is important to compare the contribution of each component to economic growth in the long-run to make rational decisions.

Therefore, the role of government spending in promoting economic growth remains debatable in both developed and developing countries. Both economic theory and empirical literature have not yet succeeded in providing a clear cut answer to the question of how public spending affects economic growth. This is the main objective of Chapter 5. The results indicate evidence that public investment contributes to the positive growth of the GDP while the current expenditure does not seem to have much impact on the long-run level of the country's growth. Consequently, public investment expenditure can boost economic growth in Oman whereas recurrent expenditure does not have much impact on GDP. This means that Oman can reduce its current expenditure at times of oil price decline without adversely affecting its economic development.

The present thesis has shown that Omani oil revenue has increased in the past thirty years and this rise was accompanied by an increase in government expenditure which has in turn boosted the GDP. The thesis contributes to the literature in three major ways. First, in terms of data: it uses time series data, with a sample period of over thirty years for Oman, which has been generally overlooked by the previous literature. Second, in terms of methodology: the thesis employed a rigorous and well-established times series methodology that includes cointegration analysis using Johansen and Engle-Granger methodologies, VAR/VECM along with causality tests, the ARDL and threshold cointegration. Finally, in order to shed more light on the effect of government expenditure on economic activities in Oman, both aggregated and disaggregated expenditure data were analysed.

Meanwhile, the major limitation in my data is that the period covered is characterised with constantly increasing oil prices. One could argue that a long period with generally stable oil

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prices would be more appropriate for such analyse. However, this is a limitation imposed by the availability of data. Using a longer time-span series would be interesting and if data become available, it will be a good area of extension.

Another possible extension of the study, which also dependent on data availability is looking at the impact of both oil revenue and government expenditure on households and businesses from the micro-econometric perspective. This will help to shed more light on the behaviour of these economic agents in terms of consumption, savings and investment.

The Omani government must face oil price slumps with care as cutting investment may have serious adverse effects for the future of the country. Consequently, the optimal long-run strategy for the oil-dependent country is to open the economy and invest in capital and technological know-how, whilst reducing military budgets as much as possible. In times of recession, decisions taken for short-run adjustments can have irreversible effects in the long-run. It is good to avoid the leverage of increasing oil production; which can be counter-productive. Also, health and education expenditure could be slightly reduced, but only as a last resort. However, the government shall not reduce total investment and or compromise the openness of the economy as suggested by the empirical work.

Since the results for the sample period show that the fiscal and current account deficits for the country are related, appropriate measures should be taken to handle fiscal deficits that are rising now in the face of the dwindling oil revenue as a result of the oil price falls. But, more importantly is the fact that the results show adjustment is asymmetric between the series as upward adjustment is much faster than downward adjustment. This imply that the government should try to resist the temptation of increasing its public expenditure in the face of a rise in oil revenue, which depends on international oil prices. Also, the government may find cutting the increased expenditure when the oil revenue falls difficult and the result will be increasing fiscal deficit that can impact on the country's current account balance and domestic exchange rate or reserves.

Finally, the general findings of the thesis and the policy implications of the results are broadly consistent with the IMF's recent macroeconomic outlook for oil exporting countries of the Middle East and the central Asia, including Oman and the policies suggested by the fund. These include taking further steps to restrain government spending, cut subsidies and raise non-oil revenue. However, fiscal deficits are projected to widen next years because of heavy

reliance of public budgets on oil revenue which is the engine of economic growth in these countries. The IMF said that Oman needed further fiscal adjustments and additional spending cuts especially for those unproductive expenditure. The IMF recommends Oman should to undertake structural reforms to enhance the business environment to attract FDI and develop private sector to play main role to induce economic growth.

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