Causal Relationships in Economic Growth:
Wagner’s law, the Case of Saudi Arabia

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ABSTRACT

The importance of public sector activities have grown significantly over the last few decades in Saudi Arabia. It is argued that such involvement often impacts economic growth significantly. In this regard, different economic perspectives emphasise the role of the public sector in transforming the economy and enhancing economic growth. Nevertheless, it is projected that such intervention may point the way to increasing dependence on the government in planning and providing infrastructure projects, which in turn leads to an increase in public expenditure size and activities.

These views were first recognised by Adolph Wagner late in the 18th century, when he posited what is now referred as Wagner’s law. A revision of Wagner’s law and its different interpretations with respect to the relationship between economic growth and government expenditure growth is presented and tested via six common versions. The tests applied on a wealthy oil-based developing country, which is a unique case because of the key role played by oil exports. This means that the level of GDP will be affected strongly by the price and volume of oil exports. Accordingly, the study tests if there is any long-run or short-run relationship between government expenditure growth and both total real GDP and non-oil real GDP. The statistical tests to examine this relationship include Granger-causality tests as well as co-integration analysis.

The empirical results confirm Wagner’s law, which implies that government expenditure in Saudi Arabia depends on GDP growth and that government expenditure in this case is ineffective as a policy instrument. Thus, one of the most important contributions of this study is its examination of the role of fiscal policy in promoting GDP growth.
STATEMENT OF AUTHORSHIP


This thesis contains no material extracted in whole or in part from a thesis submitted for the award of any other degree or diploma.

No other person's work has been used without due acknowledgement in the main text of the thesis.

This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution.

Salim A. Bagadeem
10th of February 2012
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# TABLE OF CONTENTS

## Chapter One: Introduction

1.1 Overview .......................... 1
1.2 The Problem Statement .......... 3
1.3 The Importance of the Study ..... 6
1.4 The Study Objective .......... 8
1.5 Data and Study Limitations ..... 9
1.6 Outline of the Thesis .......... 11

## Chapter Two: Literature Review

2.1 Introduction ...................... 18
2.2 Public Sector and Economic Growth 19
2.3 Perspectives on the Growth of Government Expenditure 21
2.4 Public Finance Models and Public Expenditure Growth 26

*2.4.1 Wagner's Law* .................. 28

*2.4.2 The Displacement Effect Hypotheses* 33

*2.4.3 Musgrave Hypotheses* .......... 37

*2.4.4 The Theory of Bureaucracy* .... 38

2.5 Keynesian Theory ................. 40

2.6 Empirical Studies on Government Spending and Economic Growth 41

*2.6.1 Recent Studies of Wagner’s Law in Developed Nations* 42

*2.6.2 Recent Studies of Wagner's Law in Developing Nations* 51

*2.6.3 Recent Studies of Wagner’s Law in the GCC* 57
Chapter Three: A Critical Review of Alternative Formulations of Wagner’s Law

3.1 Overview

3.2 Six Common Versions of Wagner’s Law

  3.2.1 The Peacock and Wiseman Version
  3.2.2 The Pryor Version
  3.2.3 The Goffman Version
  3.2.4 The Musgrave Version
  3.2.5 The Gupta and Michas Version
  3.2.6 The Mann Version

3.3 Measuring Government Size

  3.3.1 Total Public Expenditures
  3.3.2 The Share of Government Expenditure in Output
  3.3.3 Per Capita Government Expenditure

3.4 The Independent Variable

3.5 Testing And Specifications

  3.5.1 A Consideration of Specification Issues

Chapter Four: Economic Background of Saudi Arabia

4.1 Overview

4.2 Characteristics of the Saudi Arabian Economy

4.3 Income Diversification

4.4 Dualistic Nature of the Economy

4.5 Saudi Arabian GDP

  4.5.1 The Non-oil Sector
6.4.1 Real GDP and Non-oil Real GDP 143
6.4.2 Constructing the Quarterly Time-series Data 145
6.4.3 Method of Generating Quarterly Series 146

6.5 Econometric Methodology 149
6.5.1 Unit Root Test 149
6.5.2 Co-integration Test 152
6.5.3 The Granger-causality Test 155
6.5.4 Error Correction Model (ECM) 158

Chapter Seven: Empirical Analysis of Wagner’s Law in Saudi Arabia 161

7.1 Overview 161
7.2 Empirical Findings 162
7.2.1 Unit Root Test 162
7.2.2 Co-integration Tests 165
7.2.2.1 Co-integration Test with Real GDP Data 167
7.2.2.2 Co-integration Test with Non-oil Real GDP Data 170
7.2.3 Granger-causality Test 174
7.2.3.1 Granger-causality Test with Error Correction Model 175
7.2.3.2 Short-run Granger-causality Test 180

Chapter Eight: Summary of the Statistical Findings 184

Conclusions and Suggestions

8.1 Overview 184
8.2 Summary of the Statistical Findings 185
8.2.1 Total Real GDP 186
8.2.2 Non-oil Real GDP 188
8.3 Policy implications 189
8.4 Conclusions and Recommendations 193
8.5 Comparisons with Other Studies for Saudi Arabia 197
8.6 Suggestions for Future Research 199

Bibliography 202
LIST OF TABLES

2.1 Causes of Government Expenditure Growth 23

2.2 Government Expenditure as a Share of GDP 25

2.3 Significant Contributions to the Literature on Wagner’s Law 34

4.2 Per cent Distribution of GDP by Economic Activity 102

4.3 Necessary Conditions for Economic Growth 117

5.1 Percentage of Expenditure During Development Plans 127

5.2 Government Budgetary Revenues by sectors 138

6.1 The Six Versions of Wagner’s Law With Real GDP 142

6.2 The Six Versions of Wagner’s Law With Non-oil Real GDP 143

7.1 Unit Root Test Annual Data with Real GDP 164

7.2 Unit Root Test Annual Data with Non-oil Real GDP 164

7.3 Unit Root Test Quarterly Data with Real GDP 165

7.4 Unit Root Test Quarterly Data with Non-oil Real GDP 165

7.5 Engle-Granger Co-integration Test With Real GDP 168

7.6 Johansen-Juselius Co-integration Test, Model (1), Annual Series 169

7.7 Johansen-Juselius Co-integration Test, Model (2), Annual Series 169

7.8 Johansen-Juselius Co-integration Test Model (1), Quarterly Series 170

7.9 Johansen-Juselius Co-integration Test, Model (2), Quarterly Series 170

7.10 Engle-Granger Co-integration Test with Non-oil Real GDP 171

7.11 Johansen-Juselius Co-integration Test, Model (1), Annual Series 173
7.12 Johansen-Juselius Co-integration Test, Model (2), Annual Series  173
7.13 Johansen-Juselius Co-integration Test  174
7.14 Johansen-Juselius Co-integration Test  174
7.15 Granger-causality Test with ECM Real GDP  178
7.16 Granger-causality Test with ECM Real GDP  179
7.17 Short-run Granger-causality Test, Peacock-Wiseman Version  182
7.18 Short-run Granger-causality Test, Pryor Version  183
7.19 Short-run Granger-causality Test, Goffman Version  183
7.20 Short-run Granger-causality Test, Mann Version  184
8.1 Comparing the Findings for Wagner’s Law Studies for Saudi Arabia  200
<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Peacock and Wiseman Hypothesis</td>
<td>36</td>
</tr>
<tr>
<td>3.1</td>
<td>Theoretical Schema for Wagner’s Law</td>
<td>84</td>
</tr>
<tr>
<td>4.1</td>
<td>Real Oil GDP and Non-oil Real GDP Trend</td>
<td>95</td>
</tr>
<tr>
<td>4.2</td>
<td>Percentage Contributions of Economic Sectors to GDP in 2009</td>
<td>96</td>
</tr>
<tr>
<td>4.3</td>
<td>Saudi Arabian Oil Production</td>
<td>99</td>
</tr>
<tr>
<td>4.4</td>
<td>Saudi Arabian Exports Structure (2009)</td>
<td>100</td>
</tr>
<tr>
<td>4.5</td>
<td>Development of Value Added in Industrial Sector</td>
<td>104</td>
</tr>
<tr>
<td>5.1</td>
<td>Current and Capital Government Expenditure Outlays</td>
<td>123</td>
</tr>
<tr>
<td>5.2</td>
<td>Government Consumption Expenditure (2005–2008)</td>
<td>128</td>
</tr>
<tr>
<td>5.3</td>
<td>Numbers of Graduates at Secondary Level</td>
<td>131</td>
</tr>
<tr>
<td>5.4</td>
<td>Share of Human Resources Development in Total Investment</td>
<td>132</td>
</tr>
<tr>
<td>5.5</td>
<td>Shares of Health Service Providers</td>
<td>135</td>
</tr>
<tr>
<td>5.6</td>
<td>Government Revenues by Sectors</td>
<td>139</td>
</tr>
<tr>
<td>6.1</td>
<td>Changes in Real GDP</td>
<td>144</td>
</tr>
<tr>
<td>6.2</td>
<td>Changes in Non-oil Real GDP</td>
<td>144</td>
</tr>
<tr>
<td>6.3</td>
<td>Annual Data for Saudi Arabian GDP</td>
<td>149</td>
</tr>
<tr>
<td>6.4</td>
<td>Quarterly Data for Saudi Arabian GDP</td>
<td>149</td>
</tr>
<tr>
<td>7.1</td>
<td>Real GDP Trend</td>
<td>166</td>
</tr>
<tr>
<td>7.2</td>
<td>Non-oil Real GDP Trend</td>
<td>166</td>
</tr>
</tbody>
</table>
Chapter One

Introduction

1.1 Overview

Governments play an important role in the development of nations, and the accompanying expansion of public sector activities during this development process has become the subject of extensive investigation. Studying the growth of government expenditures can yield valuable insights into the development process and the nature of this growth.

Government spending can take several different forms, according to the nature of the expenditure. One form of government spending provides goods and services to the public, such as health care, education, government subsidies, and public goods. Such services might be provided free to the public to enhance the quality of life and social conditions. Another form of government expenditure is investment projects to augment the nation’s development; for example, infrastructure and services that are part of the nation’s output, such as private goods and services. Through provision of services and investments, government involvement is critical to the nation’s development.

The trend to increase government expenditures commensurate with increases in national output has become more prevalent in all nations across the globe. Another observable trend is that increases in government expenditure in wealthier nations are noticeably larger than the increases in poorer ones (Tarschys, 1975). Thus, there is an apparent relationship between the rate of economic growth and the size of the public sector.
The nature of this relationship is described in the academic literature in two different ways. Firstly, in some nations, government spending is initiated to achieve strong economic growth and welfare enhancement. Public expenditure, in this case, is used to support and accelerate the development process. This is the view expressed in Keynesian theory (see Keynes, 1936). The second view expressed in the literature is that government spending is considered to be endogenously determined and is a result of the development process, whereas public expenditure is a consequence of the growth of the national output. Adolf Wagner (1883) offered the basis of this idea, which was investigated by numerous studies that try to explain a unique interpretation of Wagner’s propositions, and to establish their validity. One interpretation of Wagner’s propositions states that for a modern industrialised nation, government expenditure increases at a faster rate than the national income. Various interpretations of Wagner’s hypothesis in different studies have proved its validity. On the other hand, this hypothesis has been rejected by different studies for political and social reasons. This hypothesis referred now as Wagner’s law.

In this thesis, six common versions of Wagner’s law are tested empirically for the Kingdom of Saudi Arabia. The test is applied on a wealthy developing country that is rich in certain natural resources and raw materials, such as oil, which account for a large portion of GDP—27.8 per cent during 2009 (Ministry of Economy and Planning, 2009b). The major different interpretations of Wagner’s law and the main empirical methods have been applied to test the validity of the law in such an economy.

Interestingly, Saudi Arabia is an unusual case because of the key role played by oil exports. This means that the level of GDP will be affected strongly by the price and volume of oil exports. Therefore, in such a case there exists a situation of a structurally
unbalanced dual economy—the well-developed natural resources sector and another still-developing economy highly dependent on external variables. Accordingly, two different definitions of GDP treated as an independent variable are used. The first is non-oil real GDP and the second is total real GDP. On the other hand, the overall performance of the economy can be also measured by the growth of the government budget, which is affected strongly by oil price fluctuations (Johany, 1982).

In our empirical analysis, Granger-causality tests and co-integration analysis are employed to examine this relationship. The results of testing the validity of the law in Saudi Arabia using non-oil real GDP show that a long-run relationship exists between the examined variables, and also show that public spending grew dramatically during the study period from 1974 to 2009. On the other hand, when testing the law using total real GDP, all versions, with the exception of only one version, support the existence of a short-run relationship between economic growth and government expenditure. For the long run, however, only two of the six versions support Wagner’s law.

The study’s findings presented in chapter seven show that changes in both total real GDP and non-oil real GDP contribute to changes in government expenditure for most examined versions of Wagner’s law. Thus, it is suggested that government should not worry about maintaining a particular level of spending in order to achieve economic growth. Supporting a shift in government expenditures towards non-oil activities is also recommended to enhance this sector.

1.2 The Problem Statement

Government expenditure in Saudi Arabia has shown remarkable increases over time in absolute and relative terms since the first oil boom in the early 1970s. Government
expenditure increased from around 20 billion Saudi Arabian Riyal (SAR) in 1973 to its highest level, more than 500 billion SAR, in 2008. As a result of the continued rise of government expenditure over the years and the government’s influence on economic activities, the inflation rate has jumped dramatically, reaching a peak of 11.1 per cent in July 2008. On the other hand, total government revenue increased from SAR 41.7 billion in 1973 to SAR 642.8 billion in 2007 and SAR 1,101 billion in 2008, due to the continuous rise in oil prices in recent years; the price of oil hit USD147 per barrel in 2008 (Saudi Arabian Monetary Agency, 2009).

It is clear that oil price fluctuations and production changes are reflected in the government’s budget, comprising from 66 to 89 per cent of total government revenue during the study period. As a result, the government is held accountable to the people for providing jobs to its citizens. The government also finances a variety of economic and social services either for free or for a subsidised cost (Saudi Arabian Monetary Agency, 2009). According to the Ministry of Planning report (2009), government employment increased during the last two decades from 520,000 employees in 1990 to more than 1,200,000 employees in 2009. These increments have been a direct consequence of increasing government involvement in economic activities and development strategies. Moreover, the United Nations Population Division (2009) reported that the rate of population growth, at an average of more than 4.2 per cent per year, presents a serious challenge to the government’s efforts to increase employment opportunities in both the government and private sector.

The receipt of oil revenues by the government directly produces a rise in government deposits; i.e., there is no private ownership of oil revenue. The government is the dominant influence on economic performance; therefore, government expenditure has an
influence on a large number of economic activities which, in turn, generates increases in government expenditure over time and impacts the development of the other sectors. This forces the government to diversify its investments with the participation of the private sector, with the objective of maintaining steady growth in economic activities other than oil activities, such as the private sector and Non-oil activities.

The debate about the role of government expenditure in accelerating economic growth has been subject to extensive study in both public finance literature and macroeconomic theory. The growing importance of government expenditure to a nation’s development and the achievement of steady economic growth and welfare improvement can be clearly seen. There is cause for concern, however, regarding the growing size of government expenditure and its involvement in economic activities, which may lead to a heavy reliance on the public sector and reduced activity and participation in the private sector, which is always assumed to play key role in economic development.

By examining the nature of the relationship between government expenditure and national income, this study explores the tendency of the government sector to control major economic activities, including both productive and non-productive economic activities. This is certainly the situation involving government expenditure and its components of Saudi Arabian GDP (Saudi Arabian Monetary Agency reports, 1974, 2009). This trend in government activity implies that there is a need to monitor and investigate its role regularly in steady manner. Both real oil GDP and non-oil real GDP have been used to measure the impact of economic growth on the size of the public sector. Hence, the main purpose of this project is to measure the effect of economic growth on government size and growth. Accordingly, the main hypothesis to be tested in this project is to determine if there is a causal relationship between economic growth and government expenditure.
1.3 The Importance of the Study

The relationship between government expenditure and economic growth has been subject to extensive academic study. Therefore, in order to present a distinctive body of work, this study applies modern statistical techniques when examining variables such as the concepts of stationary data, co-integration, error correction models and the Granger-causality test. Moreover, the empirical work of this study utilises two data series frequencies: a quarterly series and an annual series. Having a quarterly series in addition to annual data can be used to confirm and support the study outcomes and to determine the nature of any shocks, should they occur within the quarterly series.

The direct correlation between government expenditure and economic growth helps policy makers to implement the optimal plans and strategies for the future. Only a small body of academic work has examined Wagner’s law in the context of Saudi Arabia. Ghamdi (1983) and Al-Yousef (2000) did not use modern statistical techniques, such as stationarity and co-integration analyses, in their econometric analysis. Instead, they employed ordinary least squares without testing for stationarity of the variables used. A recent study by Al-Obaid (2004) used the concept of co-integration analyses and testing for data stationarity, but this study disaggregated government expenditure into six broad categories. Moreover, it examined only the period from 1970 to 2001. Furthermore, Al-Obaid (2004) measured only the effect of real oil GDP growth on government expenditure, without determining the impact of non-oil real GDP on government activities.

The importance of this study can be derived from its contributions and findings. If government expenditure is found to cause economic growth, promoting increases in government expenditure would be the most appropriate economic strategy for the country
concerned. Conversely, if economic growth is found to cause growth in government expenditure, then the government should not bother promoting a particular level of expenditure to enhance the country’s economic growth.

In this case, the government can adopt restrictive policies to reduce the budget deficit, if one exists. Furthermore, internal infrastructure spending might be required at some stage to expand other sectors and support sustainable development. Finally, investigating the nature of the relationship between national income and government expenditure helps development economists and policy makers to determine the best strategy to be applied at every stage of the development process in order to avoid any adverse economic downturn effects, such as recession or budget deficit. In these cases, fiscal policies should be considered in accordance with the economic situation.

The distinction between oil GDP and non-oil GDP, which is adopted in this study, helps in understanding the source and nature of economic growth. Of the study findings, it will be shown that only real GDP has a long-run relationship with government expenditure, which supports the concept of non-oil activities being a sustained part of the growth of government spending. Thus, non-oil activities can have a dominant influence on the economic performance. Although it is an accepted fact that oil production is a major source of government income, consideration should be given to the indirect and influential role of oil revenue on other economic activities and how this might impact other sectors of the economy. Moreover, sustained growth needs to move within a steady oil market, although steady market conditions are not a reality at this point in time.

It is quite clear that Saudi Arabian government expenditure has occupied a pivotal role in the development of the nation over the past three decades, resulting in the building of
infrastructure and the establishment of modern educational and health care systems, which has had a significant influence on the total economy. Therefore, it is beneficial to study the nature of the relationship between economic growth and government expenditure in order to ensure the optimal policies and strategies are adopted in the future.

1.4 The Study Objective

The achievement of a satisfactory rate of economic growth is a primary goal of any government in the world today. Therefore, investigating if there is any long-run or short-run relationship between economic growth and government expenditure would help governments to determine the best strategies for enhancing economic growth. The causal relationship can be measured by using either the Granger-causality test or an error correction model. Hence, the study objective is to investigate whether economic growth causes government expenditure to grow. In addition, by determining the role of both GDP and non-oil GDP, this study aims to test the validity of Wagner’s law in Saudi Arabia.

The study objective can be summarised in this field as follows:

i) examine the validity of six common versions of Wagner’s law in relation to Saudi Arabia;

ii) determine the nature of the growth of public expenditure by examining the role of both GDP and non-oil GDP;

iii) review other prominent research and theories that might explain government sector growth and evolution;

iv) analyse trends in public expenditure in the short and long term;
v) define the role of government expenditure, considered not only to exert a major impact on the evolution of economic activities, but also to be an important tool in a nation’s fiscal policy;
vi) determine the role of GDP and non-oil GDP in achieving and maintaining sustainable growth and planning for future expenditure; and
vii) estimate the elasticity of government expenditure with respect to income in order to assess the relationship between income and government expenditure.

Testing the extent of the impact of economic growth on government expenditure helps to determine the nature of the growth and development. Hence, the findings of this study will assist policy makers to better understand their priorities when making decisions about expenditures on national development activities. Moreover, the findings will guide those responsible for the development plan to focus on those sectors where government spending positively affects productivity and growth.

To a certain extent, oil revenues can be used to promote non-oil activities and support the nation’s development. However, this study focuses on the importance of non-oil GDP in promoting sustainable growth outside the oil sector. For instance, infrastructure spending is likely to increase during periods when there is high government income from oil revenue. Conversely, it might be useful to reduce spending on capital projects and consumption when the price of oil declines.

1.5 Data and Study Limitations

This study needs to use consistent measures for economic activities, which are determined to be real GDP and per capita GDP. Government expenditure has been used as a dependent variable, to test the relationship between economic growth and
government expenditure. Therefore, the required series to describe this relationship is as follows: i) Real Gross Domestic Product (GDP); ii) Non-oil Real Gross Domestic Product (Non-oil real GDP); iii) Total Government Expenditure (GE); iv) Total Government Expenditure for Consumption (GEC); v) GDP deflator; and vi) population.

The study uses oil GDP and non-oil GDP, with 1999 as the base period, to construct real values for the GDP. The actual value of government expenditure is used. Moreover, a population variable is needed to construct per capita values for GDP and government expenditure. Government expenditure expressed as a percentage of GDP is obtained by dividing total government expenditure by GDP.

The study covers the years from 1974 to 2009, a period that is characterised by intensive development in Saudi Arabia. Moreover, it covers the oil price boom periods in the 1970s and the second half of the 2000s. It also covers the economy’s low income stage during the mid-1980s.

The data was obtained from two primary sources:

i) International Monetary Fund, International Financial Statistics (IFS); and

ii) Saudi Arabian Monetary Agency (SAMA) annual reports.

In addition, a quarterly series will be constructed from the annual data using Simpson’s parabolic rule in numerical integration (Matthews, 2004). The quarterly data series covers the same annual period and includes 140 observations. The quarterly data is used only for the purpose of confirmation and verification of the outcome. However, this study investigates Wagner’s law using both data series. The annual data series covers the period from 1974 to 2009, while the quarterly data series covers the period from 1974Q1
to 2009Q4. The same variables will be used to test the validity of the six versions of Wagner’s law for Saudi Arabia.

1.6 Outline of the Thesis

This project is divided into eight chapters and contains theoretical and empirical work that illustrates government expenditure growth in Saudi Arabia, organised as follows.

Chapter one contains a brief summary that justifies and explains the project. Firstly, it states the problem to be examined, the relationship between continued increases in the government budget in Saudi Arabia and economic growth. This can be achieved by testing the validity of six common versions of Wagner’s law. The increased government involvement in economic activities and development strategies make it a dominant factor in economic performance; it also influences a large number of economic activities, as well as the evolution of the other sectors.

Secondly, the chapter argues for the importance of this project to the existing literature in the microeconomic and public finance fields. The relationship between government expenditure and economic growth has been subject to extensive academic studies in both areas. In order to present distinctive and original work, this study utilises modern statistical techniques when examining the studied variables.

Thirdly, chapter one clarifies the objective of the study and how it affects an important sector of the economy significantly. The objective of the study is to investigate if there is any relationship between economic growth and government expenditure.
Finally, the source of the data to be used and the corresponding limitations of the data are presented in this chapter. The data to be used should make it possible to obtain consistent measures for economic growth and government expenditure. The final section of this chapter briefly outlines the organisation of the study and its eight-chapter structure.

Chapter two presents the literature review on public expenditure theories and the evolution of Wagner’s law. Public expenditure and its rate of growth varies extensively across countries and nations, reflecting various social, political, and economic factors. Several different theories are used to explain the government’s impact on economic growth and development. Accordingly, this chapter commences with an overview of different perspectives on government expenditure and the long-term causes of its growth. Following that, an exploration is presented of several major contributions in public finance and microeconomic theories that are related to government expenditure growth. These theories include Wagner’s law, the displacement effect hypotheses, Musgrave’s hypothesis, the theory of bureaucracy and Keynesian theory.

Finally, a summary of different studies that investigated Wagner’s law and their major contributions is presented. Much of this chapter focuses on the typology of scholars who made major contributions to Wagner’s law, which is also known as “the law of growing state activities”. The review of the literature includes different types of econometric methods that can be employed to test Wagner’s law.

Following the literature review in chapter two, chapter three presents a review of alternative formulations of Wagner’s law. This includes a discussion of measurement issues concerning the accurate interpretations of Wagner’s propositions. Selecting dependent and independent variables when formulating a functional form contributes to
the different interpretations of Wagner’s propositions. Accordingly, this chapter is concerned with formulation issues and the appropriate proxies to be used when representing Wagner’s ideas. Moreover, it highlights the measurement and methodological issues that were examined in different eras and the techniques that were applied by various scholars to develop unique interpretations of Wagner’s propositions. The chapter concludes by identifying the specification that performs best in the presentation of Wagner’s ideas. The different factors that contribute to the determination of the movement of the public sector are explained in this chapter as structural, political, and economic factors.

Chapter four discusses the historical background of the Kingdom of Saudi Arabia. It also sheds light on economic growth and the rate of economic and social development during the past few decades. It is obvious that Saudi Arabia had gone through many changes and witnessed remarkable progress during this period. The rate of development in certain sectors, such as the industrial, social, and educational sectors is explored. Crude oil and petrochemical industries are keys to these development processes. This chapter also presents a general view of Saudi Arabia within the global economy, beyond being a major supplier of crude oil.

There are six main themes covered. The first theme addresses certain characteristics of the Saudi Arabian economy, including an economic overview, the cultural background, and a discussion of the impact of oil wealth on the economic structure. Second, some key issues are considered, which are usually part of the debate when forming the development structure. These issues include diversification of the economic base and the dualistic nature of the economy. Third, discussion of the various components of Saudi Arabia’s GDP composition is offered in this section, including both the oil and non-oil
sectors. Fourth, different sources of government revenues, divided into oil and non-oil revenues, are explored. Fifth, the economic development and industrial development path and factors that affect the final outcomes are examined. This discussion also explores the five years sequential development plans and economic performance. Lastly, chapter four concludes with a discussion of the necessary conditions for economic growth in Saudi Arabia.

Government expenditure in Saudi Arabia is central to the development process. Therefore, chapter five sheds light on public expenditure structure and evolution during the past four decades. This includes government budgetary approaches and planning expenditures, as well as government expenditure during the development process. Some categories, such as social welfare, health, education, and defence have the largest share of the government budget. Different sources of revenues, including oil and non-oil revenues, are also discussed in this chapter.

One of Wagner’s main propositions states that government expenditure has some bearing on GDP and in fact increases with GDP, so it is crucial to analyse the relationship between government expenditure categories and the growth of GDP. A tendency to increase the ratio of government expenditure to GDP is one characteristic of government spending observed in Saudi Arabia.

Chapter six brings to light the research methodology for this project. It commences by explaining the six common formulations of Wagner’s law that have been proposed in the literature. Each formulation outlines the variables that are considered in the suggested functional form, along with a statistical interpretation. However, the main part of this chapter is dedicated to illustrating the empirical method and its implications when
examining the validity of Wagner’s law in Saudi Arabia. The empirical method includes a description of the Dickey-Fuller unit root test, co-integration analysis for both the Granger co-integration and Johansen-Juselius tests, and last the Granger-causality test.

The data sources and a description of the variables used are given in this chapter. There are two data frequencies: an annual data series and a quarterly data series. The annual data sources, as mentioned earlier, are the IFS and SAMA annual reports.

Two techniques can be utilised to extract quarterly data from these annual reports. The first method is based on the regression technique. The second method, which is utilised in this project, is based on a numerical method using mathematical calculations. However, this is the first time that this technique has been applied to examine Wagner’s law, which is explained in detail in this chapter. The purpose of generating a quarterly data series in this project is due to the unavailability of a long-span data series for Saudi Arabia for the examined variables. Using only 35 annual reports might result in the statistical analysis being insufficient for application of Johansen co-integration analysis. Therefore, the quarterly data results used in this project serve to confirm and support the annual data outcome.

Chapter seven contains the empirical results of the project. It reports the outcomes of the econometric tests, such as the co-integration tests and the Granger-causality tests. Since the augmented unit root test is one of the most widely used tests to investigate the Time-series properties, it is applied to analysis of the data series. Moreover, to investigate the existence of the long-run relationship between the examined variables, the two-step Granger co-integration test and the Johansen-Juselius co-integration test are employed. According to the co-integration test outcomes, the Granger-causality test will be based on
either the error correction model (ECM) or it will be performed in the standard short-run form. However, these tests are applied according to the GDP type: either real GDP or non-oil real GDP.

This chapter commences with a brief introduction and overview of the technique of each test, followed by the empirical results from testing six versions of Wagner’s law in relation to Saudi Arabia. The resulting outputs of each test are presented in one table for both data series, allowing for ease of comparison and verification of the estimated output.

Chapter eight summarises the statistical findings and conclusion for the project. It commences with a presentation of the statistical results for both data series. Following this, a short recapitulation illustrates some factors that are considered to be attributable to the resulting output.

It is assumed that government expenditure increases as a result of the expansion of productive and administrative government roles, expansion of government activities, and its function in relation to education, health services, and social services. Moreover, increasing technological progress and its increasing returns to scale brings to light the debate of the government’s role in the development process. Accordingly, the policy implications are presented next, to identify key issues that arise from the study’s findings, such as using government expenditure as an effective policy instrument or treating government expenditure as an exogenous factor depending on the level of economic growth. Moreover, one of the most important implications of this project is to define the role of government expenditure in promoting sustainable economic growth. Hence, it is crucial to monitor the role of government growth and its implications for policy makers. Finally, some suggestions are presented for future research on this project.
In conclusion, this project focuses on formulating six versions of Wagner’s law to measure the relationship between government expenditure and economic growth. The Saudi Arabian economy is characterised as an oil-based economy, where oil exports account for the largest portion of its GDP and contribute to most of the development activities. Therefore, it might be a case of a structurally unbalanced economy that depends on external factors, such as the world oil market. Establishing a relationship between such natural resources and development requires a proper utilisation of the natural-resource revenues to enhance economic growth.

The study suggests that the country should have a long-term plan to achieve sustained growth that includes the establishment of systematic budgetary priorities among the different sectors and expenditure categories. This plan should take into account a future scenario in which the supply of oil has been depleted. In addition, the plan should specify the allocation and diversification of capital investments to an array of different economic activities, such as human development, industrial and agricultural production, and infrastructure improvements.

The key issue for this project is the extent of the correlation between economic growth and government expenditure according to Wagner’s law. In Saudi Arabia, oil revenues are the dominant factor throughout any development process, representing the primary source of government income.
Chapter Two

Literature Review

2.1 Introduction

The size of the government sector and its rate of growth varies extensively across countries reflecting national priorities and a host of social, political, and economic factors. On the other hand, over the last century, a number of theories have been proposed to explain the government’s impact on economic growth and development. Modern Western economies assume that the growing influence of both consumption and investment contribute to continued increases in public sector spending. These Western governments have a wide range of instruments at their disposal that they can utilise to influence the growth rate and structure of the economy. Developing countries assign the government a crucial role for the government in economic development, particularly when they face a lack of private capital stock. In both groups, there appears to be some relationship between the level of economic development and the size of the public sector (Peacock, 1979).

This relationship between government expenditure and economic growth has been modelled in two main ways. First, macroeconomic analysis proposes that government spending could be seen as an exogenous factor, which can be used effectively as a key policy instrument to enhance economic growth (as Keynesian theory). Second, public finance studies suggest that growth in government expenditure over time is caused primarily by growth in national income. In this case, government expenditure is seen as an endogenous factor or an economic outcome, but certainly not a cause of growth.
This causal relationship was proposed originally by the German economist Adolf Wagner (1883). He was the first scholar to suggest a positive correlation between different levels of economic growth and the total size of public sector. In countries where the government sector is growing faster than the economy, Wagner postulated that a functional link exists between the growth of the economy and the growth of government activities.

This chapter addresses this issue theoretically, and will be organised as follows. First, there is a discussion on government expenditure and the long-run causes of its growth. Second, there is a discussion of different perspectives on the growth of government expenditure including selected public finance models. In addition, a summary of some studies that have had a significant contribution to Wagner’s hypotheses will be provided. Finally, revisions of recent studies of Wagner’s propositions will be presented, along with an investigation of the properties of the law in both developed and developing economies using modern econometric analysis.

2.2 Public Sector and Economic Growth

The effect of government expenditure on aggregate economic activity has been investigated in various ways in the literature. For several decades, government spending has grown significantly in both absolute and real terms. General increases in living standards, education, health services, and urbanisation all place more pressure on governments that seek to meet these national responsibilities. The efficiency of the public sector can be measured by the type and amount of services the government needs to provide. An additional relevant question is this: What are the effects of government spending on economic growth, productivity, and economic welfare?
Most economists agree that sustained economic expansion is the primary goal of all nations. In the developing countries, economic development is needed to increase levels of production. However, such economic development requires the involvement of the government, particularly in the areas of guidance and planning. Public expenditure here is the driving force in the development process.

It is believed that the public sector provides services less efficiently than the private sector could provide the same services. One possible reason might be the inability of the government to control costs in public services, restrain consumers’ demands, or make decisions efficiently. Moreover, in most developing countries, the public sector finances and produces goods and services that the private sector has declined the opportunity to supply. Furthermore, some activities may require vast sums of capital that cannot be provided by the private sector, and the return on investment might be too low to attract sources within the private sector (Hyman, 2008).

It has been argued that public expenditure is designed to stimulate economic growth by improving productivity and expanding the utilisation of resources. In this case, government spending can be divided into two main categories: consumption, which provides direct utility to individuals; and investment, which increases the productivity of firms.

Most public investments have a directly positive influence on the efficiency and productivity of nations. The direct utility provided by public consumption expenditures, such as health care and education, may be considered as an investment if its long-term impact is taken into consideration. Each type of public expenditure, however, has its own distinct effect on the whole economy, such as effects on aggregate demand, effects on the
growth of real income, and on other important variables. It is also worthwhile to mention that the production of the public sector is valued in a different manner than production by the private sector (Fisher and Turnovsky, 1998).

It is believed that the public expenditure component is critical to the development process. Therefore, adopting a spending strategy suitable for the prevailing economic conditions will sustain economic growth and maximise the outcome of social activities. Effective economic plans can establish a sufficient productive investment to maximise social benefit and national welfare. Accordingly, it would be beneficial for developing nations to implement an investment spending strategy that can stimulate job creation and enhance economic growth. Proper planning can ensure both sustained development of all economic sectors and efficient usage of economic resources. This can also lead to increases in the national per capita income, an acceleration of the rate of development, and promotion of national welfare (Wolfson, 1979).

2.3 Perspectives on the Growth of Government Expenditure

A simple way to explain different growth rates of government expenditure is to examine public expenditure growth from different perspectives. Tarschys (1975) provides two perspectives based on the deciding agents when analysing public expenditure growth. The first group consists of consumers and the demand side of public goods and services. The second group includes producers and suppliers. Lybeck (1986) added finance as a third group, not as an independent agent of its own, but as a necessary precondition for the other two perspectives. Depending on the circumstances, the financial perspective can be merged with either the supply group or the demand group.
Tarschys (1975) also identified three horizontal levels of analysis for the underlying decision units: (i) the social and demographic structure, such as population density, the taxation system and efficiency, where individuals are more directly visible in the society; (ii) the ideological-cognitive level, where factors such as beliefs, knowledge and desires are taken into account; and (iii) the political-institutional level, which considers desired changes in supply or demand that might affect public output. Growth in government expenditures, however, can be seen as an outcome of all of the above factors. These factors can be discussed from the demand-side perspective, the supply-side perspective, or the financial perspective. Table 2.1 summarises different causes of government growth from a variety of perspectives.

These factors influence the demand for growth in government spending in different societies depending on the relative power of each level. For instance, for the demand side in a traditional system, tribal, racial, religious, and occupational groups may create great demand for public goods; in transitional systems, political parties, religious groups, the military, and the bureaucracy constitute leading special-interest groups; and in modern systems, labour unions, trade associations, parliaments and legal authorities are likely to be prominent.

Total interest and demand might be affected by individual decision makers, such as leaders or political parties. In a democratic nation, the opinions of unaffiliated citizens may influence certain decisions, but generally organised groups are more influential. The responses to expenditure demands are determined by the structure of the economy and by sociological, demographic, and technological factors. The nature of the economic system is considerable in accounting for differences in public expenditure categories in different
nations. In different cases, the direction of influence is not always obvious (Goode, 1984; Tarschys, 1975).

Table 2.1 Causes of Government Expenditure Growth

<table>
<thead>
<tr>
<th>Level</th>
<th>Demand Side</th>
<th>Financial Perspective</th>
<th>Supply Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-economic factors</td>
<td>Increasing geographical mobility, industrial reorganisation, population density, education, and medical services lead to greater demand for public good and services.</td>
<td>A complex taxation system requires a relatively large public sector, which is possible only in wealthy and developed nations.</td>
<td>More public workers will be required to meet specialisation and efficiency goals in the public sector.</td>
</tr>
<tr>
<td>Ideological factors</td>
<td>Greater demand for public goods at higher income levels leads to increased public goods consumption, which raises the elasticity of income to more than unity.</td>
<td>In relatively wealthy states, a large tax burden is tolerable for citizens. Legitimacy of the government also defines the incremental tax ratio.</td>
<td>“Bureau maximisation” by administrations and professionals leads to a larger public sector on account of status and ideologies.</td>
</tr>
<tr>
<td>Political factors</td>
<td>Collusion between interest groups on one hand and parliament and administrators on the other might generate greater demand for public goods and services.</td>
<td>Increasing taxes allows for a larger tax yield. Vertical differentiation of public functions increases expenditures.</td>
<td>Coalitions between different groups in society could make matters different, which reduces restrictions on the demand for public goods and services.</td>
</tr>
</tbody>
</table>

Hyman (2008) classified the government activities according to the political institutions levels. For instance, in democratic nations, it is obvious that the level of government
activities can be determined by voters and by political participation in legislation. On the other hand, in non-democratic nations, the level of government participation is determined by dictators or committees that hold political power.

Modern mixed economies often have a larger government sector. The government sector can be responsible for supplying pure government goods such as national defence, police and emergency services, highway planning, and education. It might also support pension incomes and medical insurance. The rise in public expenditure as a proportion of GDP is now seen as a standard economic phenomena. Speculation on the causes and consequences of government expenditure growth has been the subject of several studies, and explaining the causes of the growth has presented a challenge to theorists in the public finance field.

For most nations having modern mixed economies, government expenditure as a percentage of GDP varies considerably. In most modern industrial countries, government expenditure accounts for between 25 and 55 per cent of GDP. The statistics show that spending by European governments is slightly higher than US. government spending when expressed as a share of GDP. This might be because most European nations have extensive social welfare systems in which the government is called upon to provide health care and social programs that support incomes.

Table 2.2 shows statistics of total government outlays as a percentage of GDP constructed from the OECD Economic Outlook (2009) for selected modern economies and developing countries.
Among the developing countries, Iraq has the largest governmental engine, while Afghanistan is an example of a weak central government that receives most of its revenues through customs activity and donations.

In Asian countries such as China, Japan, Taiwan, and Singapore, the weak government involvement relative to the respective total sizes of the economies might be due to the lack of governmental welfare systems in these countries compared to the expansive systems of Western Europe and other developed countries.

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>% OF GDP</th>
<th>COUNTRY</th>
<th>% OF GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>49.2</td>
<td>Australia</td>
<td>43.6</td>
</tr>
<tr>
<td>New Zealand</td>
<td>45.3</td>
<td>Austria</td>
<td>54.3</td>
</tr>
<tr>
<td>Korea</td>
<td>33.8</td>
<td>Belgium</td>
<td>56.0</td>
</tr>
<tr>
<td>Spain</td>
<td>45.7</td>
<td>Canada</td>
<td>61.0</td>
</tr>
<tr>
<td>Sweden</td>
<td>57.0</td>
<td>France</td>
<td>55.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>35.2</td>
<td>Germany</td>
<td>47.7</td>
</tr>
<tr>
<td>UK</td>
<td>52.4</td>
<td>Hungary</td>
<td>49.6</td>
</tr>
<tr>
<td>US</td>
<td>41.6</td>
<td>Ireland</td>
<td>46.8</td>
</tr>
<tr>
<td>Taiwan</td>
<td>21.2</td>
<td>Italy</td>
<td>51.7</td>
</tr>
<tr>
<td>Singapore</td>
<td>16.3</td>
<td>Japan</td>
<td>30.9</td>
</tr>
<tr>
<td>China</td>
<td>22.2</td>
<td>Afghanistan</td>
<td>9.2</td>
</tr>
<tr>
<td>Kuwait</td>
<td>56.1</td>
<td>Saudi Arabia</td>
<td>40.4</td>
</tr>
<tr>
<td>Iraq</td>
<td>87.3</td>
<td>Egypt</td>
<td>47.5</td>
</tr>
<tr>
<td>Qatar</td>
<td>57.2</td>
<td>Syria</td>
<td>35.5</td>
</tr>
</tbody>
</table>

Source: OECD Economic Outlook No. 85, June 2009

Saudi Arabia and other developing countries that have similar political regimes in the region, such as Kuwait, Qatar, and Egypt, have a high percentage of government
involvement in economic activity. These governments, due to political conditions and institutions, are responsible for providing a wider range of social and educational services.

Investigating the validity of Wagner’s law in a group of countries might give indications of the nature of growth and the development processes in the countries of this group. The macroeconomic statistics of Saudi Arabia and historical trends in its government expenditure show a tendency toward increasing state activities. This issue is one of the subjects to be investigated empirically in this project.

2.4 Public Finance Models and Public Expenditure Growth

The aim of this section is to present an historical review of public finance theories and their development. Starting with the early stage, during the intellectual movement in Europe, it was commonly believed that the government’s role would diminish through changing human needs and the economic evolution of humanity. These views were shared by several leading French and German social scholars, including Karl Marx. Moreover, the classical economic theory originated by Adam Smith paid attention to secular trends towards growth in public expenditure (Tarschys, 1975).

Growth in government activities has been a concern of most societies since the early nineteenth century. Since that time, there have been several attempts to formulate a workable theory of government that could be used to predict changes in government sector size. The earlier contributions concentrated on building a complementary relationship between economic growth and government expenditure, but such explanations have been beset by difficulties.
It has been argued for several years that governments have the most important role in developing social and political life. It was assumed that government actions reflect private consumers’ preferences, which ignores an important feature of most political systems, as well as the problem of finding ways to induce consumers to raise their preferences for public goods and services (Peacock, 1979).

Empirically, such illustrations have some difficulties in regard to structural shifts in government expenditure and thus for the period of changes, as well as in coping with changes in the relative importance of different types of government as public spenders. Peacock and Wiseman (1967) paid more attention to the role of suppliers of policies in their Displacement Effect Hypothesis. Their discussion includes government involvement in promoting policies for votes and the role of bureaucrats as suppliers of specific policy.

The economic theory of public expenditure growth attempts to explain the long-term growth of public spending within the economy. Accordingly, there are two main groups of models that are used to analyse the growth level. First, there are macro models of public expenditure growth that attempt to measure the long-term growth of the total government expenditure or the growth in the size of the public sector relative to GDP. Second, macro models of public expenditure growth attempt to explain changes in particular components of total government spending (Bailey, 1995).

In the early stages of economic development, public sector investment is usually associated with the provision of social services such as infrastructure, health services, roads and transportation, and educational systems. It is argued that this kind of expenditure is necessary to advance the economy to a further stage of growth and social
development. Furthermore, by this stage of economic development, public expenditure is seen as a complementary to the growth in the private sector. Rostrow (1971) and Musgrave (1974) proposed that during all stages of development, market failures may exist and public expenditure can increase the government involvement in order to deal with these market failures.

In order to trace the major contributions in this field and government expenditure approaches, several contributions in public expenditure merit discussion in this section. Since the main thrust of this project focuses on Wagner’s thesis, a quick review of these related theories will be presented:

(i) Wagner's law;
(ii) the displacement effect hypothesis;
(iii) Musgrave hypotheses; and
(iv) the theory of bureaucracy.

2.4.1 Wagner's Law

The first scholar to identify a positive relationship between the level of economic development and the size of public sector was Adolf Wagner (1883, 1893). He believed that an increase in public spending was a natural consequence of economic growth. Wagner suggested three main reasons for increased government involvement. First, industrialisation would lead to a substitution of public for private activity. In an increasingly complex society, public protection is needed in order to achieve regulation over activity and growth. In other words, growth in the private sector creates the need for productive public activities and for maintaining efficiency. Second, Wagner argued that the ability to provide social services, such as education, health services, and
infrastructure projects would make the income elasticity greater for the government than the private sector. This is because modern changes and technologies would increase investment volume, possibly leading to monopolies. Finally, he stated that economic development and changing technology would become more expensive through the private sector, which requires government intervention to control economic and social firms in order to enhance economic efficiency.

Wagner’s law of increasing state activity was a turning point for research into government size and growth. The most important feature of Wagner’s law is that the level of per capita income has an impact on public expenditure. Wagner in his original vision did not clarify whether the increase was to be measured by the absolute level of public expenditure, the ratio of total public expenditure to GNP, or the proportion of the government sector relative to the total economy. In later contributions, several studies have tried to measure the incremental growth in government size by using different measures as an absolute value or proportion. Moreover, some studies involved population density and urbanisation as additional factors that lead to increased public expenditure, in order to maintain the efficient performance of the economy in case of increasing urbanisation.

According to Wagner’s statement (1883), “the law is the result of empirical observation in progressive countries, its explanation, justification and cause is the pressure of social progress and the resulting changes in the relative spheres of private and public economy”. Wagner mentioned financial stringency as a reason that may limit the development process by revenue, but for the long run, he concludes that a progressive nation’s passion for development will overcome financial difficulties.
A number of studies have demonstrated the validity of Wagner’s law in a certain group of countries, such as industrial countries, while in another it was rejected. Time-series analyses of several industrialised countries confirmed the assumption that public spending as a share of GNP tends to increase with the growth of GNP per capita. However, the results are less convincing for the developing countries, whereas some studies (Ansari, Gordon, and Akuamoah, 1997; Iyare and Lord, 2004) state that the law is expected to be valid in developing economies after conceiving Wagner’s propositions.

During the middle of the twentieth century, several studies across developing nations failed to provide evidence of any correlation between per capita income and government expenditure. The most extensive study on that period was by Lall (1969), covering 46 developing countries, which found no significant relationship between GNP per capita and total government expenditure. A United Nations report, World Economic Survey (United Nations, 1967) showed that the level of government tax receipts as a percentage of GDP rose in 18 developing countries, declined in seven, and remained unchanged in the other four. However, as Wagner’s predictions in the early stage concerned only the progressive and industrialised countries, the conditions under which one can expect the law to operate would seem to be under rising income, as well as enhancing technological and industrial institutions. Democratic and stable institutions would also have a strong social and economic role for the government (Tarschys, 1975).

Numerous studies of the development of government spending in different nations have confirmed the assumption of tendentious growth and added new suggestions to its causes. Solomon Fabricant (1952) concluded in his work on US government activity that government expansion was concurrent with economic growth and that greater variance between expenditure sizes for state governments could be explained by variations in
income, urbanisation, and population density. Hook (1962) traced the civil government expenditure expansion in Sweden from 1913 to 1958; the conclusion of the study was that several activities had been moved from the private to the public sector, and that cost increases in such areas were due to new technological inventions.

During the post-World War II period, with stimulus given to economic development and the national income, several authors such as Peacock and Wiseman (1967), Timm (1961), Musgrave (1969), Pryor (1968), and Goffman (1968) paid attention to the core contribution of Adolf Wagner, especially to his so-called “Law of increasing state activity”, which he outlined in a series of publications. Contributions by Gupta (1967), Gandhi (1971), and Bird (1971), followed by other scholars such as Mann (1980) and Abizadeh and Gray (1985) have used modern econometric techniques to exhibit the rawness of earlier attempts at investigating the law.

In the new academic literatures, several different specifications of Wagner’s law have been tested. These specifications attempted to approximate the theoretical variables of state activities and economic growth. There are six commonly used formulations for testing Wagner’s hypothesis and they have been used to investigate statistically the existence of long-run causality from economic growth to government expenditure (Mann, 1980; Demirbas, 1999) have listed these versions as follows: (i) Peacock and Wiseman version (1961); (ii) Goffman version (1968); (iii) Pryor version (1968); (iv) Musgrave version (1969); (v) Gupta and Michas version (1967, 1975); and (vi) Mann version (1980). A detailed empirical specification for each version is presented in chapter three.

Empirically, Wagner’s law has been investigated extensively in the literature, using both time-series and cross-sectional methods. While the argument is that the data did not offer
support for Wagner's view as a kind of general proposition, more sophisticated statistical analyses have been used to investigate the law, as the law itself was open to several interpretations.

The empirical work on the law can be classified into two groups based on the types of econometric methodology. The first group involved the early studies that were performed prior to 1990, which assumed stationary data series and employed simple estimation using Ordinary Least Squares (OLS) regressions to test alternative versions of the law.

The second group comprises the new studies that employed the co-integration technique developed after 1990, to test for a long-run relationship between government expenditure and national income. Early studies of the second group used the Engle-Granger (1987) co-integration technique, whereas more recent works applied the Johansen-Juselius (1992) co-integration technique. Both techniques are reliable based on the nature of the data and span.

The recent studies of Wagner’s law used the Granger-causality test (1987) to determine the direction of the causality between the examined variables. Since the law implies that causality runs from income to public sector expenditure, it is then important to test for unidirectional causality to verify Wagner’s law.

In principal, once the degree of integration of the examined variables has been estimated, it can be determined whether the data are co-integrated. Typically scholars proceed to determine the direction of causation, and this is where the Granger-causality tests are applied (Sideris, 2007). However, the empirical works have revealed different, and sometimes contradictory, results attributed to the differences in statistical techniques.
In summary, Wagner’s law offers a wide range of implications that be analysed with several econometric methods. The law was unspecified empirically, and can be analysed using different econometric models and techniques. Accordingly, six econometric versions of Wagner’s law that have been developed in the literature are investigated in this project. Several studies have made significant contributions to the literature of Wagner’s law, and some of these are summarised in Table 2.3. These studies have been selected to reflect various applications for Wagner’s propositions.

The studies differ in the choice of dependent and independent variables, and also in the choice of time periods, sample countries and the statistical test employed. The table demonstrates the diversity of the studies that have been devoted to study Wagner’s law, and includes Peacock and Wiseman (1961), Musgrave (1969), Bird (1971), Gandhi (1971), Goffman and Maher (1971), Abizadeh and Gray (1985), Mann (1980), and Ram (1992). It should also be mentioned that the measures used in some studies shown in Table 2.3 are not explicit, but have been suggested as examples to provide better comprehension.

2.4.2 The Displacement Effect Hypotheses

One of the best representatives of the financial perspectives of Wagner’s law is Alan Peacock and Jack Wiseman’s study (1967) of government expenditure in Great Britain. They developed a new version in the search for explanations of Wagner’s law. Their hypotheses were derived from a study of British data between 1890 and 1955. They claim that it gives an approach to the subject that might be equally applicable for different countries or periods.
### Table 2.3 Significant Contributions to the Literature on Wagner’s Law

<table>
<thead>
<tr>
<th>Reference</th>
<th>Country</th>
<th>General Specification</th>
<th>Measure of Government</th>
<th>Dependent Variable</th>
<th>Result</th>
<th>Statistical Test</th>
<th>Independent Variables</th>
<th>Date Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock and Wiseman (1961)</td>
<td>UK</td>
<td>$G = f(Y)$</td>
<td>GE plus transfers at constant prices</td>
<td>$G$</td>
<td>Support specification</td>
<td>Inspection and calculation</td>
<td>$Y$, proportion of $N$ living in urban areas</td>
<td>Time-series</td>
</tr>
<tr>
<td>Musgrave (1969)</td>
<td>UK</td>
<td>$\frac{G}{Y} = f\left(\frac{Y}{N}\right)$</td>
<td>GE plus transfers at constant prices</td>
<td>$\frac{G}{N}$</td>
<td>Support specification</td>
<td>Multiple regression</td>
<td>$Y$, proportion of $N$ living in urban areas</td>
<td>Time-series</td>
</tr>
<tr>
<td>Bird (1971)</td>
<td>Canada</td>
<td>$G = f(Y)$</td>
<td>GE plus transfers at current prices</td>
<td>$G$</td>
<td>Support specification</td>
<td>Inspection and calculation</td>
<td>$Y$</td>
<td>Time-series</td>
</tr>
<tr>
<td>Gandhi (1971)</td>
<td>African countries</td>
<td>$G = f(Y)$</td>
<td>GE consumption at current prices</td>
<td>$G$</td>
<td>Variable elasticity</td>
<td>Multiple regression</td>
<td>$Y$</td>
<td>Cross-section</td>
</tr>
<tr>
<td>Reference</td>
<td>Country</td>
<td>General Specification</td>
<td>Measure of Government</td>
<td>Dependent Variable</td>
<td>Result</td>
<td>Statistical Test</td>
<td>Independent Variables</td>
<td>Date Source</td>
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</tr>
<tr>
<td>Goffman and Maher(1971)</td>
<td>Six Caribbean countries</td>
<td>$G / Y = f(Y)$</td>
<td>$GE$ plus transfers at constant prices</td>
<td>$G / Y$</td>
<td>Inspection and calculation</td>
<td>Inspection and calculation</td>
<td>$Y$, proportion of N living in urban areas</td>
<td>Time-series</td>
</tr>
<tr>
<td>Abizadeh and Gray(1985)</td>
<td>Countries grouped as poor, developing and developed</td>
<td>$G / Y = f\left(\frac{Y}{N}\right)$</td>
<td>$GE$ plus transfers at current prices</td>
<td>$G / Y$</td>
<td>Support specification</td>
<td>Multiple regression</td>
<td>$\frac{Y}{N}$, time, proportion of $Y$ generated in primary sector, energy consumption per capita, Exports + imports / $Y$, Currency / money supply</td>
<td>Pooled</td>
</tr>
<tr>
<td>Mann (1980)</td>
<td>Mexico</td>
<td>$G / Y = f\left(\frac{Y}{N}\right)$</td>
<td>$GE$</td>
<td>$G / Y ; , ; G$</td>
<td>Support specification, Not statistically significant</td>
<td>Multiple regression</td>
<td>$Y ; , ; \frac{Y}{N}$ proportion of $Y$ in manufacturing sector, Proportion of $Y$ generated in primary sector</td>
<td>Time-series</td>
</tr>
<tr>
<td>Ram (1992)</td>
<td>UK</td>
<td>$G = AY^\beta$</td>
<td>$GE$ at current, constant prices, GE consumption</td>
<td>$G$</td>
<td>Support specification, Constant elasticity</td>
<td>Multiple regression, Box-Cox</td>
<td>$Y$</td>
<td>Time-series</td>
</tr>
</tbody>
</table>
The work of Peacock and Wiseman focuses on the citizens’ opinion of a tolerable tax burden as a decisive restrictive factor limiting growth in public spending. Their hypotheses suggested that under normal conditions there is no substantial increase in government expenditure. However, after inspecting public expenditure data, they noted that over time public expenditure reaches peaks which usually coincide with periods of wars and crisis. To explain this, they used what they called ‘The Displacement Effect’ (Figure 2.1), in which (the line graph) of the ratio of public expenditure and gross national product looks higher during war periods, which related the causes of the growth process to a change in the majority attitudes toward taxes. The corresponding increase in public expenditure will not be temporary, as the new levels of government expenditure and taxation are accepted by the voters, the public sector size will remain stable at a higher level until the next shock.

**Figure 2.1 Peacock and Wiseman Hypothesis**

![Graph showing the Peacock and Wiseman Hypothesis](image)
In contrast to Wagner’s law and the increasing state activities model, Peacock and Wiseman introduced suppliers into the public expenditure determination process. There are three basic propositions underlying the Peacock and Wiseman analysis. First, governments can find profitable ways to consume available funds. Second, for citizens, higher taxes are usually considered unacceptable. Finally, governments should be responsive to citizens’ needs. From these basic tenets, Peacock and Wiseman derived the key concept of a tolerable burden of taxation.

As a result, the displacement effect appears as a viable theoretical approach to the secular trend of government spending, comparable to Wagner’s law. However, Peacock and Wiseman adopted Wagner’s propositions, and formulated one of the versions of Wagner’s law, which assumes a unidirectional relationship between public spending and income. This functional relationship will be discussed in detail in chapter three, in which the six versions of Wagner’s law are illustrated.

### 2.4.3 Musgrave Hypotheses

Like Wagner, Musgrave (1969) was concerned with the changing role of the public sector during the development process, but he differed from Wagner in the sense that he measured the development by per capita income. Moreover, Musgrave developed a more detailed model to be used to examine the issue of public growth. He assumed that all resources are divided between public and private use in an efficient manner. Then he asked the specific question: “as per capita income rises due to increasing productivity … what will happen to the public goods share of total output?”
Musgrave classified possible factors that affect the public share of resources into three main categories: (i) economic; (ii) conditioning, such as changing in technology and demographic factors; and (iii) social, cultural and political factors. More consideration was given to the effects of changes in the economic factors. Thus, he distinguished between government consumption, investment spending, and government transfers.

In addition, he considered these changes at various levels of development. For social and cultural factors, he concluded that these factors might change with development in ways that encouraged increased demand for transfers, but he argued that the impact of such changes on public sector share is no more predictable than changes in the economic factors. However, according to Musgrave, there are several reasons to expect a positive correlation between levels of public expenditure and per capita income. Finally, most of Musgrave’s work concerns changes in the relative size of the government.

There are limited tests of Musgrave’s views on changes in government consumption and goods with income levels that seem to have produced a measure of empirical support. Musgrave’s overall conclusions are still valid, but it might be difficult for them to rise to the level of an expenditure law.

2.4.4 The Theory of Bureaucracy

Modern versions of Wagner’s law used the notion of individual utility-maximisation as a necessary component of the explanation. Niskanen (1971) stated that government expenditure may rise disproportionately with growth as a result of the utility-maximising behaviour of bureaucrats, who might seek to expand the size of their bureaus at the expense of efficiency.
Wittman (1989) suggested that one way of testing this prediction requires the estimation of the optimum size of the public sector; determining this optimum size, however, is a formidable task. Niskanen presumes that bureaucrats would like to expand budgets, because their utility levels depend on their remuneration, prestige, power and promotions, all of which are direct functions of their budgets. However, connecting bureaucratic theories to Wagner’s law in its simple version is a more difficult task than expected.

Muller (1989) argues that bureaucrats’ power arises from their ability to maximise the quantity and price of their activity, which he assumes is a function of the size and complexity of the budget itself. Measuring the growth of the budget can be assumed to rely on the absolute size of the bureau. The arguments consistent with this are that outside monitoring difficulties grow with the size of the bureau, and that the larger the bureau, the more insiders there are working to influence the size of the bureau. However, there are no obvious measures of bureaucratic strength in societies.

Tullock (1974) considered the extent to which bureaucrats convert their power into higher wages for employers. He noted that bureaucratic political power could diminish when the number of bureaucrats is falling. While bureaucrats cannot represent a model of economic morality where their behaviour is considered superior, they are sure to maximise their utility and sell their skills by providing administrative advice to the producers of government policies. However, bureaucrats have to depend on politicians for reward budgets. In this case, politicians have the ultimate power in regard to the budget. Bureaucrats are more in the position of sole suppliers of particular administrative and technical advice.
2.5 Keynesian Theory

The Keynesian proposition offers an integrated role for government involvement in the economic development process. It considers one of the most important illustrations that depend on the foundation of Wagner’s law. Keynes (1936) assumed that several forms of government expenditure may contribute effectively to economic growth. This relation suggests that increasing government expenditure tends to enhance aggregate demand, which in turn increases income, reduces unemployment, and stimulates economic growth due to multiplier effects.

According to Keynesian theory, the level of output and employment in the economy is determined by aggregate demand, or what he called the Keynesian effective demand principle. This would occur when an exogenous agent, such as the government, interfered to increase demand and lead the economy to a higher level of employment. Therefore, the causality in the Keynesian theory runs from government expenditure to national output. Public expenditure from this point of view can be seen as an exogenous variable or as a government instrument that can be used as a tool to enhance economic growth.

The Keynesian proposition on public expenditure is not a theory of government growth. It does not assume that government interference in economic activity would adjust its relative size. Keynesian theory in general can be seen as a theory of economic stabilisation. During the great recession of the early 1930s, the Keynesian formulation considered public spending as a tool that can be used positively to enhance economic growth, through multiplier effects on aggregate demand. A level of government expenditure has been assigned a crucial role in managing economies, particularly in the developing countries.
In the aggregative Keynesian model, four groups of decision-makers can create fluctuations in prices, income, and employment: firms are responsible for determining the demand for physical investment and imports; households determine the consumption level; and foreigners determine the demand for exports. In the course of carrying out optimisation, government will instantly influence the demand variable, which is controlled by other groups and in ways that will be reflected in the budget (Peacock, 1979).

In summary, in Keynesian theory, public expenditure is an important policy instrument to stimulate the level of equilibrium output. Based on this analysis, the causation runs from government expenditure to economic output. Thus, government expenditure will be considered as an important fiscal policy variable for the government or economic policy makers, and can also be used to enhance economic growth. However, validation of Keynesian theory on government expenditure is, at most, supported by the developing countries, which have based their economies mostly on the growth of the public sector, followed by growth of national income.

2.6 Empirical Studies on Government Spending and Economic Growth

In this section, it is beneficial to shed light on the empirical question about the correlation between government expenditure, fiscal policy, and economic growth. The effects of government expenditure on economic growth in the long run have been tested empirically since the early nineteenth century. Modern econometric techniques have been employed in recent studies to investigate the nature of this relationship. In addition, some older studies are still valid due to their core contributions to this field.
In the academic literatures, some studies have found that economic growth would be negatively affected by rising government expenditure, which supports the hypothesis that rising government expenditure is associated with a decline in economic growth. On the other hand, a positive relationship is found between the two variables, which support the hypothesis that government expenditure is positively associated with economic growth. However, it is worth mentioning that one feature of contemporary economies is the continuous growth within the public sector in developed nations as well as developing nations, regardless of the nature of their economies and political systems.

This project investigates the effects of increased social and economic growth on government expenditure. Hence, the following section will be divided into three subsections devoted to exploring recent studies that investigated Wagner’s propositions in different parts of the world, and will be designed as follows: first, studies that tested Wagner’s propositions in developed nations are presented. Second, studies that tested the validity of Wagner’s propositions in developing nations. Finally, since similar economic, social, and political systems are predominant in the Gulf Cooperation Countries (GCC), which include Saudi Arabia, the last subsection introduces some studies that were devoted to test Wagner’s law in these countries.

2.6.1 Recent Studies of Wagner’s Law in Developed Nations

In a study using Swedish data for the period 1861–1990, Henrekson (1993) criticised previous studies that purported to test Wagner’s law, since these studies failed to test for stationarity when examining the data properties, even though it is evident at first glance of the figures that a positive correlation can be proposed. In Henrekson’s test, the variables used were government civilian exhaustive expenditures as a share of GDP, and
real GDP per capita in Sweden. By examining the data properties, he found that the null hypotheses, which state that both the government spending variable and the income variable are $I(1)$, cannot be rejected. This violates the usual stationary assumptions of time-series analysis. Since the two variables are not co-integrated and cannot be defined in a way that would allow the coefficient of interest to become a coefficient on a mean zero stationary variable, the regression specified in the levels of the variable will lead to inconsistent estimates.

Henrekson concluded that there is no significant long-run relationship between government expenditure and economic growth, despite the observation that both government expenditure share and real income per capita increased dramatically during that period in Sweden. Thus, he pointed to the need for an additional explanation for the sudden increment in government expenditure after World War II in the share of GDP, which cannot be traced back to a structural change in the rapid growth of real income. He assumed that the support for Wagner’s Law found by other researchers may be spurious or misleading.

Huang (2006) examined government expenditures in Taiwan, one of the most recent industrialised countries, over the fiscal years 1966–2002. He follows the approach of Mann (1980), and employs six different versions of Wagner’s Law to test its validity in Taiwan. The study used data for government expenditure ($G$) and gross domestic product (GDP). Further, for the sake of consistency, the data was converted to real terms based on the fiscal year. It is unlike previous studies in that the GDP price deflator is not used to convert total government expenditure into real terms. Instead, the study divided total government expenditure into two categories: transfer payments (which includes social expenditures, subsidies, and capital formation) and government expenditure for
consumption (which includes expenditures on national development, health, education general administration, and defence expenditures). Transfer payments are deflated by using the implicit price deflator for personal consumption expenditures, whereas government expenditure for consumption is converted to real terms by using the implicit price deflator for government consumption expenditure. The real values for GDP are generated by using the GDP deflator.

Shin and Smith (2001) used the bounds test for co-integration, and the newer Granger non-causality test (Toda and Yamamoto, 1995) to examin Wagner’s law. The bounds test results for six versions of Wagner’s law indicate that a long-run relationship between output and government expenditure does not exist. Results from the newer Granger non-causality testing procedure show that there is no causal relationship between government expenditures and output, indicating that the empirical results do not support Wagner’s law in the case of Taiwan. This result clearly points to independence between output and government expenditure in Taiwan. Neither the Keynesian view, which states that government expenditure can be used as a fiscal policy to support economic growth, nor Wagner’s propositions, which state that government expenditure growth is a consequence of the national output growth, is supported by the study findings.

It can be proposed that the significance of this study is that it focuses on converting nominal values into real values by using different price indexes. This might be useful for future research and applications when defining the government expenditure variables to study Wagner’s law in the case of Saudi Arabia. It is noticeable from the government’s expenditure figures that this division can impact the analysis significantly.
A study of five different versions of Wagner’s law was examined empirically by Chang, Liu and Caudill (2004) using annual time-series data for 10 industrialised countries over the period from 1951 to 1996. These countries include three of the emerging industrialised countries of Asia Taiwan, South Korea, and Thailand and seven industrialised countries: Australia, New Zealand, Japan, South Africa, Canada, the US and the UK.

The authors believe that this work has an advantage over previous other works in two aspects. First, it considered the stationarity properties of the data, where the order of integration is examined empirically using the Augmented Dickey Fuller (1981) test and the Kwiatkowski, Phillips, and Schmidt (1992) test. Second, the hypothesis of a long-run co-integration relationship between income and government spending is examined by using the method suggested by Juselius (1988) and Johansen (1992).

The causality test showed that a unidirectional Granger-causality runs from economic growth to government expenditure for the newly industrialised countries of South Korea and Taiwan. In addition, results from the industrialised countries of the US, Japan and the UK support Wagner’s law. The five remaining countries in the study, Australia, New Zealand, Canada, South Africa, and Thailand, showed no causal relationship between income and government expenditure.

In a study by Lamartina and Zaghini (2008), the authors used a panel co-integration analysis of the joint development of government expenditures and economic growth in 23 OECD countries for the period of 1970–2006. The study used both cross-sectional and time-series dimensions of the sample for 23 OECD countries. Since nominal and real definitions of the used variables have been argued by several authors, this study
employed a baseline analysis in which per capita GDP and general government expenditure are used in nominal terms. In addition, in parts of the study, Lamartina and Zaghini check for changes in the definition of both economic development and public expenditure. In the later stages, the authors also examined variables in real terms.

In the empirical literature, Wagner’s law has been tested in reference to both government spending as general government total expenditure, and economic development as GDP per capita. This study used a panel estimation technique of pooled mean group regressions which was proposed by Persan, Shin, and Smith (2001). The methodology employed, as claimed by the researchers, is suitable to be placed between two other estimation procedures when dealing with panels with large cross-sectional and time-series dimensions.

The study found evidence of a structural positive relationship between public expenditure and per capita GDP, which is consistent with Wagner’s law. The long-run elasticity of government expenditure with respect to GDP per capita is larger than one, which suggests that the increase in income per capita is associated with a slightly more than proportional increase in government expenditure. Furthermore, the study concluded that the correlation is higher in most countries with lower per capita GDP. It is also useful to mention that the most noticeable characteristic of the analysed period was the strong development of government activities with respect to economies.

Hung Liu, Ed Hsu, and Younis (2008) focused on the relationship between federal expenditure and GDP growth in the US using time-series data for the period of 1947–2002 to identify the causal relationship between economic growth and public expenditure. Aggregate data as well as disaggregate data were used. The study divided
federal expenditure into five categories: (i) national defence expenditure; (ii) human resources; (iii) physical resources; (iv) net interest payments; and (v) other functions.

They researchers employed two kinds of analyses; first, they investigated the long-term relationship between GDP growth and these five federal expenditure types by plotting their trends. Second, they explored the causal relationship between growth rates and different subsets of the federal expenditure items.

The findings of the study postulated that total expenditure does cause GDP growth, which is compatible with Keynesian theory. On the other hand, GDP growth does not cause an increase in total public expenditure, which is incompatible with Wagner’s Law. The test for causality between GDP and the five categories of federal expenditure found that there is no causal relationship between national defence expenditure and GDP growth. Furthermore, unidirectional causality was found between GDP and human resources expenditure and other expenditures. Therefore, the study suggested that the federal government should consider reallocating national defence expenditure to human resources expenditure.

The policy recommendation that was suggested by this work is that the US government should stimulate investment in human resources expenditure and other expenditures. This means that the US government should assume that economic growth is the single most important factor on the government agenda.

Since Wagner’s law did not mention subcategories of government expenditure when it was first proposed, studying aggregate values might generate a different outcome, which might support the study findings. However, it might still be argued that disaggregating
government expenditure is significant and useful, if one takes into consideration the political institutions and government structure and authorities.

In a study of Wagner’s law and Baumol’s cost disease in Austria, Neck and Getzner (2007) examined Austrian data for the period from 1956 to 2002. The growth of government spending is confirmed by the descriptive statistics and the econometric analysis the authors employed. Baumol’s disease assumes that the growth of the public sector is at least partially determined and influenced by higher price increases of public goods and services. The hypothesis of Baumol’s cost disease assumes that labour productivity grows at a below average rate in the public sector, with a parallel development of wages. This means that expenditures for public services increase without an adequate growth of output.

In this working paper, the examined variables were measured as a proportion of nominal government expenditures to nominal GDP. On the other hand, the study also used real values to examine the relationship between the variables.

Investigating the time-series relationship of the nominal government expenditure ratio, per capita GDP, and relative prices of public and private goods suggests positive correlations between these variables. The empirical test for the data properties shows that all variables are integrated of order one; i.e., they are non-stationary in levels but stationary in first differences. Furthermore, the econometric co-integration tests could not find any relationship between government expenditures as a proportion of GDP on one hand, and GDP per capita and relative prices on the other hand. Since co-integration is an important precondition to apply OLS estimations of structural models in levels, regressions were run in this case with variables in first-difference form.
The analysis shows that the growth of the nominal government expenditure ratio is influenced significantly by increases in public sector costs, which is consistent with Baumol’s cost disease, while per capita income shows a negative influence. This negative influence does not fulfil Wagner’s propositions, which state that an increase of government expenditure ratio follows increases of per capita income.

The influence of the income variable has been explained by the influence of the short-term fluctuations also known as the business cycle. The study indicated that the level of unemployment exerted a positive influence on government spending. Moreover, tests of the validity of the so-called fiscal illusion hypothesis are confirmed successfully. The study also suggested the influence of other variables related to political economic determinants of the government spending ratio, such as the political ideology of the parties in government, the business cycle, and the form of the government.

Kumar, Webber, and Fargher (2009) present an empirical investigation into the validity of Wagner’s law for New Zealand for the period from 1960 to 2007. The study compared the obtained results using two measures of output general national product (GNP) and general domestic product (GDP). The autoregressive distributed lag (ARDL) bounds test technique was used to select the optimal model. To test the data properties, the Augmented Dickey Fuller (ADF) was applied for both levels and first differences and with an intercept with trend. In addition, a Phillips Perron (PP) test for stationarity properties was applied to ensure the robustness of the results. According to the stationary tests, all variables indicated that the level variables are $I(1)$ and their first differences are stationary.
The co-integrating relationship between the real government spending share of GDP (GNP) and real GDP (GNP) per capita was investigated by applying the ARDL bounds test to select the optimal model. The results suggest that there is a co-integrating relationship between the share of government spending in national output as a dependent variable and per capita income as an independent variable.

To confirm the robustness of the results, they used an extra four methods of co-integration: Engle and Granger, Phillip Hansen’s Fully Modified OLS, and Johansen-Juselius. All five methods of estimation provided results consistent with the original co-integration test, which revealed a long-run relationship between the examined variables. The results also imply that inclusion of either GDP or GNP in the model provides fairly consistent results, suggesting that open trade might have a small effect on the share of government expenditure in income for New Zealand. Furthermore, Granger-causality tests were used to define the direction of the causality between the examined variables.

In the short run, it was found that the share of government expenditure in income Granger-causes per capita income and vice-versa, but in the long run statistically significant evidence is reported in favour of per capita income Granger-causing the share of government expenditure in income, which is consistent with Wagner’s propositions. The study suggested that, with the global financial recession, the New Zealand government should be cautious about its expenditure in the present and the future, since extra public spending is unlikely to cause higher income for the economy in the long run. In consideration of the public debt in New Zealand, which standing at an estimated 23 per cent of total GDP in 2008, any further increases would imply that future government spending may increase debt servicing.
A study by Gray and Abizadeh (1985) covered the period from 1963 to 1979 for 55 countries; the findings supported Wagner’s law for wealthier nations, but not for the poor nations. Another study by Ram (1987) covered the period from 1950 to 1980 for 63 countries, and found limited support for Wagner’s law. Serletis and Afxentiou (1996) examined six European countries France, Italy, Germany, Belgium, the Netherlands, and Luxembourg for the period from 1961 to 1991 and found no evidence to support Wagner’s propositions. Ansari, Gordon, and Akuamoah (1997) studied three African countries Kenya, Ghana, and South Africa and also found no evidence supporting Wagner’s law. Such examples and others are mentioned elsewhere in this project to reflect the validity of Wagner’s propositions in different nations.

The method of testing Wagner’s law empirically for both developed and developing countries using both time-series and cross-sectional data was commonly adopted in the academic literature. Interestingly, the resultant output was different among the countries studied. By following alternative econometric techniques, the next subsections explore different studies in both developed and developing nations.

2.6.2 Recent Studies of Wagner’s Law in Developing Nations

Demirbas (1999) investigated the statistical existence of a long-run relationship between public expenditure and GNP using data for Turkey for the period 1950-1990. He used time-series analysis to explore this relationship. The findings postulated that both public expenditure and GNP variables were stationary in first differences; i.e., integrated of order one, I(1). Accordingly, he applied co-integration tests and Granger-causality tests on the data; the results showed no co-integrating relationship between the variables. Furthermore, testing six versions of Wagner’s law did not reveal any long-run
relationship between the examined variables, indicating that there is no evidence to support Wagner’s law. This result has been reached despite the growing tendency to increase public expenditure in Turkey.

It can be assumed that the conclusion reached depends on decisions about how public expenditure should be distributed among competing categories. Thus, other factors, such as political processes, interest group behaviour, and the specific nature of Turkish development might be considered as alternative explanatory variables for increasing the size of public expenditure. Furthermore, Demirbas mentioned the power of state economic enterprises as an effective factor, and also that if they were included in the definition of public expenditure, the conclusion of the study might change.

In another study for Turkey, Halicioglu (2003) presented an empirical analysis of Wagner’s law over the period 1960–2000. The study used modern time-series econometric techniques to test Wagner’s law in the case of economic development and government expenditure increases. He adopted the functional form developed by Musgrave (1969) to investigate the relationship between the share of government expenditure in GDP and real per capita income, and considered these variables to be the most appropriate measures.

Halicioglu used two empirical techniques to test the data; one of these, OLS, is based on a classical econometric technique. The resulting output of this technique provided supportive evidence for Wagner’s law. The second technique is based on modern time-series econometric analysis; it utilises the Unit Root test, co-integration analysis, and the Granger-causality test. The estimation based on this technique did not support the validity of Wagner’s law.
The source of this apparent contradiction has been related to the fact that modern time-series econometric techniques are highly sensitive to the time span used in the estimation, because the modern technique requires more observations. Furthermore, the functional form used was not compatible with the modern technique. Co-integration and causality tests were not consistent with the proposed implications of Wagner’s law. Finally, Halicioglu proposed that Wagner’s law holds in the case of adopting the traditional form, with a positive long-run relationship between the share of government expenditure in GDP and real per-capita income growth. However, he argued that further analysis on the basis of the Granger-causality test has revealed that Wagner's law does not hold for Turkey and the direction of flow has been rejected.

Public spending voracity in 51 developing countries has been examined by Akitopy, Clements, Gupta, and Inchauste (2006). In this study, the voracity effect, known as a positive shock to income leads to a more than a proportional increase in public spending, even if the shock is expected to be temporary. A test of short- and long-run behaviour of government expenditure with respect to national output has been employed using the error correction model. Evidence of voracity in government expenditure and cyclical ratcheting, which refers to the tendency for the government spending-to-GDP ratio to rise during recessions and to be only partially reduced during expansions, has been supported by the study for 51 developing countries. The tendency for public expenditure to grow over time has been reported accordingly.

Econometrically, the scholars were unable to apportion the increase in government spending separately to voracity and cyclical ratcheting. However, they found that the main components of government spending are procyclical in about 40 per cent of all countries, the level of which varies across expenditure categories.
In addition, the study shows that output and government expenditure are co-integrated, for at least one of the spending aggregates, in 70 per cent of the studied countries, implying that there is a long-run relationship between government expenditure and economic growth, in line with Wagner’s propositions. These results contradict a portion of the empirical literature, which at most provides weak support for Wagner’s law for developing countries, while there is somewhat stronger support for industrial countries.

Regarding the policy implications, three conclusions have been drawn from the study. First, the short- and long-run elasticity of capital spending in relation to GDP is relatively high, suggesting that government expenditure capital budgets rise proportionally during economic upswings, and fall disproportionately during economic downturns. This suggests that spending on capital projects and on the military is more prone to corruption than spending on health, education, and other social programs. Second, there might be implications for fiscal policy or fiscal responsibility laws, particularly in those countries that limit the discretion for procyclical fiscal policy during economic development in the business cycle. Third, in most countries, there is a long-term relationship between the level of output and government expenditure. In these countries, short-run cuts in spending or surges in government outlays will eventually taper off as government spending brings the GDP ratio back to its long-term average.

For future research, the study suggested the following issues: first, it would be useful to study the empirical analysis in depth by distinguishing between good times and bad; and second, the analysis can be developed by assessing the short- and long-run movements of revenues and fiscal balances.
In an empirical study for Thailand, Sinha (2007) investigated the validity of Wagner’s law using time-series data for the period 1950–2003 for government expenditure and GDP. He used the Ng-Perron (2001) unit root test to show that all variables were $I(1)$. Further, he postulated several advantages of using the test, such as its suitability for small samples.

In the Toda-Yamamoto study (1995), Granger-causality tests were performed and found that causality does not exist in both directions between GDP and government expenditure. Sinha also used the Autoregressive Distributed Lag approach to co-integration. The analysis showed no evidence of co-integration at the 95 per cent level of significance, but some evidence of co-integration was found when he used the 90 per cent level of significance in some cases. He concludes that there is insufficient evidence to support Wagner’s law for Thailand.

Narayan, Prasad, and Singh (2008) examined Wagner’s law for Fiji using time-series data for the period 1970 to 2002. They used the Johansen (1988) test for co-integration, and they found one co-integrating relationship between national output and government expenditure. They used five different long-run estimators, namely OLS, Fully Modified OLS, Autoregressive Distributed Lag (ARDL), Dynamic OLS, and Maximum Likelihood (ML) estimators to investigate the impact of national income on government expenditure. More than one estimator was used to confirm the validity of the results before drawing conclusions.

The authors found that all five estimators provided highly consistent results regarding the impact of national income on government expenditure. The elasticity of public expenditure was more than unity, which implies that increases in income were associated
with higher percentage increases in government expenditure. The finding that government spending increases by more than the overall increase in national income is consistent with Wagner’s law; hence, they conclude that in the case of Fiji, there is clear evidence in favour of Wagner’s law.

They concluded that the results sound promising for Fiji despite its macroeconomic conditions and existing trends in the allocation of government expenditure. For example, total debt for Fiji was around 68.8 per cent of GDP, and debt-servicing expenditure over the previous five years averaged 10 per cent of total government expenditure. They proposed that the government would have to alter its expenditure allocations substantially towards debt servicing, and attempt to achieve considerably higher economic growth.

Afzal and Qaisar (2010) examined the validity of Wagner’s law in Pakistan for the period from 1960 to 2007. They divided the study period into four time periods to account for structural breaks. Population growth and fiscal deficit were also added to the functional form of the law. The study adopted the form that relates the share of government expenditure in GDP with per capita income, which is the Musgrave (1969) version The dependent variable, real government expenditure, has been replaced by four expenditure categories, namely: (i) government expenditure on general administration, (ii) defence expenditure, (iii) development expenditure, and (iv) expenditure on interest payments.

The statistical tests used in the study were the Dickey-Fuller test to evaluate the data properties, the Johansen-Juselius (1992) and Johansen (1995) co-integration tests to find any long-run relationships between the examined variables, and the standard Granger-causality test to attempt to determine the direction of causality between the variables, if causality should exist.
The relationship between aggregate government spending and per capita income for the four periods does not hold except for the period of 1960-1972. In the case of government expenditure subcategories, Wagner’s law was found to work for expenditures on administration for the period 1981–2007 and 1991–2007. For development expenditures, however, Wagner’s law held only for 1991–2007. Nevertheless, it held when including fiscal deficits to the original model for the period 1981–1991. However, a unidirectional causal relationship between fiscal deficits and public spending, as well as between income and fiscal deficits, has been found. Moreover, population growth was found to be caused by economic development. Afzsal and Abbas (2010) argue that the validity and strength of Wagner’s law and its applications depends on how the law has been approached by scholars, particularly the nature of the data, span of the study, functional form and the estimation method.

2.6.3 Recent Studies of Wagner's Law in the GCC

In a study for Saudi Arabia, Abdel-Rahman and Barry (1997) investigated the operation of Wagner's law by testing the hypothesis of the long-run elasticity of the share of government expenditure and its consumption and investment components. They used a bivariate model to estimate all parameters of the study period (1970-1991). Total government expenditures, consumption, and investment were used as a measure of government size. Real GDP and real GDP per capita were used as a measure for economic development and to define the output.

The overall results pointed to significant short-run responses of the government expenditure shares to variations in income. Furthermore, evidence was found for a strong relationship between economic growth, public investment, and government consumption,
but the relationship was less evident for the latter. The authors suggested that the government consumption component may have served to weaken the evidence recorded in the overall government share of the economy.

In general, the study considered the effects of oil-price fluctuations on the government expenditure component during the entire period, which might be a good example to apply as a base for the empirical work of this study, using modern techniques such as co-integration analysis and Granger-causality tests to examine the relationship between the relevant variables.

Fanaso and Wang (2001) investigated the dynamic relationship between both government current and capital expenditure and non-oil GDP growth. The study covered five out of six GCC countries, including Saudi Arabia, Bahrain, Oman, Qatar, and United Arab Emirates, using a data for the period from 1980 to 1999. For real values, the consumer price index was used to convert the nominal values to real values. The multivariate co-integration and error correction model are used to examine this relationship.

The econometric methodology used in the study presents a different view of the role of the non-oil GDP growth process in these countries; it discerns the dynamic causality between non-oil growth and government expenditure in a Granger intertemporal manner rather than in a structural manner. In fact, it helps to distinguish between short-run movements among the variables (the short-run causality) and the long-run causality.

The study findings indicated that over the long run, non-oil GDP growth is negatively related to government capital expenditure in four countries. Only Saudi Arabia shows
a positive correlation with current and capital expenditure. Moreover, the outcome of the Granger-causality test does not strongly support a conclusion that changes in government current and capital spending tended to slow or enhance non-oil GDP growth in these countries. A strong unidirectional relationship running from government spending to non-oil real GDP was not found, indicating that the countries of the GCC can cut spending without negative effects on non-oil growth.

In the short run, the empirical results indicate that current expenditure has a negative effect on non-oil economic growth, while capital expenditure has a positive impact. These results reflect the changing structure in government expenditure for the period prior to the oil era. During the period of non-oil activities growth, government capital outlays experienced a downward trend. However, the study findings recommended that governments choose carefully between competing expenditure categories, because of diverse effects on non-oil activities growth in the long and short term.

The dynamic structure of the relationship between economic growth and public expenditure was tested by Al-Faris (2002). He applied the technique of unit root, cointegration, and Granger-causality for the countries of the Gulf Cooperation Council (GCC) Kuwait, Saudi Arabia, Qatar, Bahrain, the United Arab Emirates and Oman using annual data for the period 1970–1997. The study was designed to test both the framework of the Keynesian hypotheses and Wagner propositions.

Al-Faris focused on the GCC countries for two reasons. The first concerns the similarity in the economic growth patterns of these economies. It is believed that these countries share many features and characteristics. Moreover, fiscal policy in these countries
follows similar developments and patterns in the international oil market. Second, he wanted to address the lack of similar studies on the GCC economies.

The study showed the existence of a long-run relationship for all the GCC countries between national income on one hand and total public expenditure and its components, current and capital spending, on the other. The empirical evidence also supported, in most of the GCC countries, Wagner’s proposition that economic growth is a predictive factor of the expanding role of government expenditure. Only Bahrain showed that the causal relationship between these two variables was bi-directional.

Despite the prominent role played by governments in these countries, the author believes that these results, which refute the Keynesian hypotheses, may have been reached for three reasons. First, a large part of public expenditure in GCC countries is devoted to defense, wages, and subsidies. Such government expenditure outlays are not considered growth-promoting activities. Second, it is widely believed that growth gains from public expenditure depend on the efficiency of spending, and that this expenditure efficiency cannot be compared to that of the private sector. Third, the impact of public expenditure on social activities such as education, health services, and infrastructure might not be immediate, and is felt only after a time lag.

For Saudi Arabia, Al-Hakami (2002) examined the empirical causal relationship between government expenditure and GDP over the period 1965–1996. He used time-series analysis to examine the statistical characteristics of the variables. The co-integration test showed that the two time-series were co-integrated when examining the trend and pattern of the causal relationship between the two variables. The finding also indicated a causal relationship running from GDP to government expenditure. Hence, the result implies that
government expenditure in oil states is based on GDP and is ineffective as a policy tool, which supports Wagner’s law. However, the study pointed out the limitations of its result and recommended further research in this area.

In another study for Saudi Arabia, Al-Obaid (2004) investigated the nature of the direction and the relationship between economic growth and public expenditure by testing the six versions of Wagner’s law. He used data for GDP and government expenditure for the period 1970–2001 to monitor Saudi government expenditure growth. His emphasis was on how Wagner’s law helps to understand the nature of Saudi Arabian economic growth. By investigating the time-series properties, he found that government expenditure and GDP variables were integrated of order one. According to the test result, a co-integrating relationship between the variables was found to exist. In addition, he used the Granger-causality test to determine the direction of the causality. He found uni-directional causality runs from GDP to government expenditure, which is suggested by Wagner’s law. The study findings show that the Saudi Arabian experience supported Wagner’s law during the study period.

By utilising aggregate annual time-series data for the period 1971–2001 for Kuwait, Saudi Arabia, Oman, and Bahrain, Al-Hasoon (2005) examined the long-run causal relationship between real government expenditure and real domestic product in terms of GDP and non-oil real GDP. He estimated the six versions of Wagner’s law using the co-integration analysis and the error correction model. The conclusion of the study was in favour of Wagner’s law for Saudi Arabia and Bahrain only.

Al-Hasoon assumed that these countries tend to enhance the role of governments to support increasing demand for public services such as education and healthcare. On the
other hand, the study pointed out that Keynesian theory holds for Kuwait and Oman, which revealed mixed evidence for the oil states.

Al-Hasoon concluded that there is a tendency for these countries to invest in their infrastructure in order to accelerate the development process. The results of the study indicated that some GCC countries are less dependent on government spending than others. He also suggested some useful strategies to boost economic development in these countries, such as using oil revenues as a tool for spending and stimulating economic growth and development, and reducing the government’s role and size to enhance and support the ability of the economy to function effectively. Moreover, he suggested that the government should adopt policies to decrease dependence on crude oil revenues via diversification of production within the economy. In GCC countries, finding different sources of income can be an important strategy for maintaining economic growth.

In a study for Oman, Al-Fazari and Asutay (2007) examined the impact of government expenditures on economic growth to investigate the causality between economic growth and government expenditure within Wagnerian and Keynesian relationships using time-series data covering the period from 1971 to 2002. The authors employed a framework based on Landau (1986) and Barro (1990). They categorised the government expenditure either as productive (investment) or unproductive (current expenditures, foreign aid, debt-service payments, and participation and support expenditures). They also used the value of exports as a share of GDP as a variable in testing causality.

The study found, in general, an inverse relation between government investment expenditure and external debt-service payment, while there was no evidence of causality running from government expenditure (disaggregated into capital and current) to GNP or
vice-versa. Similarly, no persuasive evidence was found for a causal relationship between government capital expenditure and GNP per capita.

They attributed the revealed result to the extent that the increasing government expenditure in developing countries such as Oman is associated with an increasing fiscal deficit, which suggests the inability of developing countries to raise enough revenue to finance higher levels of expenditure, thereby leading to negative effects on economic growth. As a result, the impact of government expenditure on economic growth in developing countries may depend on how they allocate government spending. They suggested providing greater attention to the components of public expenditure and their overall impact on growth in the long run.

The most recent study of Wagner’s law for Saudi Arabia that explains public expenditure growth and social welfare was performed by Wijeweera and Garis (2009). The authors agree that Wagner suggests a robust model of public spending. Accordingly, they believe that different governmental regimes can be considered and tested. The authors contended that studying the role of Wagner’s law on the economy of Saudi Arabia, a wealthy nation, would be comparable to investigating Western industrial economies.

To measure the relationship between public expenditure and economic growth, the study adopted four common models of Wagner’s law, each of which employed a different set of variables. Model 1 used income and real government expenditure, Model 2 used per capita income and government expenditure, Model 3 used per capita income and per capita government expenditure, and Model 4 used national income and government final consumption expenditure. The GDP deflator is used to obtain real values.
The results neither confirmed nor refuted Wagner’s law. Two of the four models showed a positive long-run relationship between government expenditure and economic growth. However, income elasticity was not large enough to suggest that the growth in government expenditure was more than the growth of the national income. The results only suggested that growth in Saudi national income increased government spending.

This finding implies that as a fast-growing nation, Saudi Arabia can expect its government expenditure to rise in the next few years. Moreover, the resultant econometric outcomes suggested that government expansion seems to be responsible for increases in social and public welfare. When the government expenditure components are examined, it appears that the public welfare in Saudi Arabia has experienced significant gains attributable to funds generated from national output increases.

However, the objective of this study is to investigate the long-run relationship between economic growth and government expenditure, partially testing the validity of Wagner’s law in Saudi Arabia as an oil-based economy, and the indirect impact of oil price fluctuations on overall economic growth as fluctuations in production and prices are reflected in the government budget.
Chapter Three

A Critical Review of Alternative Formulations of Wagner’s Law

3.1 Overview

Wagner’s approach (1893) and particularly his so-called “law of increasing state activities” has been discussed extensively in the literature. Moreover, this law has been subjected to intensive econometric investigations. Many different interpretations for Wagner’s propositions have been assumed and investigated, since he did not define any actual measures for the law to be tested empirically.

The different interpretations of Wagner’s propositions did not reduce its power. Methodology debates took place among economic researchers over the specific techniques that should be applied when testing the law. Hence, selection of different dependent and independent variables when formulating a functional form contributed to the different interpretations of Wagner’s propositions.

From that point, the theoretical approach combined with the statistical tests employed, six common versions of Wagner’s hypothesis emerged through publication in the academic literature. The typology and the primary contributions to Wagner’s law might provide a clear view of Wagner’s thesis, but it might be unfair to suggest that one of these versions is better than the others to illustrate Wagner’s thesis. However, institutional and cultural differences between nations significantly impact the analysis and make it more complex.
Empirically, in the process to differentiate, the debate shifted more towards appropriate testing procedures and away from the meaning of Wagner’s propositions. This debate is ongoing, since new data analysis and econometric techniques are continually being introduced to allow for further tests of Wagner’s law.

This chapter sheds light on alternative formulations for Wagner’s law and measurement issues. The discussion explores the six common versions currently used in the academic literature to test Wagner’s propositions. Ultimately, the chapter reviews some criticisms involving issues ranging from estimation techniques to the selection of the appropriate variables to include when testing alternative versions.

3.2 Six Common Versions of Wagner’s Law

In the literature, there are six commonly used formulations for testing Wagner’s hypothesis. These common versions aim to investigate statistically the existence of long-run causality from economic growth to government expenditure. However, there are no objective criteria that can be used to decide which of the six versions is the most appropriate, since the explanation of the causes of growth is limited by several factors (Demirbas, 1999; Mann, 1980). These factors can be defined by the complementary relationship between economic growth and public services, and may include social, political, and cultural behaviours related to consumer preferences for public services.

The widely accepted forms of Wagner’s law cited in the literature are: (i) Peacock and Wiseman (1961); (ii) Goffman (1968); (iii) Pryor (1968); (iv) Musgrave (1969); (v) (Gupta, 1967; Michas, 1975); and (vi) Mann (1980). In the subsections that follow, there will be an exploration of these six common versions of Wagner’s law. For each version, the author defined the variables to be used.
3.2.1 The Peacock and Wiseman Version

This is the traditional version proposed by Peacock and Wiseman (1967). The formulation of the traditional version of Wagner's law has used the following form

\[ GE = \alpha + \beta \cdot GDP \]  

(3.1)

where \( \alpha \) and \( \beta \) are the equation parameters, \( GE \) is total government expenditure in constant prices, and \( GDP \) is also in constant prices. Peacock and Wiseman considered total government expenditure as a dependent variable and \( GDP \) as an independent variable. To verify Wagner’s propositions, it is assumed that government expenditure should grow at a faster rate than \( GDP \). Moreover, Peacock and Wiseman emphasised that variables should be expressed in nominal terms and not in real terms. For this purpose, they argue in favour of utilising the same deflator for both series (Peacock, 1979).

3.2.2 The Pryor Version

Pryor (1968) formulated a new concept of Wagner’s proposition. He used government expenditure for consumption as the dependent variable, arguing that transfer payments, subsidies and capital formation should be excluded from the definition of government expenditure. Moreover, he classified government expenditure into two categories: government expenditure for national security and government expenditure for consumption. However, Pryor was concerned with the latter type of expenditure, as he believed it to be the major component of overall government expenditure. He also assumed that this type of public expenditure tends to increase dramatically during the development of the economy due to its significant contribution to the development process. Pryor formulated the second version of Wagner’s law as follows:
\[ GE = \alpha + \beta \, GDP \]  

(3.2)

where \((GEC)\) denotes government expenditure for consumption and \(GDP\) denotes gross domestic product.

If the elasticity of expenditure for consumption is less than unity, this implies that government expenditure for consumption only increases proportionally with increases in GDP. The policy makers should be more concerned about and interested in the investment components of public expenditures, particularly those directed to capital and infrastructure projects.

### 3.2.3 The Goffman Version

In his formulation, Goffman (1968) used per capita GDP as an independent variable to define economic growth instead of using aggregate GDP. He argued that in the early stages of economic development and growth, public sector activity will increase as a result of increases in per capita GDP. Essentially, as a nation experiences economic growth and development, an increase must occur in the activities of the public sector, and the ratio of increase in public expenditure would exceed the rate of increase in output per capita. Accordingly, Goffman’s version is written as:

\[ GE = \alpha + \beta \left( \frac{GDP}{N} \right) \]  

(3.3)

where GE is total government expenditure, and \( \frac{GDP}{N} \) denotes per capita GDP.
3.2.4 The Musgrave Version

The Musgrave (1969) version examines Wagner’s law by using per capita gross domestic product as an independent variable, and the ratio of government expenditure to GDP as a dependent variable. Musgrave attributed the expanding ratio of government expenditure to GDP to the rising size of the per capita GDP.

According to Musgrave (1969), “ever since Wagner expounded his law of the expanding scale of state activities, economists have speculated on its validity and the underlying causes. The proposition of expanding scale, must obviously be interpreted as postulating a rising share of the public sector or ratio of public expenditure to GDP in the context of the development of a country from low to higher per capita income.”

The Musgrave version can be written as:

\[
\left( \frac{GE}{GDP} \right) = \alpha + \beta \left( \frac{GDP}{N} \right) 
\]

(3.4)

where \( \left( \frac{GE}{GDP} \right) \) denotes the ratio of government expenditure to GDP, \( N \) denotes the total national population, whereas \( \left( \frac{GDP}{N} \right) \) is the per capita GDP.

It seems that Musgrave’s version places particular emphasis on the effects of public expenditure on non-economic factors that might affect development, and holds them responsible for a great proportion of the increases in government spending observed during the development process.
3.2.5 The Gupta and Michas Version

This version uses a per capita measure of government expenditure and GDP. Government expenditure per capita is the dependent variable, and per capita GDP is the independent variable. Accordingly, the formulation of the Gupta (1967) and Michas (1975) version can be written as follows:

\[
\left( \frac{GE}{N} \right) = \alpha + \beta \left( \frac{GDP}{N} \right)
\]

(3.5)

where \( \left( \frac{GE}{N} \right) \) is per capita government expenditure, and \( \left( \frac{GDP}{N} \right) \) is per capita GDP.

3.2.6 The Mann Version

The formulation of Mann (1980) can be regarded as a modification of the traditional version. Mann used the share of total government expenditure in gross domestic product as a dependent variable. Moreover, he argued that the share specification mostly generates a closer approximation of Wagner’s hypotheses. Thus, this version assumes that an incremental rise in the share of total government expenditure in GDP can be expected to occur after a rise in GDP. Consequently, this version takes the following form:

\[
\left( \frac{GE}{GDP} \right) = \alpha + \beta \ GDP
\]

(3.6)

where \( \left( \frac{GE}{GDP} \right) \) denotes the share of government expenditure in GDP, and GDP is the gross domestic product.
The Mann version of the share of government expenditure in gross domestic product assumes that this measure is more consistent when examining the pattern of government expenditure during development.

3.3 Measuring Government Size

The government sector can be defined in different forms when formulating Wagner’s propositions. Some writers used government expenditure for consumption as a dependent variable, excluding transfer payments, subsidies, and public enterprise. Other writers (Peacock and Wiseman, 1967; Goffman, 1968) used wider definitions in which all expenditures are included when defining government expenditure. The argument for a narrower or wider definition of public expenditure includes defending the exclusion of these variables, as suggested by Pryor (1967). However, Wagner’s thesis traces links between economic development and government activity without mentioning the details of which government activities are affected.

Goode (1984) has identified several factors that seem to have contributed to the rise of government expenditures in relation to national income in industrial countries. He further explained that these factors may also operate in developing countries. Nevertheless, the observed inaccuracy of Wagner’s law is clear when we show the omission of factors that might significantly contribute to the growth of the size of the public sector; e.g., public utilities, which are considered part of the public sector. Furthermore, it is not clear whether Wagner, when he mentioned the growth of the state, was referring to the growth in the ratio of government expenditure to GDP, or to the absolute size of the public sector.
In earlier investigation, Peacock and Wiseman (1961) drew attention to the fact that before making any decision about changing the real size of government in relation to GDP, changes in both series should be expressed in constant prices. They argue that there is no reason for using the same deflator for both GDP and government expenditure, assuming that the latter includes transfer payments and subsidies, as well as other inputs for all economic activities. They also argue that most studies of long-term expenditure growth have ignored this issue. However, the conclusion of a statistical finding by Peacock and Wiseman for a period from 1890 to 1955 showed that the divergence between values expressed in current and constant prices was slight (Peacock, 1979).

Even though methodology and statistical difficulties may be encountered, the debate over whether to use nominal or real price series continues. The problem of the used index also arises when deflating private and public output. Beck (1981) shows that total government expenditures measured in constant prices grew more rapidly than GDP in industrial countries, whereas government consumption grew less rapidly than GDP using current prices.

The six versions of Wagner’s law used both wide and narrow definitions of the public expenditure when interpreting Wagner’s propositions. Out of these definitions, there are three main measures of government expenditure as the dependent variable. The first measure is total government expenditure. The second is the government expenditure share of output. The third is government expenditure per capita. Peacock and Scott (2000) argued that we can identity 14 possible measures of government expenditure that can be used to study Wagner’s law. These measures can be disaggregated according to economic and political conditions.
In the next subsection there appears a discussion of the three main measures of government expenditure: i) total public expenditure; ii) the share of government expenditure in output; and iii) per capita government expenditure. All three measures have featured extensively in the literature, and it would be beneficial to determine the factors that might affect each of these categories.

### 3.3.1 Total Public Expenditures

Total public expenditure has been used as a dependent variable to measure the growth of the public sector in multiple studies of Wagner’s law (Peacock and Wiseman, 1967; Gupta, 1967; Bird, 1971; Abizadeh and Gray, 1985; and Murthy, 1993). The issue becomes an argument when some interpretations of the law feature a concept of public expenditure that includes not only capital formations and public enterprises, but transfer payments as well. It has been proposed that the growth of government spending is limited by the capacity to finance this spending. Hence, this constraint is more binding in less developed countries than in more developed ones, since spending in the former is limited by fiscal capacity and policy, whereas in the latter group it responds primarily to the demand for services and transfers. Therefore, it seems reasonable to differentiate between these two groups of countries.

Both the demand for services and the supply of resources contribute to the growth of government expenditure in all economies. It shall be noted that Wagner’s propositions of the law of increasing state activity clearly indicate that public enterprises must in some way be included in the definition of the public activities. It might still be argued, however, that whatever procedure one uses for aggregating public finance with public utilities, trends in public finance still merit further investigation (Goode, 1984).
Out of the six versions, the measure of total government expenditure as a dependent variable in formulating Wagner’s law has been adopted by Peacock and Wiseman (1967) and Goffman (1968). Whereas Pryor (1968) excluded transfers and capital formation when he defined public expenditure, other versions used the proportional definition.

Peacock and Scott (2000) argued that, when deciding how to aggregate general government expenditure, one should consider the following obstacles which might affect this approach:

i) aggregating government expenditure with other components of the public sector that are also components of the GDP, such as public enterprise gross investment. This is because the current accounts of public enterprise include different components of expenditure on intermediate goods that cannot be aggregated with national income components in a suitable manner;

ii) aggregating the value added components in the public sector would result in a representation of the wages component plus government building rents. This seems likely to result in a higher weighting than in (i) to public enterprises; and

iii) adopting, an alternative measure of both the public sector and of economic activity, for instance, expressing public employment as a proportion of total employment or the total labour force.

It is suggested that the scholar should not be dogmatic about the measurement choice, as long as the chosen measure shows the difference made by the inclusion of public enterprises to the expression of Wagner’s law.
3.3.2 The Share of Government Expenditure in Output

The share of the government expenditure (GE) in output is adopted by Musgrave (1969) and Mann (1980) in their revisions of Wagner’s law. They generally argue that the share of total government expenditure in national income tends to rise over the development period. Musgrave’s interpretation (1969) refers to Wagner’s law as an expression of the growth of the relative size of the public sector. He proposed that as per capita income in an economy grows, the relative size of the public sector will also grow. The factors that determine those movements in the ratio of public sector to GDP were explained in terms of structural factors, such as political and economic factors, that take into account changes in the social structure of the economy.

However, Musgrave remains ambivalent on whether tendencies towards an increasing or decreasing public investment share in GDP will contribute at a relatively late stage of development. Hence, further studies in later stages e.g., Mann (1980) used the ratio measure with no distinction between expenditure on consumption, investment, and transfer payments.

Expressing government expenditure as a percentage of community output may introduce further confusion because of differences in measures of community output. National product may be expressed either as a gross or net amount. Furthermore, it may be valued at market prices or fixed prices.

Another criticism of expressing public expenditure as a share of the national output is the probability of showing an upward trend according to GDP growth, even though public expenditure had actually decreased. However, it has been argued that this measure is the most meaningful of the trends in public expenditure. The share of public expenditure to
GDP can be used as a measure if one takes into consideration the factors that might affect public expenditure figures, such as tax allowances or cash payments, and factors that affect national output figures, such as taxes on goods and services. Furthermore, for any analysis, a more detailed disaggregating is required for public expenditure, since the relevant methodology and data analysis for testing Wagner’s law differ according to the interpretation of the law (Sandford, 1992).

3.3.3 Per Capita Government Expenditure

The per capita measure can be obtained by dividing total expenditure by total population. It should be expected that government expenditure will tend to rise when the total population increases. This measure has been used by Gupta (1967) and Michas (1975), since they had adopted this form of government expenditure when testing Wagner’s law.

Sandford (1992) argues that this measure can be inadequate because expenditure may vary according to the age distribution and, to a lesser extent, to the gender composition of the total population. Thus, a high percentage of old people likely to incur expenditure on pensions, health care and supplementary benefits, while the large proportion of young will increase education and leisure costs.

Gupta and Michas assumed that a rising per capita GDP has a positive impact on per capita government expenditure. Gupta argued that elimination of the effects of population and price changes always causes specification problems, since population changes usually consist of not only changes in total numbers, but also because of changes in the composition of the population, both of which are likely to impact government spending.
In Gupta’s formulation for Wagner’s law it is assumed that per capita measurement is the most significant proxy for both government expenditure and economic output. If the problem of the deflation method is taken in consideration, it is likely to account for equal measure for the computation of both government spending and national output, since government purchases are one of the main components of national product. The definition of government expenditure in this case includes not only the purchases of goods and services, but also transfers and subsidy payments. It is certainly true that in recent decades, different countries have followed different paths in relation to relative size of the general government sector. However, since there is no single correct measure to use, the choice between alternatives being determined by the tasks to be investigated and the issues to be addressed (Saunders, 1992).

### 3.4 The Independent Variable

National income has been used as a dependent variable in studying Wagner’s law by different scholars to measure the state’s progress. The choice of an appropriate measure of the national income for a particular country includes the availability of data for that particular country and statistical expediency. Hence, different measures of the independent variables have been used when testing Wagner’s hypothesis in different countries.

It is proposed that the impact of changes in income is affected significantly by several factors. Wagner also proposed population as an important factor. This is why several versions employ per capita GDP as an independent variable; e.g., Goffman (1968), Gupta (1967), Michas (1975), and Musgrave (1969). They assumed that as population increases, the level of activity associated with the public sector would also have to expand.
On the other hand, the traditional version of Peacock and Wiseman (1967), the Pryor version (1968), and the Mann version (1980) have adopted total GDP as the independent variable. These studies cannot properly separate income from other national characteristics and public opinions that influence the growth of government spending. National income is considered the main proxy that defines the growth of the national output according to these versions.

Another key issue in the literature concerns the use of real versus. nominal values for GDP. The debates on this issue are similar to the debates over government spending measures. This leads to further discussion concerning the choice of index to be used when deflating the nominal values. The specific issue is related to the deflation of the government purchases of goods and services which are, at the same time, one of the main components of the GDP.

Peacock (1979) argued for using more than one deflator for GDP and government expenditure. He assumed that the output could be a divergence between the variables expressed in current prices and variables in constant prices. While this divergence was very slight for a study covering the period from 1890 to 1955 for the U.K., in later stages, Peacock indicated that the divergence is now more significant. However, eliminating price effects is important when studying Wagner’s law, since the observed increases in nominal values of GDP ratio might be due to a rise in the relative real output of government or a rise in its relative price (Beck, 1985). The influence of using the series in real values to measure GDP was suggested by Gupta (1967) in version three of Wagner’s law.
3.5 Testing And Specifications

To test Wagner’s law, various dependent and independent variables can be combined together in different ways, each of which is based on a theoretical interpretation of the original Wagner propositions. In each case, the key issue is to investigate if the specification is supported by the data obtained.

Despite the fact that more sophisticated statistical techniques are now available, this does not mean that simple statistical tests are no longer appropriate. For instance, significant non-linearity or discrete changes in the data series can be investigated simply by discovering the data pattern. Recently, the new statistical approaches in multiple regression analysis have addressed new concepts and techniques, which allows for better outcome and interpretations. The co-integration analysis and the Granger-causality tests are the most popular methods, but that may not be apparent in the simple regression tests.

To verify the validity of Wagner’s law, the direction of causality should be obtained according to the co-integration test. Hence, co-integration analysis attempts to identify the existence of a long-run relationship between the examined variables. Furthermore, it could be considered as being consistent with Wagner’s opinion that there was not necessarily just a cause-and-effect relationship between economic development and government activities.

In summary, the method is straightforward: after testing the data stationary of each variable, it can be decided whether the series are co-integrated. The next step is to determine the direction of causation, and then the Granger-causality test is applied.
To decide whether Wagner’s law applies, determine the direction of causality of the co-integrated variables, which should run from economic development to the government sector. Wagner’s hypothesis implies that it would have been satisfied with the co-integration analysis alone, while several interpretations in the literature have focused on whether the statistical methods were applied properly to the data series. Thus, the original theoretical hypothesis might become lost when discussing the most suitable methodology (Peacock and Scott, 2000).

The data span used to test Wagner’s proposal can vary from country to country, depending on whether it is an advanced developed nation or a developing one. In addition, different examples are given to compare the validity of the law in different countries. Moreover, several authors concentrate on the kind of development postulated by Wagner in order to offer a justified test. While others are interested to know whether the law has more extensive applications, Wagner did not necessarily forecast a smooth continuous growth in public activities over time, but he recognised the ability of temporary shock constraints to limit public expansion in the short-run.

It is well-known that social change over the long run usually contains periods of stability followed by discrete shock, which is brought about by resistance to change. Most researchers seem to have missed this point when testing Wagner’s law. Others might have denied this cyclical behaviour if relative public sector increases were observed only for specific periods of time with plateaus in between. These observations do not appear to violate Wagner’s propositions, but these are often difficult to test based on regression analysis, when testing a short-run data span (Gemmell, 1993).
3.5.1 A Consideration of Specification Issues

The discussion of the limitations that have been imposed on testing Wagner’s law has focused on some important difficulties in applying modern testing methods to Wagner’s law. A notation on the nature of the time-series analysis, measuring the social progress phenomenon and the concept of government growth, should also be considered, since it might differ in several societies. Earlier studies (Gupta, 1968; Musgrave, 1969) have tested Wagner’s hypothesis using cross-sectional data for different countries rather than time-series analysis. Cross-sectional studies might not have yielded a reliable result, because these maintain the implicit assumption that parameters controlling the various countries are similar. This is not a realistic assumption, however, due to different geography, sizes, economic conditions and levels of political institution (Afzal and Abbas, 2010).

In criticising these types of studies, Bird (1971) argued that such tests are completely irrelevant, since Wagner’s propositions did not factor in any analysis between countries reflecting differences in political and economical conditions. Accordingly, the studies should be based on time-series analysis, rather than on a cross-sectional analysis of countries. However, recent studies that used the same data set for both cross-sectional and time-series analyses to test Wagner’s law tended to propose consistent results for both methods (Ram, 1987). Moreover, the paucity of time-series data ensures that the validity of this application will remain controversial and difficult to demonstrate.

The changes in the ratio of government expenditure to GDP can be examined using either nominal or real values of the variables. If the relative prices remain unchanged, the choice is irrelevant. Most studies until the mid-1980s used nominal ratios. Beck (1985) argued that development is regularly associated not only with increases in per capita
incomes, but also with increases in the relative prices of public goods. Thus, the observed increases in nominal public spending or GDP ratio might be due to a rise in the relative real output of government, or a rise in its relative price.

To the extent that relative price increases have occurred, the income elasticity calculated from nominal ratios will be overestimated, which increases the propensity to accept Wagner’s law, when it should be rejected. However, most recent studies used real data when testing Wagner’s hypothesis.

To test for income elasticity, the argument of holding constant all other factors determining the government expenditure is usually maintained. This requires that any change in income will lead to a more than proportional change in demand for government activities. Several empirical tests of Wagner’s hypothesis failed to hold the *ceteris paribus* condition. This can be attributed to the inability to hold any other relevant factors constant in the true analysis. In the literature, which is filled with methodology flaws, interpretation of such results is hampered further by the habit of some scholars of using the term income elasticity only when referring to a relationship between government and income variables derived from a simple bivariate regression. However, testing for the validity of Wagner’s law has been extensively differentiated in the literature, according to the various measures and hypotheses assumed by scholars when testing the law.

The modern technique in the statistical analysis implies the stationarity assumption of the data series. Testing the data properties is one of the most important aspects when testing the validity of Wagner’s law. Thus, except for more recent studies after 1990, most researches have adopted the assumption of data stationarity and have proceeded to test
Wagner’s hypothesis with the OLS method. However, if the series follow a random or stochastic trend, the time-series may have a unit root and not be stationary. In such cases, spurious and inconsistent relationships might be generated out of the test, which might lead to a false conclusion (Ericsson, 1992).

The causal impact can also range extensively across different societies. Several hypotheses proposed by Wagner are assumed to contribute toward transforming social progress into government growth, and it would support the law. Wagner (1893) identified some of the factors that have a direct effect on the rate of economic and social progress; e.g., urbanisation, population density, and the increasing level of demand. These factors have an impact on government size and growth by affecting banking services, regulation administration services, social services, and government enterprises.

The flow of various hypotheses proposed by Wagner is depicted in Figure 3.1. Transmissions of social progress in to government growth underpin Wagner’s law. Proper tests of these hypotheses would require information on the “direct effects” in Figure 3.1 and their correlation, at least, with government growth.

Apart from testing the income-elastic argument, however, almost none of the other links between (2) and (3) in Figure 3.1 has been rigorously examined. Most tests of Wagner’ law therefore turn out to be either tests of the income elasticity, such as first two versions, or merely tests of Wagner’s prediction that social progress, proxied by per capita income, will be associated with relative growth of government activities as in the Gupta, Musgrave versions. However, several important elements in Wagner’s explanation of government growth therefore remain untested.
Figure 3.1 Theoretical Schema for Wagner’s Law

<table>
<thead>
<tr>
<th>Economic/Social Change</th>
<th>Direct Effects of (1)</th>
<th>Effects of (2) on Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation, Increased $\Delta$ Incomes and Social Progress</td>
<td>$\Delta$ Complexity of Econ. Relation</td>
<td>Monetary/banking services Law and other (Protective) services</td>
</tr>
<tr>
<td></td>
<td>$\Delta$ Urbanisation</td>
<td>Regulatory and Communication Services</td>
</tr>
<tr>
<td></td>
<td>$\Delta$ Population Density</td>
<td>Education Social services Transfers</td>
</tr>
<tr>
<td></td>
<td>$\Delta$ Demand for Income Elastic Goods</td>
<td>Government Enterprises Non-tax revenues</td>
</tr>
<tr>
<td></td>
<td>$\Delta$ New Industries with Economic of Scale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\Delta$ Progressive Taxation</td>
<td></td>
</tr>
</tbody>
</table>

Source: The Growth of the Public Sector, Norman Gemmell
Chapter Four

Economic Background of Saudi Arabia

4.1 Overview

The Kingdom of Saudi Arabia has witnessed a dramatic rise in the rate of economic and social development during the past few decades, but the country had undergone many changes prior to this point. The rate of development was more obvious in certain sectors, such as the education and social sectors. These changes were designed to achieve several socio-economic objectives. These objectives included completion of basic infrastructure, raising the standard of living of citizens, developing human resources, diversification of the economic base, and encouragement of the private sector to play an effective role in development. Crude oil and petrochemical industries remain the key to these development processes. However, Saudi Arabia is benefited by its crude oil wealth, gas and mineral resources supplies, and (with foresighted planning) it can be positioned to become a major player in all three of these sectors. The development process cannot be achieved without strategic alliances and integration with other nations.

In this chapter, a general view of Saudi Arabia’s position within the global economy, beyond being a major supplier of crude oil, is discussed. Six main themes are covered. The first theme addresses some characteristics of the Saudi Arabian economy. This includes an economic overview, a cultural background, and consideration of the impact of oil wealth on the economic structure. Second, there are some key issues that are taken into consideration, and these are usually part of the discussion when forming the
development structure. These issues include diversification of the economic base and the dualistic nature of the economy. Third, discussion about the composition of Saudi Arabia’s GDP, including both the oil and non-oil sectors, is provided. Fourth, different sources of government revenues, which have been divided into oil and non-oil revenues, are explored. Before ending, economic development, the industrial development path and factors affecting the final outcomes are discussed. Further, the discussion explores the five-year sequent development plans and economic performance. Finally, necessary conditions for economic growth in Saudi Arabia are explored.

4.2 Characteristics of the Saudi Arabian Economy

Saudi Arabia was unified in 1932. At that time, the economy depended primarily on agriculture, livestock, and commerce. Subsequently, there were no significant industries, and the rate of unemployment was very high. Infrastructure projects were poorly executed and insufficiently financed by foreign aid.

Ten years later, oil was discovered and became a commercial commodity during the mid-1940s (Assah, 1969). Oil prices and export quantities have since kept increasing and fluctuating dramatically. These dramatic changes had a serious impact on the Saudi Arabian development process, as well as on the culture and education of its people. Oil revenues have been used to build huge infrastructure projects, such as modern roads, harbours, airports, and educational institutes. However, oil became the main source of income and foreign exchange, and it still contributes a large proportion of Saudi Arabian GDP. Despite that, the government continues to invest in developing the oil refining and petrochemical industry, as well as the non-oil sector.
The impact of the oil boom on Saudi Arabia was relatively minor. Oil-producing countries everywhere face similar economic and political circumstances. Economically, oil wealth produced an unhealthy dependence on oil, which in turn left the producing countries vulnerable to unstable market conditions. For various reasons, oil discoveries obstruct efforts to stimulate diverse economies over long periods. Likewise, governments, as the recipients of oil revenues, remain the main providers of social services, salaries, subsidies, and free health services.

Politically, the 1973–1974 oil shock enabled the Saudi Arabian government to use oil revenues to consolidate its grip on political authority and to achieve a sound foundation of economic stability with emphasis on Islamic law (Jones, 2010). However, Askari, Nowshirvani, Jaber, and Jelb (1997) argue that having a rich natural resources endowment does not necessarily lead to sustained growth. As a matter of fact, other oil-rich economies have experienced negative rates of growth and low per capita income.

Since demographic factors are mentioned in Wagner’s proposition, it is argued that a high rate of population growth could either create economic challenges or boost economic growth. Therefore, this factor can be manipulated in an efficient manner. The population and workforce have grown dramatically from 6 million in 1970 to more than 25 million in 2009, with the highest birth rate growth in the world. The population structure of Saudi Arabia has changed markedly; the majority of the population is young, with only 2.5 per cent over 65 years of age and 43 per cent still under 20. Unless the demographic growth trends change, the total population is predicted to reach 40 million by 2025 (Simmons, 2005).
The economic challenges inherent in the country’s population explosion are staggering. To maintain the current standard of living, growth in the number of jobs and economic development activity will need to keep pace with population growth. On a per capita basis, the current GDP is 50 per cent less than that of OECD countries. This population growth increases the demand for social services, and makes sustained new job creation a necessity. All of this is necessary if the population is to become a foundation for enhancing economic growth (Jones, 2010).

The Saudi Arabian economy has been affected significantly by different factors. These include economic and cultural factors that should be considered when policy makers plan for the future. Examples of these factors are human resource development, infrastructure management, technological development, and optimal utilisation of oil and gas resources. Safeguarding Islamic values and cultural heritage are still emphasised from the outset of each plan (Ramady, 2010). The intention is to promote economic development, without importing Western cultures. The internet revolution makes maintaining such social status quite difficult. Furthermore, internet access has broken down barriers and is profoundly reshaping Saudi society. (Rasheed, 2002; Azzam, 2002).

Public interest in establishing Islamic law is crucial in reinforcing Islamic values and high moral principles, which extol hard work, prosperity, peace, and form a solid basis for the development of both the individual and society. The application of Islamic law provides an important mechanism for the redistribution of wealth. It has also helped to reduce inequality of income and wealth. At the same time, other societal and political developments may have exacerbated inequality issues (Wilson et al., 2004).
The government sector in Saudi Arabia is very active in promoting efforts to diversify the economy. To highlight some characteristics of this relationship, three important features of the Saudi Arabian national accounts are explored, which might help to underscore the fact that the Saudi Arabian economy has unique characteristics compared to other economies. First, the importance of oil revenues ensures that the government, through its fiscal tools and mechanisms, continues to exert a very strong influence on both the structure and level of economic activities. Economic activity can be stimulated through direct consumption expenditure, investment, and the provision of long-term subsidies and loans. Second, the degree of Saudi Arabia’s economic interdependence with the rest of the world has risen dramatically as oil revenues have increased. Third, the large share of GDP that is paid to foreign labourers working in Saudi Arabia has boosted the size of remittances sent overseas by foreign workers. This significant outflow has ignited debate in the media about the need to speed up the process of Saudization, a campaign to replace most foreign workers with Saudis. Others argue that establishing a friendly climate for foreign investment might encourage foreign corporations to invest locally (Ramady, 2010).

4.3 Income Diversification

One critical challenge for Saudi Arabia is the predominance of its oil sector, which accounted for 27.8 per cent of GDP in 2009 (Saudi Arabian Monetary Agency, 2010). With oil revenues being the main source of income, reducing dependence on oil wealth remains a key priority. Nonetheless, economic diversification seems easier said than done. The country still relies heavily on hydrocarbon natural resources for economic output and public finance, leaving fiscal policy at the mercy of unexpected developments in the global oil market. During the period 2005–2010, oil prices ranged
from USD 27 to USD 147 per barrel, which created considerable uncertainty in budgetary planning. Since the early 1970s, Saudi Arabia has attempted to embrace diversification of its national economic base as a strategic choice. Because of its negative consequences on the entire economy, continued dependence on substantial oil exports is not a successful long-term strategic choice. Therefore, adopting a large-scale industrialisation and diversification option still appears to be the most viable option, at least on the surface.

It is worth mentioning that in the past three decades, oil revenues were the driving force behind economic development, and these revenues still represent the largest share of Saudi government receipts. At times, non-oil revenues have not been able to keep pace with the expansion of the economy, leading to an increased dependence on the oil sector for general investment and operational expenditures of the budget. Nevertheless, oil revenues, which are non-renewable, would best be invested in renewable capital that could contribute to diversifying the economic base and achieving sustainable development and economic growth. Therefore, it is essential for non-oil public revenues to be enhanced, so that oil revenues can be gradually transformed into productive assets and effective human capital (Ministry of Economy and Planning, 2010b).

Since the development process emphasises enhancing the role of the non-oil sectors of the national economy, a notable success has been achieved, with the GDP share of non-oil sectors increasing from 48 per cent in 1970 to 71 per cent in 2009. However, developing the non-oil sectors to raise the share in both production and exports remains one of the primary development goals. Achieving this goal is a necessary condition for building a modern and stable economy based on a wide range of diversified economic resources, with a high degree of close connection between various economic activities.
The power and size of the non-oil sector and its ability to achieve sustained growth will determine the long-run progress and growth prospects for the entire economy (Ministry of Economy and Planning, 2010c).

### 4.4 Dualistic Nature of the Economy

One major characteristic of the Saudi Arabian economy is the dualistic nature of the economic structure, whereby a traditional sector sits alongside a modern industrial sector. To explain the development process and obstacles it might face, it is necessary to analyse the dualistic nature of the economy and structural relationships between the two sectors. Some economists, including Ranis and Schultz (1988), are concerned about how to shift the overall economy from the traditional sector to the modern industrial sector; in the process, the traditional sector will become dependent on the modern sector. The usual outcome is that the dualistic economy soon becomes a modern industrial economy.

Yamani (1994) argues that the Saudi Arabian oil-based economy differs from the above model, and that the basic issue for such an economy is not the transition from a traditional static sector to a dynamic oil sector. Unlike sectors such as manufacturing, the dynamic oil sector is entirely based upon a non-renewable resource that generates a flow of income at the cost of its own depletion. Accordingly, this type of development creates a problem for oil producers to convert oil resources and growth rates in the same manner, or choose to deplete at a faster rate in order to develop the traditional sector.

In the latter suggestion, the dynamic oil sector acts as the leading sector and growth-enhancer for the entire economy. This is not like the Western models of development,
where the dynamic new sector is essentially an external sector carried by the traditional one, and their interaction will determine future success. For this to be a successful strategy, the government of an oil-based economy should be able to transpose the output of the dynamic sector to development projects in which the state can benefit from a comparative advantage in the dynamic sector.

This strategy has recently been adopted by the energy sector, which tried to diversify and create a high-value petrochemical industry to integrate the dynamic sector into the traditional sector. Government expenditure in this model plays a dominant role, unlike the Western development models where private sector enterprises are generated by natural development forces. Economic development in these countries responds faster when the government is very strong. The Saudi government must enhance the major influential factors that promote economic development.

Transforming a dual structure into a highly integrated economy is not an easy task. In a small open economy such as the Saudi economy, where imports account for a high proportion of GDP, leakages abroad are clearly significant. Expenditure leakages abroad should be reduced over time as the economy grows, and globalisation may slow down this trend as consumption increases for goods that cannot be produced locally.

On the other hand, supply can also facilitate domestic economic integration and reduce the degree of dualism. The crude-oil sector is no longer as isolated, since there are supply relationships with the petrochemical, refining, and energy industries, which formerly emerged beside local service industries. Hence, the constructing supply industries have to be predominant.
To an extent, Saudi Arabian economic growth can be described as unbalanced rather than balanced. This is because oil-related industries lead the way, while commerce and agriculture lag far behind. Industry accounts for approximately half of GDP; the majority of this share comes from oil activities, with small industries and agriculture still accounting for a small proportion of GDP. However, with the strength of the oil sector as an engine of growth, both the services and manufacturing sectors can be regarded as dependent sectors, rather than as potential influencers of economic growth.

It can be concluded that government policy will have to lead Saudi Arabia away from oil dependence to achieve self-sustaining economic growth. Despite noticeable achievements, there has been some degree of government failure, which contributed to a failure of the labour market to achieve equilibrium. In addition, the government did not succeed in ensuring that the supply side of the domestic economy would be able to respond adequately to the demands of the increasing population. The demographic pressures can be turned into advantages, however, if domestic markets grow to become a major engine of economic growth alongside the oil sector (Wilson, et al., 2004).

**4.5 Saudi Arabian GDP**

It is widely believed that GDP reflects the economic quality of life and standard of living in nations. It refers to the amount of goods and services that are produced in an economy over a particular period. On the other hand, few economists would dispute that GDP is not a very accurate indicator of the state of the economy. GDP is not a tool for economic projections, which would make it subjective; it is just a measure of total economic activity, not a measure of the sustainability of growth (Carlin and Soskice, 2006).
Bernanke, Olekalns and Frank (2005) argue that there are two important indicators of macroeconomic performance: (i) rising long-run living standards; and (ii) avoidance of shocks in the short run. Sometimes a country may achieve a temporarily high GDP by over-exploiting natural resources or by misallocating investment. An example is Saudi Arabia’s GDP despite massive government spending over the past three decades, it remains insignificant compared to the world’s largest economies, such as Japan or the US. The reason for its lagging growth compared to industrialised countries is that the US and Japan have highly diversified economies, while Saudi Arabia does not. It is truly an oil-based economy with the resultant strengths and weaknesses. Thus, Saudi Arabia’s economic performance is influenced by two major factors: (i) oil prices and the growth of oil revenues; and (ii) government budgetary policy. Of these two, government budgetary policy determines the relationship between the oil sector and other economic activities, and also determines the course of economic growth in the event of high fluctuations in oil revenues (Ramady, 2010).

Therefore, it can be concluded that oil-rich states can sustain a high GDP without industrialisation, but this high level would cease to be sustainable if oil revenues fell sharply. Economies may experience an economic bubble, such as a housing bubble or stock-market bubble; on the other hand, a low private-saving rate could create the appearance of faster growth due to higher consumption. In that event, the Saudis would be mortgaging their futures in exchange for present growth.

An exploration of Saudi Arabia’s GDP pattern can be illustrated by Figure 4.1. It shows that during the period of the first oil boom, total GDP exhibited steadily growth from 1974 to 1981, when it reached a peak of SAR 540,558 billion. After that, GDP started to decline gradually. From 1982 to 1990, the GDP was affected adversely by the oil-
price recession; in 1985, it reached its lowest point, SAR 408,974 billion. From 1990 to 2003, Saudi Arabia’s GDP increased steadily, fueled by gains in both the oil and non-oil sectors. Since 2005, oil prices have continued to rise to historic levels; this was reflected in the GDP, which rose to SAR 831,356 billion in 2009.

**Figure 4.1 Real GDP and Non-oil Real GDP Trend**

When looking at GDP growth of the non-oil sector (both private and government) over the past four decades, a relatively slow growth is reported compared to the oil sector. Figure 4.1 shows trend information for non-oil real GDP growth. Preliminary data from the Central Department of Statistics and Information (2009b) indicates that GDP at current prices recorded a growth rate of 22.1 per cent in 2008, while the non-oil sector GDP grew by 6.8 per cent and accounted for 39 per cent of total GDP. In 2009, GDP at current prices recorded a decline of 21.2 per cent. This was attributable to the decline in the growth rate of the oil sector due to the global financial crisis; meanwhile, non-oil GDP grew by 5.1 per cent. Non-oil private sector GDP increased by 3.6 per cent, while the public sector as a whole grew by 7.7 per cent. Data on GDP at constant prices shows that it grew by 0.6 per cent in 2009.
In recent years, the non-oil sector has exhibited steady growth, and its contribution to GDP is less erratic than the oil sector contribution. The next subsection presents the composition of Saudi Arabia’s GDP, broken down into the oil sector and non-oil sector. Figure 4.2 shows the contribution of economic sectors to GDP in 2009 (at 1999 prices). The economic sectors here are divided into three broad sectors; oil sector, private sector, and government sector. Both the oil sector and non-oil sector are discussed in detail in the next subsections where a closer breakdown of these activities is presented.

**Figure 4.2 Percentage Contributions of Economic Sectors to GDP in 2009**

![Figure 4.2 Percentage Contributions of Economic Sectors to GDP in 2009](image)

Source: Saudi Arabian Monetary Agency 46th Report

### 4.5.1 The Non-oil Sector

For decades, economic development in Saudi Arabia was marked by the major role played by the oil sector in generating GDP and financing government expenditure to establish infrastructure and to provide public services. To circumvents dependence on oil, the government has persistently focused on diversification of economic activities and on enhancing the role of the private sector. The progress made in these areas is
reflected by the high growth rates of the non-oil sector. Interestingly, non-oil real GDP (at 1999 constant prices) increased at an average annual rate of 5.3 per cent during the period from 1974–2009 (Ministry of Economy and Planning, 2010a). Moreover, despite the sharp fall in oil prices at certain stages, the non-oil sector has shown a steady growth during the past four decades.

A breakdown of non-oil GDP by major economic activity indicates that all economic activities recorded varied proportions of GDP in 2009. The transport, storage, and communications industries recorded 7.1 per cent of total GDP. In contrast, the agriculture, forestry, and fishing industries registered 4.8 per cent, realising a steady increase in growth rates over recent years. Public utilities, including electric power, natural gas, and water registered 1.8 per cent. In recent years, public utilities activity has grown steadily, but has lagged behind population growth. The categories of wholesale and retail trade, restaurants, and lodging, which include a large proportion of imported goods, registered 8.7 per cent. Manufacturing activity (including oil refining) grew by 2.7 per cent in 2009, to register 12.6 per cent of total GDP.

Construction and building activity grew by 4.7 percent in 2009, against growth of 1.5 percent in the preceding year, recording a contribution of 7.2 per cent of GDP. Growth indicators in financial, insurance, real estate, and business services activities, where the private sector plays a significant role and provides a large proportion of job opportunities, represent sensible progress. These activities grew by 3.7 per cent against 2.4 per cent in the preceding year, now accounting for 12.9 per cent of total GDP compared to levels of 5 to 7 per cent in earlier periods.
An associated positive development is the improvement of the structure of both exports and imports. The ratio of non-oil merchandise exports to total exports increased from 8.5 per cent in 2000 to around 15.2 per cent in 2009. On the other hand, the relative share of imported consumer goods has declined, which is an indicator of increased reliance on domestic products and their improved competitiveness (Ministry of Economy and Planning, 2010c).

It is obvious that an increasing focus has been given to the development plans to enhance diversification of the economic base and expand non-oil public revenues. However, the Saudi economy is also becoming increasingly integrated into the global economy, with the ratio of merchandise trade to GDP reaching around 76.5 per cent by the end of the Eighth Development Plan (2009). Over recent decades, foreign trade has witnessed rapid growth, contributing to the acceleration of economic growth at both the macroeconomic and sectoral levels.

### 4.5.2 The Oil Sector and Development

According to the Saudi Arabian oil company (Aramco), the Kingdom’s proven crude oil reserves totalled around 265 billion barrels in 2009, which is equivalent to around 20 per cent of the total world crude oil reserves. In line with the increase in the country’s proven crude oil reserves, crude oil production has risen from 3.8 million barrels a day in 1969 to 8.5 million barrels a day in 2009. These increases in oil production are associated, in different stages, with increases in oil prices, which enabled the oil sector’s real value added to increase. Figure 4.3 shows the rapid rise in oil production, which doubled during the 1960s, and has climbed consistently since the 1990s.
The GDP contribution of mining and quarrying activities, which include crude oil and natural gas, was 44 per cent at current prices in 2009. The oil-refining industry was the major value-adding industry in this field. Its productive capacity has increased four-fold since the 1970s, from 3.8 million barrels per day in 1970 to nearly 10 million barrels per day in 2010. However, oil production contributes 80 per cent of total country exports. Other exports, including petrochemicals, mining manufacturing industries, and agriculture, contribute 15 per cent of total exports, whereas services exports account for 5 per cent of total exports, as shown in Figure 4.4. Over the past two decades, price fluctuations largely accounted for any changes in oil-export revenues, the production level holding relatively stable (Saudi Aramco, 2010).

It is true that oil is the main engine of development. Despite expansion and diversification of the economic base, oil revenues remain the leading source of national budget revenues that finance investment and operational expenditures, as well as the main source of foreign currency needed to finance increased demand for imports. Given the role that oil plays as a major source of energy and as an input to many products,
industrial development has been linked to expansion of the oil industry and its derivatives (Ministry of Economy and Planning, 2010b).

**Figure 4.4 Saudi Arabian Exports Structure (2009)**

![Pie chart showing exports structure: Oil and Gas Exports 80%, Other Exports 15%, Services Exports 5%](image)

Source: National Account Indicators (2009)

The Saudi oil sector can claim many favourable characteristics, including massive reserves, low production costs, high production capacity, and a highly-skilled labour force. Since oil is an exhaustible resource, Wilson et al. (2004) argue that given Saudi Arabia’s large proven reserves and ability to sustain current or higher levels of production for many decades, resource depletion should not be regarded as a serious issue, nor as the prime motivation for economic diversification. Any future problems for the oil sector are likely to be related to the demand side and technological advances impacting other fuels that might emerge as substitutes for oil.

Other questions await future resolution, such as the optimal size of the oil sector in relation to other sectors, the extent to which development can be based on oil exploitation, and the optimal ways to utilise oil revenues to produce economic development and sustained economic growth. Answers to these questions may come
through transformation of these resources into reproducible capital. The authority to pursue such transformation is in the hands of the public sector, which controls the oil sector and assumes responsibility for social and economic development. If the development objective is to increase economic welfare and per capita income, sufficient accumulation of productive capital out of oil revenues should be raised. This can be achieved through the establishment of a sophisticated planning system, and the setting of priorities among the different sectors based on planners vision (Higgins, 1968). Other objectives may include financing a modern efficient infrastructure, as well as an advanced education system and expanded social services.

Nowadays, industrial and economic diversification can serve to move the economy away from being a primary supplier of crude oil. Industrialisation, particularly in the hydrocarbon energy industries, remains central to the development of plans and strategies. In the new millennium, public-private ownership or pure private sectors have been strongly emphasised, and the petrochemical sector remains one of the most promising sectors for the future.

Today, the centre of the Saudi oil industry is at the large, modern petrochemical complexes located in the two modern industrial cities of Jubail and Yanbu. The output of the Saudi petrochemical industries has been impressive over a short period, and today it accounts for around 10 per cent of the world’s total petrochemical output and around 8 per cent of world exports (Ramady, 2010).

In conclusion, the government has been successful in promoting the oil sector and related petrochemical industries, while conserving resources for future generations to the greatest extent possible. The hydrocarbon and mineral industries will remain
government priorities for the long term, despite diversification attempts in the non-hydrocarbon area. However, abundant revenues from oil and gas constitute the leading public financial resource, while exports of crude oil and gas and their downstream products still top the list of commodity exports. Table 4.2 shows per cent distribution of GDP by economic activities at 1999 constant prices.

Table 4.2 Per cent Distribution of GDP by Economic Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Agriculture, Forestry and Fishing</td>
<td>5.2</td>
<td>5.0</td>
<td>4.9</td>
<td>4.9</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>- Mining and Quarrying</td>
<td>28.8</td>
<td>29.0</td>
<td>27.8</td>
<td>26.2</td>
<td>24</td>
<td>24.0</td>
</tr>
<tr>
<td>Crude Petroleum and Gas</td>
<td>28.4</td>
<td>28.7</td>
<td>27.5</td>
<td>25.8</td>
<td>25.8</td>
<td>23.6</td>
</tr>
<tr>
<td>Other</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>- Manufacturing</td>
<td>11.3</td>
<td>11.4</td>
<td>11.7</td>
<td>12.2</td>
<td>12.4</td>
<td>12.6</td>
</tr>
<tr>
<td>Petroleum Refining</td>
<td>3.0</td>
<td>2.9</td>
<td>2.8</td>
<td>2.7</td>
<td>2.7</td>
<td>2.7</td>
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<tr>
<td>- Other</td>
<td>8.3</td>
<td>8.5</td>
<td>8.9</td>
<td>9.5</td>
<td>9.7</td>
<td>9.9</td>
</tr>
<tr>
<td>Electricity, Gas and Water</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.7</td>
<td>1.8</td>
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<td>Construction</td>
<td>6.7</td>
<td>6.7</td>
<td>6.9</td>
<td>7.1</td>
<td>6.9</td>
<td>7.2</td>
</tr>
<tr>
<td>Wholesale and Retail Trade</td>
<td>7.9</td>
<td>7.8</td>
<td>8.0</td>
<td>8.3</td>
<td>8.5</td>
<td>8.7</td>
</tr>
<tr>
<td>Transport, Storage and Communication</td>
<td>5.2</td>
<td>5.4</td>
<td>5.7</td>
<td>6.2</td>
<td>6.7</td>
<td>7.1</td>
</tr>
<tr>
<td>- Finance, Insurance, Real Estate</td>
<td>12.3</td>
<td>12.4</td>
<td>12.5</td>
<td>12.8</td>
<td>12.5</td>
<td>12.9</td>
</tr>
<tr>
<td>Ownership of Dwellings</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Others</td>
<td>5.6</td>
<td>5.8</td>
<td>6.0</td>
<td>6.2</td>
<td>6.1</td>
<td>6.4</td>
</tr>
<tr>
<td>Community, Social and Personal Services</td>
<td>3.7</td>
<td>3.7</td>
<td>3.8</td>
<td>3.8</td>
<td>3.7</td>
<td>3.8</td>
</tr>
<tr>
<td>Less Imputed Bank Service Change</td>
<td>2.1</td>
<td>2.0</td>
<td>2.0</td>
<td>1.9</td>
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<td>Subtotal</td>
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<td>81.1</td>
<td>81.5</td>
<td>80.9</td>
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<td>Producer of Government Services</td>
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<td>17.9</td>
<td>17.7</td>
<td>17.7</td>
<td>17.4</td>
<td>17.9</td>
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<tr>
<td>- Total</td>
<td>98.9</td>
<td>98.9</td>
<td>98.8</td>
<td>98.8</td>
<td>98.8</td>
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<tr>
<td>Import Duties</td>
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<td>1.2</td>
<td>1.2</td>
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<td>- Gross Domestic Product</td>
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<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Saudi Arabian Monetary Agency, 46th Report

4.6 Industrial Development

In line with Wagner’s propositions, significant industrial and social progress lead to an increase in total GDP, this in turn increases government expenditure and generates significant employment. In Saudi Arabia, industrial production in petrochemical and oil
refining has also boosted exports and helped to satisfy domestic demand for various manufactured products. These economic conditions, plus the oil revolution, might combine to make Wagner’s propositions operational in such an environment.

The industrial sector has made considerable progress over the past three decades, inspired by the economic diversification strategy and the development of the country’s industrial sector in particular. Hence, in order to achieve these objectives, new allocations should be made to industrial projects, particularly in the petrochemical manufacturing and oil refining industries. According to recent estimates published by the Saudi Arabian Monetary Agency (2010), the value added of the manufacturing sector in 2009 totaled SAR 105.9 billion. This amount is equivalent to 12.6 per cent of the country’s GDP at real 1999 prices, compared to 5.3 per cent of real GDP in 1969 figures. A key contributor to this progress is the significant increase in the value of physical investment and fixed capital formation in other manufacturing industries. This figure rose from SAR 0.075 billion in 1969 to SAR 12.5 billion in 2009.

Oil refining also holds a significant position in manufacturing. In 2009, its value added stood at SAR 22.5 billion, compared to SAR 5.5 billion in 1969. Moreover, investment in petrochemical industries was estimated at SAR 24 billion in 2009, equivalent to 26.8 per cent of the sector’s total investment. It also represents a significant share of manufacturing output, generating SAR 14 billion in 2009 at real 1999 values, compared to SAR 0.4 billion in 1983.

The value added of the entire manufacturing sector has grown from SAR 10.3 billion in 1970 to SAR 15.2 billion at the end of the First Development Plan in 1975, and reached SR 20.8 billion by the end of the Second Development Plan in 1980. The manufacturing
sector continued this performance throughout the subsequent development plans. Its value added to GDP increased in a continuous manner from the end of the *Third Development Plan* until the end of the *Seventh Development Plan*, as well as during the *Eighth Development Plan*. The sector realised a real average annual growth rate of 6.6 per cent over the period 1970–2009. The manufacturing industries, which include metals, building materials, food, and clothing, experienced an upward trend with their value added at constant 1999 prices rising from SAR 3.3 billion in 1970 to SAR 69.6 billion in 2009. Figure 4.5 shows development of the added value in the industrial sector for the period 1969 to 2009 at constant 1999 prices.

**Figure 4.5 Development of Value Added in Industrial Sector**

![Graph showing the development of value added in the industrial sector from 1969 to 2009 at constant 1999 prices.]

Advanced technology will be employed to develop the industrial sector; making it more competitive in international markets by promoting and attracting direct foreign investment. The Council of Ministers issued a resolution in 2000 calling for the establishment of the Saudi Arabia General Investment Authority (SAGIA). It also announced a resolution, in this context, to approve the New Foreign Investment Act,
which aims to remove constraints, facilitate issuance of licenses, and approve visas and residence permits. The new regulations also provide for an array of incentives, including increased tax holidays, ownership of real estate, and easier sponsorship rules, in addition to giving licensed foreign investment projects all privileges and guarantees granted to domestic projects.

The establishment of industrial cities has become one unique factor of industrial development, contributing to efforts to provide the basic infrastructure and services needed for industrial activity. This includes infrastructure projects such as roads and telecommunications networks, seaports and airports, which enhance competitiveness of national products in foreign and domestic markets.

One milestone in Saudi industrial development was the establishment of the Saudi Arabian Basic Industries Corporation (SABIC) in 1976. SABIC is the largest and most powerful non-oil organisation in the Middle East, as well as one of the five largest petrochemical manufacturers in the world. Its overall production in 2011 reached 69 million metric tons (See SABIC, 2011). SABIC is primarily a publically-owned company, based in Riyadh. The Saudi Arabian government owns 70 per cent of its shares, and the remaining 30 per cent is owned by private investors in Saudi Arabia and in the other countries of the Gulf Cooperation Council. Major operations of SABIC are located in the industrial city of Al-Jubail, in Dammam on the Arabian Gulf, and in Yanbu on the Red Sea.

The total value of SABIC’s sales amounted to SAR 21 billion in 2000 and increased to SAR 103 billion in 2009. Furthermore, other national industries achieved significant growth as well. Among these industries are cement production, which is expanding at
an average annual growth rate of 10.5 per cent, and chemical fertilisers, which is expanding at an average annual growth rate of 15.5 per cent. Overall, the importance of these achievements is reflected in the increased volume, value, and variety of the industrial exports, and the increased competitiveness of these exports in both domestic and foreign markets (SABIC, 2011).

4.7 Economic Development

The objective of this section is to assess the development process that is needed to satisfy the long-term needs of the growing population. Given substantial oil revenues and a relatively small population, it might not be that difficult to meet the immediate needs of the population. Oil revenues can be used to provide services, subsidies, and employment; ultimately, however, the economy will need to survive without oil revenues, and must be ready to operate on a non-oil basis. Conversely, it is possible that technological developments in the energy sector may reduce global reliance on oil, dampening the global demand for oil. However, the long-term needs should not be dependent on the continued inflow of oil revenues. Saudi Arabia should make tangible efforts toward establishing a sound non-hydrocarbon economic base.

Assessing the economy’s ability to survive without oil depends on whether current economic policies are farsighted enough to cope with a distant future whose requirements and needs are difficult to predict. To evaluate this issue, Niblock and Malek (2007) cited an approach that depends on two strategies. The first is to define the criteria of success, the dimensions of development and economic growth that can provide a basis for economic vitality. The second is to identify the structural characteristics that underlie economic policies. These characteristics include
socioeconomic and political factors that have shaped economic policy and development. An understanding of the factors affecting policy and development would provide bases for determining which projects are likely candidates for future development.

The objective of the second strategy is to define the parameters that will create economic growth in the future. The extent to which states intervene in economies comprises three characteristic levels of state involvement: the minimal state, state-aided capitalism, and state-sponsored capitalism. The first two are in line with the private-sector development approach, while the third establishes the state as the chief engine of growth. In the third level, the government is acting positively to promote rapid industrialisation. This level requires a high volume of productive investment, which can be controlled and directed only by government (Wade, 1990). Since government in Saudi Arabia takes over most of the large projects, such as oil and petrochemical industries, the third level might be a workable approach for Saudi Arabia according to the high volume of capital investment in these projects.

To facilitate economic and social development planning, the Saudi Arabian government has adopted a series of five-year national plans. The primary commitment of the government regarding these plans is to directing the planning process and fostering long-term growth and supportive relationships with the private sector. One of the government’s responsibilities is promoting investments in key industries, while at the same time ensuring that these industries are technologically advanced and internationally competitive. In the next section is an exploration of these five-year national plans.
4.8 Economic Development Plans

Since 1970, five-year plans have served as the nation’s economic and social planning mechanism, with each planning period organised into broad expenditure categories. Social welfare has been among the pillars of the development strategy for two major categories; a focus on human development and education is one primary goal of these stages. The importance of human development to contribute to social and economic growth has been recognised. The other large sector expenditure item is social services and health care. Provision of the public services at reasonable rates has been one of the key objectives of this strategy.

The development plans have laid the basis for government policy. The development strategy becomes framed around a vision of social and economic transformation. Now, there is a modicum of administrative and planning structures, physical and social infrastructure and actual developmental plans to sustain social and economic changes.

In these economic plans, priority has been given to the oil and gas industries to provide sufficient funding for other infrastructure development projects such as transport, housing, electricity, water, communications, health, and education. Oil has turned out to be not just a natural resource that creates great wealth; it has also created a set of relationships among politics, business, global capital, and scientific expertise, all of which have interacted to forge the modern state of the country. A total of eight plans have been constructed, while the ninth plan is currently operating during the period from 2010 to 2014.

Consequently, the first three development plans covering the period 1970–1985 focused on socioeconomic development, which was achieved by building a solid infrastructure
and implementing programs for massive economic and social transformation. These three plans were followed by two development plans from 1985 to 1994 characterised by reductions in public expenditure on infrastructure, due to the decline of revenues from oil exports. The emphases in these plans were placed on maintaining and developing the state-run programs and operations. Promoting human resource development and creating a well-trained workforce and economic diversification were among the priorities.

The next two successive development plans, which cover the period 1995–2004, resulted in the achievement of some infrastructure development goals, enabling an expansion in the national economy. The concentration in these plans was on employment, education and public health, whereas the agricultural sector also developed rapidly.

The First Development Plan from 1970–1974 allocated 41.5 per cent of development expenditure to infrastructure (transportation, communications, housing, and municipal services). In addition, the value of investments in the public utilities sector in current prices totaled SAR 972 million by the end of this plan, in order to meet the basic needs of industrial, commercial, and services projects, as well as those for civil purposes. Spending in communications and transport increased from SAR 42 million in the base year to SAR 505 million by the end of the First Development Plan (Ministry of Planning, 1970).

During the Second Development Plan from 1975–1979, spending on infrastructure reached SAR 171 billion, representing about a 12-fold increase over the First Development Plan. This amount constituted 49.3 per cent of the total expenditures
allocated for development. Spending on electric power and water totaled approximately SAR 12 billion, representing a dramatic increase in public utilities investments (Ministry of Planning, 1975).

The Third Development Plan from 1980–1984 continued funding for infrastructure projects, totaling SAR 257 billion. This amount represents 41 per cent of the total expenditures of SAR 625 billion allocated for development. Priority was given to the public utilities sector, which received significant increases in investments totaling approximately SAR 35 billion. Investments in transport and communications increased even more, from SAR 6 billion to approximately SAR 18 billion. Completion of different large-scale public infrastructure programs was one of the outcomes of the first three development plans from 1970-1984 (Ministry of Planning, 1980).

Despite the need to expand and maintain infrastructure, low oil revenues during the Fourth Development Plan from 1985–1989, caused by sharp reductions in oil prices, led to a 61 per cent reduction in funds allocated to infrastructure development, which at the time represented 28.9 per cent of total development expenditure. Funds allocated to the public utilities sector were raised slightly during this plan. Investments in communications and transport, however, were reduced by 12 per cent and started to focus on regional development, by enabling the transportation of passengers and commodities throughout the vast area of the country (Ministry of Planning, 1985).

Low global oil prices continued to reduce revenues during the Fifth Development Plan from 1990–1994. Therefore, funds for infrastructure investments were further reduced by 26 per cent, representing 22 per cent of the total expenditure allocated for development. However, remarkable increases in funds for expansion of utilities services
were secured to meet the growing needs of urban areas, in response to increases in population density (Ministry of Planning, 1990).

In the *Sixth Development Plan* from 1995–1999, development expenditure for infrastructure decreased by 8 per cent, representing 16 per cent of the total expenditure allocated for development. Investments in electricity and water again increased by 65 per cent, or 13 per cent annually. The increase in total investment value in electricity and water above is attributed to the relationship between spending in the sectors of infrastructure and economic resources. The funds for communications and transport were reduced marginally by an average annual rate of 0.15 per cent (Ministry of Planning, 1995).

During the period of the *Seventh Development Plan* from 2000–2004, balancing the development process was a key priority. The target in the seventh plan was a real GDP growth of 3.16 per cent over five years; the growth in 2000 was spectacular, because of high oil prices that year, and exceeded 15 per cent. On the other hand, the demands of the growing population increased, putting pressure on infrastructure development. Other goals for this stage included providing a favourable investment environment for the private sector and attracting direct foreign investment.

The Seventh Plan also aimed to maximise the return on public investment by justifying new infrastructure investments, as well as improving efficiency. The strategic base of this plan emphasised the importance of significant maintenance of the existing infrastructure to keep it in good working condition. Policies consequently concentrated on the necessity of maintenance and operations programs for each and every development project.
The transport, communications, municipalities, and housing sectors received approximately 13 per cent of the total expenditure allocated for development. For economic resources development, financial allocations were 11 per cent of the total approved financial allocations for development agencies during this plan.

The Seventh Development Plan also witnessed a remarkable start of large-scale conversion of public ownership to the private sector, known as privatization programs. The most important of these were in the area of telecommunications, transport, and electrical power. In addition, initial steps toward privatising the air transport sector got underway. A number of private-public partnerships were formed, including collaborative efforts to manage and operate seaports and to provide various municipal services. Private commitments and investments were deemed crucial to the establishment and operation of industrial cities and clusters set up during this period. The operations and business models of the industrial cities of Jubail and Yanbu were constructed in a successful manner, and serve as a model for future private-public partnerships (Ministry of Planning, 2000).

The Eighth Development Plan from 2005–2009 stressed the promotion of economic growth and infrastructure maintenance, as well as management of economic resources. The government resolved to develop the above sectors and to increase economic efficiency, in order to create sustained and balanced growth and development. The main objectives of this plan comprise the following: raising the standard of living and improving quality of life; developing human resources and improving workforce skills; diversifying the economic base and enhancing productivity; achieving balanced economic growth; and developing science and technology informatics. Scientific research and technology should enhance the efficiency of the national economy and
accelerate the transition toward a knowledge economy. (Ministry of Economy and Planning, 2010a).

During this plan, the national economy realised positive growth rates in GDP, capital accumulation, foreign trade, balance of payments, manpower development, and private sector contributions. This was a result of the combined effects of two key economic initiatives. The first initiative intensified efforts to enhance the business environment and expand private-sector participation. This approach contributed to raising the rates of investment, employment, and productivity across different economic sectors (Ministry of Economy and Planning, 2005).

The Ninth Development Plan from 2010–2014 has been approved by the government. Topping its list of priorities are the following items: raising the standard of living for individual citizens, reducing unemployment, increasing private sector growth, and approving higher housing allowances for citizens. It is estimated that the implementation of this plan will cost approximately SAR 1.4 trillion. The growth rate exceeded 67 per cent compared with spending during the previous Plan. Government spending during this period will also include expenditure programs for completing electrical distribution networks, transportation projects, and other health and social projects. However, the human resources sector accounts for the lion’s share, with 50 per cent of total approved appropriation (Ministry of Economy and Planning, 2010d).

The social development and health care sectors account for 19 per cent of the total allocation, while the development of economic resources account for 15 per cent, transport and communications 7 per cent and municipal services and housing 7 per cent of the total allocation plan (Alarabiya.net, 2010).
4.9 Economic Performance

Economic performance can be measured by identifying the major business cycles for Saudi Arabian GDP that explain the changing economic conditions observed. Ramady (2010) summarised seven major business cycles, which can be identified as follows:

i) An oil boom cycle from 1970 to 1982, which was characterised by high oil prices, rapid economic growth, increased government expenditures on infrastructure, and high per capita income;

ii) The second cycle, called the oil bust era, was characterised by a dramatic downturn in oil revenues. Oil production declined from approximately 9 million barrels a day in 1981 to an average of 3.5 million barrels in 1986. Furthermore, oil prices dropped from a peak of 35 USD per barrel in 1981 to less than 11 dollars per barrel in 1986. Government revenues fell dramatically to approximately SAR 50 billion in 1986, compared to approximately SAR 400 billion in 1981. As a result, imports declined drastically and reductions in investment affected both the private and government sectors;

iii) The third cycle between 1987 and 1991 became known as the recovery business cycle, in which the economy showed a better performance due to improvement in world oil markets, but that was followed by a stagnant business cycle caused by another decline in the oil market and fiscal restrictions;

iv) The fourth cycle between 1992 and 1995 was characterised by budget cuts across the board, a freeze on capital expenditure, and slowdowns in government cash disbursement. During this cycle, the government began to withdraw funds from its overseas reserves, resulting in growing budget deficits and debt-service payments;

v) The fifth cycle between 1996 to 2002 was a crucial stage, in which economic
reforms and major restructuring efforts took place, with a government emphasis on the private sector role as the main engine of growth;

vi) The sixth cycle from 2003 to 2008 was considered the second-longest economic boom period, with real GDP growth consistent at around 5 per cent per year. High oil prices and abundant liquidity characterised this period, with oil prices peaking at 147 USD;

vii) The seventh and current cycle, which began in 2009, can be viewed as another stage of retrenchment and restructuring for the economy. This cycle also witnessed the unfolding global financial and credit crisis (Ramady, 2010).

4.10 Necessary Conditions for Economic Growth

One of the first steps toward economic growth is to set significant development goals. Development objectives must meet the needs of a fast-growing, young population, with high expectations that pose various challenges to the development process. A more strategic and flexible planning process is likely to be needed in a global economy that is evolving rapidly. Most observations of the Saudi Arabian economy agree that economic, structural, and social reforms are now a necessity and not a luxury (Champion, 2003; Najem and Hetherington, 2003).

There are multiple perspectives regarding the scale and pace of reform, since there are different estimates of trends in the Saudi economy and how these interact with the most crucial issues, such as employment and population levels. In addition, the extent of the problems that the economy might have to face in the future is undetermined. The debate on the effectiveness of the economic assumptions of Western modernisation theories does not take into account the uniqueness and privacy of the Saudi culture. The Saudi
Arabian society can be differentiated by other societies in social and religious traditions (Abdeen and Shook, 1984).

Table 4.3 explores certain key conditions for Saudi economic growth, and whether these conditions are of rising, falling, or neutral importance. In the end, there can be no certainties in forecasting data for any country, and Saudi Arabia is a case in point. Observers of the economy seem to be either overly optimistic or overly pessimistic about the future, depending on their basic assumptions and perceived trends. The truth is that the Saudi economy lies somewhere in between, despite considerable “developed” country characteristics, including overdependence of GDP and the budget on petroleum revenues, lack of economic diversification, and a high level of bureaucracy.

The table sets out some necessary preconditions for growth that are sometimes used to assess a given country’s stage of development. Some of these factors are based on perception rather than on hard data sources. The table shows eight factors that assist growth without necessarily promoting it (poor performance in any of these areas, of course, would limit growth).

In some areas, the economy might seem to be under considerable pressure, for example, inflation. On the private-sector side, development of laws in support of new companies could be particularly beneficial for economic growth; on the public-sector side, the quality of government services clearly needs to be improved.
## Table 4.3 Necessary Conditions for Economic Growth

<table>
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<th>Factor Component</th>
<th>Priority</th>
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<tr>
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<td>● Macroeconomic Stability</td>
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<td>Government Deficit</td>
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<td>Inflation</td>
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<tr>
<td>Exchange Rate Stability</td>
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<td>Solvency of Financial System</td>
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<td>● Deep Financial Markets</td>
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<td>Interest Rate Spreads</td>
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<tr>
<td>Developed Equity Markets</td>
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<tr>
<td>Sophistication of Financial System</td>
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</tr>
<tr>
<td>● Openness to International Trade</td>
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<tr>
<td>Low Import Tariffs</td>
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<tr>
<td>Low Hidden Import Barriers</td>
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<tr>
<td>● Quality of Government</td>
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<td>Efficient Use of Public Funds</td>
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<tr>
<td>Subsidies to Improve Productivity</td>
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<tr>
<td>Reducing Senior Management Time Spent with Government Officials</td>
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</tr>
<tr>
<td>Proper Levels of Administration, Regulation, Burdens</td>
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<tr>
<td>● Infrastructure</td>
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<td>Road Quality</td>
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<td>Efficient Electrical Generation</td>
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<td>High Level of Competition in Provision of Basic Infrastructure</td>
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<tr>
<td>● Education</td>
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<td>Average Years of Schooling of Population</td>
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<td>Private Investments in Training</td>
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<td>● Role of Law</td>
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<td>Independent Judiciary</td>
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<td>Ability to Successfully Litigate against Government</td>
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<tr>
<td>● New Economy</td>
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<td>Internet Hosts</td>
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<td>Computers Per Capita</td>
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<tr>
<td>Development of Laws in Support of New Companies</td>
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↑ refers to high importance, ↓ refers to low importance, → refers to neutral.

Chapter Five

Government Expenditure and Policy in Saudi Arabia

5.1 Overview

For decades, economic development in the Kingdom was marked by the major role played by the oil sector in generating GDP and financing government expenditure to establish the infrastructure and to provide public services. Until the economic base is better diversified on a sustainable basis, government expenditure will continue to occupy the key role in any sustainable domestic development programs and investment plans. Because of its economic size in terms of spending, investment, and consumption, as well as its ownership of the most valuable economic resource, the Saudi Arabian government and its fiscal policies still affect the economic well-being of the entire nation. The public sector is spending generously for social and economic development.

On the other hand, according to Wagner’s propositions that government expenditure comprise considerable weight of GDP, it is crucial to analyse the relationship between government expenditure categories and the growth of the GDP. A tendency to increase the ratio of government expenditure to GDP is a persistent characteristic of government spending in Saudi Arabia. One key objective of studying government expenditure is to define a proper view regarding the role and scope of government expenditure policies in the development process. Another is to shed light on public expenditure structure and evolution during the past four decades, including the governmental budgetary approach and planning expenditures.
This chapter also aims to explore government expenditure during the development process. At certain stages, some categories, such as social welfare, health, and education, has had the lion’s share of the government budget. In addition, sources of revenues including oil and non-oil revenues are discussed at the end of this chapter.

5.2 Government Expenditure and the Market Outcome

One reason of economic wellbeing is enforcing the invisible hand of the government. Here, government enforces the rules and maintains the institutions that are keys to a market economy. In this situation, market economy will create an outcome that allocates goods and services for those who value them most highly and makes the best use of the scarce resources to insure that property rights are protected.

There are two main reasons for a government to intervene in the economy — to promote efficiency and to promote equity. Here efficiency is the property of society getting the most it can from its scarce resources. Equity means that the benefits of those resources are distributed fairly throughout society. That is, most government policies aim either to enhance the economy or to change how it is organised.

Considering the goal of efficiency, some time the market itself fails to allocate resources efficiently. One possible cause of market inability to achieve efficiency is what calls externalities, which is the impact of some party’s actions on the wellbeing of a bystander. In this case, governments can raise economic wellbeing through regulations.
Another possible cause of market failure is market power, which refers to the ability of a small group to unduly influence market prices. In this case, regulating the price that this small group charges may improve economic efficiency (Katz, Rosen 1998).

Different public policies, such as taxes and social welfare, aim to achieve a more equitable distribution of economic welfare. To propose that, the government can enhance the market outcomes at times does not mean that it always will. Public policy is made by politicians operating in a political process that is far from perfect. Sometimes policies are designed simply to reward the politically powerful. Sometimes they are made by well-intentioned leaders who are not fully informed (Gans, King and Mankiw, 2009).

In Wagner’s propositions, increasing government involvement is attributed to: i) growth in the private sector which creates the need for productive public activities to maintain efficiency; ii) Wagner argues that the ability to provide social services, such as education, health services, and infrastructure projects would make the income elasticity greater for the government than the private sector; and iii) economic development and changing technology would become more expensive through the private sector, which requires government intervention to control economic and social firms in order to enhance efficiency.

By studying the government expenditure approach in Saudi Arabia, the role of government policy can be justified according to the goals of equity and efficiency. However, deciding whether providing goods and services is better by the government or the private sector is determined by these terms. In the case of Saudi Arabia, economic, social and political factors are associated with strong involvement in the economic
activities. Moreover, to avoid the impact of market failure or externalities, government should intervene to enhance the market outcome and restore efficiency. However, in an oil based economy, market efficiency can be easily affected by instability in oil market.

5.3 Government Expenditure Approach

In Saudi Arabia, the Ministry of Finance is responsible for allocating all government revenues and distributing them according to the annual budget. The government budget usually contains four chapters, the first three being those that deal with government consumption expenditure. These three chapters are: (i) salaries and allowances, including civil and military employees. This portion of the budget also covers the salaries of contract staff, wages for daily workers, overtime, visiting experts, compositions, and others; (ii) General expenses, which covers travels and transportation expenses for government bodies, operating supplies, equipment, and utilities expenses; and iii) miscellaneous expenses, including international organisation expenses, medical treatments and insurance, training and educational fees, social security assistance, subsidies for agencies with independent budgets, electric power and the like. The fourth chapter deals with project and capital expenditure. Expenditures in this chapter cover government projects and development projects, including public utilities projects, municipalities, and all other public services.

The first three chapters are prepared by the budget department in the Ministry of Finance after receiving estimates of annual expenditures from different ministries and government agencies. The Ministry of Economy and Planning is responsible for preparing the fourth chapter, as well as adding other ministries and agencies to the planning process by forecasting future expenditures.
At this time, security and defense expenditures remain the largest functional sector of the budget. In the sections that follow, more details concerning government expenditure categories are presented.

5.4 Government Expenditure Evolution

Since 1974, government size and expenditure has increased dramatically in both absolute and relative terms. Total current and capital government expenditure increased from SAR 35 billion in 1974 to a peak of nearly SAR 596 billion in 2009. However, while actual current expenditure registered an increase of 7.1 per cent in 2009 compared to an increase of 12.0 per cent in the preceding year, actual capital expenditure increased by 37 percent in 2009 compared to 10.2 per cent in the preceding year. The share of actual current expenditure in total expenditure amounted to 70 per cent in 2009, against 30 per cent for capital expenditure. The high percentage increase in the capital expenditure in 2009 reflects the government’s tendency to develop the old infrastructure and the approval of new development projects related to health, education, water, sewage, roads, and technology. Once more, capital spending has emerged as a high priority for the government; current expenditure, however, will continue to dominate overall government spending.

The growth in capital expenditure has also reflected the government’s aims of creating opportunities for the private sector and the policy of keeping the economy in a sustainable growth pattern. The 2010 budget for capital expenditure is the largest since Saudi Arabia started on its economic modernisation strategy (Saudi Arabian Monetary Agency, 2010).
It is obvious that key spending in the new millennium has concentrated on the water and energy sectors, as well as the education and health infrastructures. The evolution of capital and current expenditure shares are shown in Figure 5.1

![Figure 5.1 Current and Capital Government Expenditure Outlays](image-url)

Source: Saudi Arabian Monetary Agency 46th Report

To avoid any sharp drops in GDP, the government believes that it should keep increasing capital investment. For instance, in earlier stages of the economy the government had emphasised private sector investment to build up the nation’s capital stock. The overall effect of the boom and adjustment economic cycles ensured that many businesses that entered the market during the boom era went bankrupt, because they were unable to adjust to the new market conditions. The recent conditions in the Saudi private sector are a far cry from the private sector of the early development period. During the early development period, for example, the private sector lacked proper planning and cost control.
The positive side of the various development strategies that were put in place towards the end of the boom periods provided the foundation for sustained growth during adjustment eras of the economy. However, these capital investment projects seem to be in line with Wagner’s conditions of enhanced technology and economic progress when he emphasised increasing state activities with large-volume development projects and enhanced technology. It is obvious that these infrastructure projects have large budgets requiring financing in both long and short terms.

Analysing the government expenditure items reveals a steady rise in capital expenditure from a low of SAR 2.3 billion in 1994 to SAR 225 billion in 2009 or approximately 41 per cent of total expenditure. On the other hand, in recent years, the current expenditure items have tended to be dominated by such items as wages, operations, and maintenance. Government employment increased recently from 166,000 employers in 1974 to nearly 900,000 in 2008, for an annual growth rate of 9.25 per cent. This rapid increase in government employment is the direct consequence of increasing government involvement in economic activities. It is also a result of the government’s overall development strategy, under which many of the economic and social services are provided by the government. Accordingly, in line with increasing government revenues, the public sector is trying to stimulate development and economic growth.

Operation and maintenance expenditure has also grown as the government built up its surplus reserves during the period of 2002–2008, and the spending strategy now focuses on improvements to the social and physical infrastructure, particularly the water and sewage projects necessitated by the floods that struck Jeddah city in 2009 and 2010.
More factors and item expenditures also contributed to the capital expenditure increases, but in lesser amounts than the projects and activities mentioned above (Ramady, 2010).

The macroeconomic statistics relating to Saudi historical trends show that the government expenditure share of GDP averaged 40 per cent in 2009, which tended to support the significant role of state activities. In general, the rising trend of government involvement in economic activities might be a result of government commitment to the citizens to provide state funds for social and economic development. At the same time, initiatives related to population growth, construction of new economic cities, and infrastructure renewal projects have become priority expenditures for the government. Moreover, international programs and obligations add substantial sums to government spending (Saudi Arabian Monetary Agency, 2010). However, as can be noticed from Figure 5.1, both expenditure categories have experienced an upward trend during the last six years that support heavy government involvement in economic activity.

5.4.1 Expenditure during Development Plans

During the planning period from 1970 to date, actual and planned expenditure have been impressive. Over time, the expenditure trend of the development plans has become more evident. The focus was on education and human resources development, which accounted for 57.1 per cent of the actual expenditure of the Seventh Development Plan of 2000–2004 and declined to only 55.6 per cent in the Eighth Development Plan of 2005–2009. The fundamental mission of human resource development has been acknowledged to be the realisation of sustainable economic and social goals.
Compulsory primary and secondary education has been reinforced starting from the *Seventh Development Plan*, with the aim of achieving universal primary education by 2015. According to the World Bank (2009) development indicators, adult literacy stood at 86 per cent in 1990 and 97 per cent in 2009. Another large sector expenditure has been social and health care programs.

Social welfare and solidarity is one of the chief goals of government development strategies; another objective has been provision of public services and basic needs at an affordable price. Groups and individuals are assisted by a multitude of social programs administered by the Saudi Deputy Minister of Social Affairs.

One factor that might contribute to Wagner’s proposition regarding social and cultural development in society first appears at the low end of the poverty statistics. This is because of the strong family orientation that permeates not only the nuclear family, but also extended-family relations. Another reason for this concerns the implementation of Islamic principles, which assume close brotherhood relationships in society. The principle underlying all development plans is raising the standard of living of people, improving the general quality of life and enhancing skills and abilities.

Expenditure during the last development plan for the period 2010–2014 is forecasted at SAR 1,444 billion more than the last three plans combined with approximately 50 per cent allocated for human resources development. However, it is important to analyse the changing emphases established during each planning period, which reflect national priorities.
Table 5.1 shows how closely government expenditure patterns follow the fortunes of oil revenues, with the *Eighth Development Plan* of 2005–2009 surpassing the peak boom cycle of the *Third Development Plan* of 1980–1984.

**Table 5.1 Percentage of Expenditure during Development Plans**

<table>
<thead>
<tr>
<th>Development Plan</th>
<th>Economic Resources Development</th>
<th>Human Resources Development</th>
<th>Social and Health Development</th>
<th>Infrastructure Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st (1970–1974)</td>
<td>27.7</td>
<td>20.6</td>
<td>10.3</td>
<td>34.1</td>
</tr>
<tr>
<td>2nd (1975–1979)</td>
<td>28.0</td>
<td>14.7</td>
<td>8.0</td>
<td>347.2</td>
</tr>
<tr>
<td>3rd (1980–1984)</td>
<td>30.7</td>
<td>18.4</td>
<td>9.8</td>
<td>635.2</td>
</tr>
<tr>
<td>4th (1985–1989)</td>
<td>20.4</td>
<td>33.0</td>
<td>17.7</td>
<td>348.9</td>
</tr>
<tr>
<td>5th (1990–1994)</td>
<td>10.0</td>
<td>48.0</td>
<td>20.0</td>
<td>340.9</td>
</tr>
<tr>
<td>6th (1995–1999)</td>
<td>11.5</td>
<td>51.5</td>
<td>20.8</td>
<td>420.4</td>
</tr>
<tr>
<td>7th (2000–2004)</td>
<td>11.2</td>
<td>57.1</td>
<td>19.1</td>
<td>12.6</td>
</tr>
<tr>
<td>8th (2005–2009)</td>
<td>12.2</td>
<td>55.6</td>
<td>18.0</td>
<td>14.2</td>
</tr>
<tr>
<td>9th (2010–2014)</td>
<td>15.7</td>
<td>50.7</td>
<td>18.2</td>
<td>14.7</td>
</tr>
</tbody>
</table>


**5.5 Structure of Government Consumption Expenditure**

Because national accounts provide the basic framework for the collection of data on general government outlays, basic government expenditure categories (in most economies) can be represented as government final consumption expenditure, gross capital formation, and transfer payments. The disaggregation of these outlays depends on the economic concept and its classification of the national accounts. Breaking down government expenditure into different components will help to isolate the kinds of expenditures that are most responsible for the increased importance of the government sector in the economy.
Transfer payments include subsidies, social security benefits, social assistance grants, and public debt interest payments. On the other side, gross capital formation includes expenditure on government plant and equipment, such as, roads, schools, hospitals, and medical equipment. Even though defence expenditure accounts for a large share of the government’s budget, the System of National Accounts (SNA) considers government expenditure on defence as part of final consumption expenditure, whether or not it corresponds to the purchase of equipment (Saunder, 1993).

In Saudi Arabia, within this classification, final consumption expenditure includes general public services, defence expenditure, education expenditure, health services expenditure, social and security welfare services, other community and social services, economic services, and other purposes. Figure 5.2 depicts distribution of these categories by millions SAR at current prices as constructed by the Central Department of Statistics and Information, Ministry of Information and Planning (2009). Of these categories, statistics show that education, defence, and general public services are the most important components.

![Figure 5.2 Government Consumption Expenditure (2005–2008)](image-url)
Explaining the differences in outlay structure each year depends on several factors, such as demographic, economic, and social factors. These factors imply that government has limited influence over expenditure levels in the short term or even in the medium term. However, what is relevant to Wagner’s propositions is to establish that those factor impacts exist and may contribute to differences when testing Wagner’s law in different forms or different societies.

Disaggregating government expenditure outlay also is a concern of those who aim to analyse and understand the impact of government programs on economic performance and societal welfare. For this reason, a breakdown of expenditure for consumption outlays by functional field e.g., defence, education, health services, etc is of higher significance. Such a breakdown allows governments to better understand how to measure the need for each category. In the subsections that follow are illustrations of some of the major expenditure components, plus trend and performance information.

**5.5.1 Expenditure on Education**

The availability of qualified, highly efficient, productive national manpower is an indicator of the likelihood of achieving sustainable development. Developing manpower and raising its efficiency through education and training calls for building a national centre for science and technology, capable of promoting scientific research, innovation, and technological development. Human resources development points to a remarkable achievement during the last two decades, namely an expansion of education and training capacity in all regions of Saudi Arabia. However, human resource needs exceeded the supply of qualified national manpower in those areas that require recruitment of foreign labour.
Employment in the public sector is now approaching saturation point, amid signs that growing incompatibility between outputs of the education and training system and requirements of development is leading to structural unemployment among Saudis. The various social and economic aspects of this mismatch should be addressed in the short, medium, and long terms. However, the plans and programs for socioeconomic development were successful in achieving progress and increasing growth rates. Quantitative and qualitative progress in general education levels, higher education, and training programs have been achieved.

The current vision for the future of general education highlights educational planning as a tool for achieving the target outcomes. These outcomes include expanding the capacity of the educational institutions to meet the steady growth in demand; raising the quality of education, in order to deal efficiently and flexibly with the challenges of global scientific and technical developments; and customising the outputs of education to match the actual needs of the labour market. This, however, can be adopted within the framework of the future vision for socioeconomic development, which underscores the development of education at the lowest cost, and at the highest quality levels.

As a result of the great expansion in educational facilities, the number of graduates at the secondary level increased from 28,000 students in 1970 to 191,700 in 2000; 267,900 in 2006; and 321,000 in 2008, for an average annual growth rate of 13 per cent. Figure 5.3 depicts the growth in the number of graduates at the secondary level. Higher education has experienced a number of positive quantitative and qualitative developments that should help it to keep pace with demand, and extend it to all regions of the country. Considerable efforts are being made to increase the number of universities and colleges. By the end of 2009, the number of universities reached 25 and
community colleges reached 35. Moreover, since 2007, the King Abdullah scholarship program is on track to meet its goals in 10 years in stages.

**Figure 5.3 Numbers of Graduates at Secondary Level**

![Bar chart showing numbers of graduates at secondary level from 1970 to 2008.]


For technical and vocational training programs, building a training system capable of preparing a well-qualified, highly efficient national labour force requires adaptability to changing needs in terms of quantity and quality, in the various disciplines, and in the technical skills needed by the national economy to keep pace with rapid technical development. However, for education and training to have a positive impact on the development of human resources, they must be carefully designed and well-funded.

The total investments and shares of human resources development, including health care programs and projects, are presented in Figure 5.4 for the eight development plans covering the period 1970 to 2009 (Ministry of Economy and Planning, 2009a).
5.5.2 Expenditure on Health Care

Health services are provided through a wide health care network. The Ministry of Health is the principal health care agency, providing preventive, curative, and rehabilitative health services to the public. Recent statistics reflect continued growth in the major indicators of health resources in the Kingdom, namely the number of dispensaries, hospitals, beds, physicians, and nurses. In 2009, the share for government agencies, other than the Ministry of Health, was 19.5 per cent of hospital beds and 21.2 per cent of doctors, while the corresponding share for the private sector amounts to 20.5 per cent and 30.1 per cent, respectively. In a study by Bagadeem (2002) for the health care industry in Saudi Arabia, the trans-log multiproduct cost function (TMCF) is tested to demonstrate the role and effect of cost factors on outcomes in the health services sector. Costs of capital and equipment, plus salaries and payments, comprise the largest component of the cost of the health care sector in Saudi Arabia.
In recent years, important steps have been taken to promote and develop health services. The Cooperative Health Insurance Board was established per Health Insurance Regulation; the latter is mandated to extending the health insurance system to all foreign residents in the first phase, and subsequently, to the entire population.

Population indicators show that Saudi Arabia is among the fastest-growing and youngest societies in the world. Estimates show that the Kingdom’s population grew by more than three-fold during the past three decades, rising from 7.3 million in 1975 to 25.37 million in 2009. A comparison of Saudi Arabia’s average population growth rate with those of other Arab countries, developing countries, OECD countries, and other countries of the world shows that Saudi Arabia exceeds the others by varying degrees. The high growth rate of the Kingdom's population was attributable to remarkable improvement in economic, health, and social conditions. The continued development of the economic structure, the massive investments in infrastructure, and investments made by the government and the private sector, have all contributed to the recruitment of a large workforce in this field. It is obvious that the demand for health care services is rising steadily over time due to several factors; most significant among these are the relatively high rate of population growth and society’s increasing awareness of the importance of health care.

The above scenario might be in line with Wagner’s proposition for increased government involvement in Western society (1883). Wagner suggested that the ability to provide social services, such as education, health services, and infrastructure projects, would be greater for the government than the private sector. This is because modern changes and technologies in the health sector would increase investment volume in that sector, possibly leading to monopoly. Therefore, economic development
and changing technology in the health sector might become more expensive if provided only through the private sector. Nevertheless, government in Saudi Arabia spends generously on education, social services and the health sector.

The *Ninth Development Plan* of 2010–2014 aims to provide comprehensive, integrated and high-quality health care services that cover every province, with balanced regional distribution of services. The targeted health care will be run by an efficient health sector to promote health and enhance quality of life. This plan has adopted a number of targets to accelerate achievement of development goals. However, continuing high population growth rates, as well as the consequent increase in demand for basic health care services, make it necessary to continue expanding facilities and programs to provide access to these services for everyone (Ministry of Economy and Planning, 2010c).

There are three main sources providing the health care services in Saudi Arabia: the Ministry of Health, the private sector, and other governmental sectors. It is notable that the Ministry of Health dominates the share of provided services at 59 per cent. The private sector share of health care services is only 21 per cent, while 19 per cent is provided by other governmental institutions. Figure 5.5 presents data on the share of health services providers in Saudi Arabia as reported in the Ministry of Health annual report (2010).

**5.5.3 Expenditure on Defence**

Defence expenditure comprises one of the largest government expenditure categories with approximately 31 per cent of total consumption expenditure in 2010. Ministry of Defence expenses fall under this category and include administration, supervision, and
operation of defence facilities. The share of defence expenditure usually increases during periods of instability in the Middle East. This type of expenditure reported dramatic increases during Gulf Wars I and II.

![Figure 5.5 Shares of Health Service Providers](image)

Source: Ministry of Health annual report (2010).

Some interpretations of Wagner’s law, such as Pryor (1968), argue that, in growing economies, the share of government consumption in GDP is increasing. Pryor also classified consumption expenditure into two categories: government expenditure for internal and external security, and government expenditure for social welfare. However, the study findings support the Keynesian proposition when applied to Pryor’s version.

Pryor is concerned primarily with the increases in expenditure for social welfare, arguing that it is the major component of overall government expenditure. Accordingly, it may rise suddenly during the development process following security expenditure rises because of periods of instability.
However, for Prior’s version, more researches are needed to investigated social welfare expenditure during instabilities periods. For instance, Gulf Wars I and II caused heavy burden on government expenditure, increasing it by approximately 13 per cent during the period of instabilities and few years after the end of the unstable conditions (Saudi Arabian Monetary Agency, 2010).

5.6 Government Sources of Revenues

Despite expansion and diversification of the economic base, oil revenues remain the main source of government budget revenues that finance its operational expenditures and investment. According to the Saudi Arabian Monetary Agency (SAMA) annual report (2010), oil revenues reached their peak of SAR 983,369 billion in 2008, before declining to SAR 434,420 billion in 2009, affected by the global financial crisis.

The actual outcome for the non-oil sector reveals that there has been a gradual rise in these revenues since 1994. Non-oil revenues rose gradually from SAR 46,900 billion in 2002 to its highest level, SAR 117,624 billion, in 2008. These sources of government income include investment income, fees and charges, income taxes on foreign corporations, custom duties and other (“other” includes local Zakat, which is 2.5 per cent collected from the local private sectors in accordance with Islamic law). As a result of rising prices and production, oil revenues in the last decade maintained a level higher significantly than at any time since the early 1980s. In 2005 and 2006, they increased further, in a dramatic manner never seen before. Nevertheless, the high level of revenues put the government in a different position than the earlier oil boom, gradually leading to a realisation that the country could now start to revaluate its development strategies (Niblock and Malik, 2007).
Oil revenues are typically generated in two ways: one way includes those revenues that go directly to the government in the form of royalties, taxes, and rents. The other way is money spent by the oil companies in the form of wages, salaries, grants, and other local purchases (Nimattallah, 1968).

The government has also introduced a range of fees and service charges to the public. The income from such services has risen steadily to approximately SAR 29 billion in 2009, which contributes around 27 per cent of non-oil revenues. SAMA has reported investment income totalling approximately SAR 34.5 billion in the same year, falling from SAR 36.3 billion in 2008, again as a result of the sharp fall in the global financial market and interest rates. This dramatic fall has affected the Saudi investment income returns significantly.

The third source of the government revenues is income taxes, which are mostly on foreign corporations working in Saudi Arabia (plus local Zakat). Income tax collection commence in November 1950, when the first personal and corporate income tax law was introduced by the government. It was meant to be applicable only to foreigners, but in the end these taxes were imposed only on corporate and international investment (Brown, 1963).

On the other hand, Zakat revenues are a traditional annual tax that is fixed at 2.5 per cent of total capital and profit and is required by every Moslem; and as such it was meant to reflect the Islamic point of view that surplus wealth of the rich should be redistributed among the needy. However, non-Moslems are excluded from Zakat payments; non-Moslems pay taxes instead. These revenues generated approximately SAR 5.5 billion in 2009 (Eldiwany, 2010). Other sources of revenues, such as customs
duties and government services fees, have tended to remain stable in recent years, at between SAR 6.0 to 9.8 billion. However, surplus revenues have accumulated during the period 2002–2010, as a result of the gradual rise of oil prices and all the other economic activity during that period. Table 5.2 and Figure 5.6 show historical statistics for government budgetary revenue in Saudi Arabia.

Table 5.2 Government Budgetary Revenues (SAR Billions)

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2003</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Revenues</td>
<td>213,000</td>
<td>293,000</td>
<td>642,800</td>
<td>1,100,993</td>
<td>509,805</td>
</tr>
<tr>
<td>Oil</td>
<td>166,100</td>
<td>331,000</td>
<td>562,186</td>
<td>983,369</td>
<td>434,420</td>
</tr>
<tr>
<td>Non-oil</td>
<td>46,900</td>
<td>62,291</td>
<td>80,614</td>
<td>117,624</td>
<td>75,385</td>
</tr>
</tbody>
</table>

Breakdown of Non-oil Revenues

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Income</td>
<td>13,929</td>
<td>11,136</td>
<td>26,133</td>
<td>36,373</td>
<td>34,416</td>
</tr>
<tr>
<td>Fee and Charges</td>
<td>23.0</td>
<td>24.0</td>
<td>26.8</td>
<td>27.0</td>
<td>28.9</td>
</tr>
<tr>
<td>Income Taxes</td>
<td>2.40</td>
<td>3.10</td>
<td>6.60</td>
<td>6.80</td>
<td>5.50</td>
</tr>
<tr>
<td>Custom Duties</td>
<td>4.00</td>
<td>5.50</td>
<td>9.39</td>
<td>9.65</td>
<td>9.82</td>
</tr>
<tr>
<td>Other</td>
<td>3.70</td>
<td>18.30</td>
<td>15.70</td>
<td>34.50</td>
<td>26.70</td>
</tr>
</tbody>
</table>

Source: Saudi Arabian Monetary Agency 46th Report

The last two development plans covering the past ten years have announced several priorities to develop government revenues and restructure its budget, including increasing non-oil revenues, reducing the budget deficit to lower levels, restricting government non-producer investment, and developing suitable tools to maintain long-term fiscal policies to avoid the adverse effects of oil revenues on the government budget. To implement these priorities, improving the revenue base in the short and long term should be a priority.
However, government surpluses of oil revenues during oil boom periods can be used to reduce national debt in some stages and help to restructure the government budget in a diversified form (Ministry of Economy and Planning, 2010c; Malik, 2006).

**Figure 5.6 Government Revenues by Sector**

In conclusion, it is obvious that government expenditure in Saudi Arabia has been expanded significantly over time according to different factors. These factors include: expansion of productive administrative government roles; expansion of government activities and functions in relation to education, health services, and culture; and increasing technological progress and its increasing returns to scale. This indicates that these high cost technological projects are better provided some times initially by government. Moreover, considering the empirical analysis of the estimated output presented in chapter seven, the study findings have supported the validity of Wagner’s law in Saudi Arabia, which implies that government expenditure is dependent upon GDP growth, where it is not used as an ineffective a policy instrument.
Chapter Six
Research Methodology

6.1 Overview

In this study, co-integration analysis is employed along with the Granger-causality test (1969) to investigate the relationship between economic output (GDP) and total government expenditure (GE). The test is used to find whether the series are stationary in order to obtain an accurate estimate of the relationship among the economic variables. Wagner’s law suggests that causality runs from GDP to GE; i.e., an increase in economic output causes an increase in government activities. Accordingly, this causal relationship is inferred to be a positive one, in which government expenditure moves in the same direction as national output does. There are six versions of Wagner’s law that have been developed in the literature using different variables associated with economic activity and government expenditure. This study used the six versions of Wagner’s law to examine the long-run relationship between economic growth and government expenditure in the case of Saudi Arabia.

This chapter is organised as follows: First, the six versions of Wagner’s law are explored. Second, there is an introduction to the methodology and the data definitions, including constructing a quarterly data series mathematically. Finally, there are analyses of time-series properties of the data, including unit root tests, co-integration analysis for both Granger-co-integration and Johansen-Juselius tests, standard short-run Granger-causality tests, and the use of the error correction model to investigate for long-run relationships.
6.2 The Examined Versions of Wagner’s Law

In Chapter three, the six commonly used formulations to test Wagner’s law were defined. This chapter presents the formulations of these six versions of Wagner’s law that reflect its interpretations. Moreover, these six formulations will be estimated using Saudi Arabian statistical data.

These widely accepted forms of the law cited in the literature are: (i) Peacock and Wiseman (1961); (ii) Goffman (1968); (iii) Pryor (1968); (iv) Musgrave (1969); (v) (Gupta, 1967; Michas, 1975); and (vi) Mann (1980).

The data series properties tests include unit root tests and co-integration tests. A short-run standard Granger-causality test is performed if co-integration does not exist between the variables, and the Granger-causality test in the framework of the error correction model is estimated if a co-integrating relationship exists between the variables.

In this section, the testing procedures used with each version of Wagner’s law are illustrated. In each of the six versions, log values of all variables have been used, since this enables an interpretation of the result as elasticities (Gujarati and Porter, 2009). In addition, Eviews 7 has been employed to obtain the parameters estimates.

6.3 Summary of the Six Versions

This section provides a summary of the six forms of Wagner’s law, since there is no consensus on the functional form describing Wagner’s law. As an oil-based economy, Saudi Arabia’s GDP would be affected by oil price volatility and export quantity
fluctuations. Hence, two forms of independent variables, real GDP and non-oil real GDP, are introduced to test six versions of Wagner’s law.

For this study, the causality hypothesis runs from real GDP or non-oil real GDP as an independent variable to the dependant variable total real government expenditure which takes four forms: total government expenditure (GE); government expenditure on consumption (GEC) per capita government expenditure \( \frac{GE}{N} \) and the share of government expenditure in total GDP \( \frac{GE}{GDP} \). The six versions of Wagner’s law with total real GDP and non-oil real GDP are outlined in Tables 6.1 and 6.2 respectively.

<table>
<thead>
<tr>
<th>Version</th>
<th>Functional Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Peacock and Wiseman (1967)</td>
<td>( \ln(GE) = \alpha + \beta \ln(GDP) + \varepsilon )</td>
</tr>
<tr>
<td>2 Pryor (1968)</td>
<td>( \ln(GEC) = \alpha + \beta \ln(GDP) + \varepsilon )</td>
</tr>
<tr>
<td>3 Goffman (1968)</td>
<td>( \ln(GE) = \alpha + \beta \ln \left( \frac{GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>4 Musgrave (1969)</td>
<td>( \ln \left( \frac{GE}{GDP} \right) = \alpha + \beta \ln \left( \frac{GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>5 Gupta (1967) and Michas (1975)</td>
<td>( \ln \left( \frac{GE}{N} \right) = \alpha + \beta \ln \left( \frac{GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>6 Mann (1980)</td>
<td>( \ln \left( \frac{GE}{GDP} \right) = \alpha + \beta \ln(GDP) + \varepsilon )</td>
</tr>
</tbody>
</table>

The natural logarithm is denoted by \( \ln \)
Table 6.2 The Six Versions of Wagner’s Law with Non-oil Real GDP

<table>
<thead>
<tr>
<th>Version</th>
<th>Functional Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Peacock and Wiseman (1967)</td>
<td>( \ln(GE) = \alpha + \beta \ln \left( \frac{Non-oil-GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>2 Pryor (1968)</td>
<td>( \ln(GEC) = \alpha + \beta \ln \left( \frac{Non-oil-GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>3 Goffman (1968)</td>
<td>( \ln(GE) = \alpha + \beta \ln \left( \frac{Non-oil-GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>4 Musgrave (1969)</td>
<td>( \ln \left( \frac{GE}{Non-oil-GDP} \right) = \alpha + \beta \ln \left( \frac{Non-oil-GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>5 Gupta (1967) and Michas (1975)</td>
<td>( \ln \left( \frac{GE}{N} \right) = \alpha + \beta \ln \left( \frac{Non-oil-GDP}{N} \right) + \varepsilon )</td>
</tr>
<tr>
<td>6 Mann (1980)</td>
<td>( \ln \left( \frac{GE}{Non-oil-GDP} \right) = \alpha + \beta \ln \left( Non-oil-GDP + \varepsilon \right) )</td>
</tr>
</tbody>
</table>

The natural logarithm is denoted by \( \ln \)

6.4 The Sample Data

Testing causal relationship between national outputs defined as real GDP and total government expenditure GE for Saudi Arabia for the period 1974–2009 requires data that was obtained from the following sources: International Monetary Fund Statistics Department (2009), IFS, and Saudi Arabian Monetary Agency (SAMA) annual reports. In addition, the Simpson’s parabolic rule with numerical integration (Matthews, 2004) is applied to construct a quarterly data series from the annual data.

6.4.1 Real GDP and Non-oil Real GDP

The Saudi Arabian economy is primarily based on the oil sector. This sector accounts for approximately 90 per cent of its exports (Economist Intelligence Unit, 2009). Long-run changes in oil market conditions would surely affect the country’s total GDP. This
dependence makes the economy vulnerable to oil price fluctuations and world economic conditions. The dualistic nature of the economic structure makes the distinction between the concept of real GDP and non-oil real GDP beneficial in economic analysis. Therefore, the behaviour of both series is quite different. Figures 6.1 and 6.2 graph the fluctuations of the real GDP and the real non-oil real GDP respectively for the study period.

**Figure 6.1 Annual Changes in Real GDP**

![Chart showing annual changes in real GDP over the years 1976 to 2009.](chart1)

**Figure 6.2 Changes in Non-oil Real GDP**

![Chart showing changes in non-oil real GDP over the years 1976 to 2009.](chart2)
6.4.2 Constructing the Quarterly Time-series Data

The most common problem facing applied researchers is data availability. Most developing countries have very limited databases. Notably, Saudi Arabia maintains a rich national accounts database when compared to other developing countries in the region. The problem is that it is only available on an annual basis, so the datasets might not contain a high enough number of observations to conduct a reliable statistical analysis. Therefore, expanding the number of observations using different methods, while maintaining the structure of the original data, is beneficial for the purpose of comparing or confirming the statistical result.

There are several methods that can disaggregate quarterly data from annual observations. These methods can be classified into methods that are based on regression techniques, and numerical methods based on mathematical calculations. The first method might not be practical for most developing countries, as data for other variables are required to generate the quarterly series, and there is no guarantee that the other series will be available. The second method is the numerical method, adopted in this study, which depends on generating quarterly series for the national accounts mathematically. The advantage of this method is that it does not require the use of any additional variables. The method is based on the Simpson’s parabolic rule in numerical integration which has been used by Al-Turki (1995), Goldstein and Khan (1976), and further illustrated in (Matthews, 2004).

Conventional wisdom suggests that more observations provide a better statistical outcome. However, Hakkio and Rush (1991) suggested that this wisdom needs to be treated carefully, since it is believed that co-integration analysis is a concept for a long-run span: it requires a longer span of data, not merely a short sequence. Therefore, it is
not beneficial to increase the number of observations using a shorter frequency in the same span. Shiller and Perron (1985) defended the same argument and mentioned that the length of the time-series is far more important than the frequency of observation.

In this study, expanding the number of observations could be beneficial for the purpose of comparing and confirming the study results. The study investigated Wagner’s law using two data series, the annual data series for the period from 1974 to 2009, and the quarterly data series, which was generated by using the numerical method for the period 1974Q1–2009Q4.

### 6.4.3 Method of Generating Quarterly Series

To generate quarterly series from annual observations, the researcher should approximate the graph of \( Y = f(x) \) between two points at which the values of \( Y \) are known. Here, \( Y \) denotes the variable whose annual observations are available. Representing \( f(x) \) by a quadratic function as

\[
Y = ax^2 + bx + c
\]  

(6.8)

we have three consecutive annual observations at year \( t-1 \) and \( t+1 \) of a flow variable \( Y \), then the quadratic function approximation of the graph of \( Y \) takes the form

\[
\int_{t-1}^{t} \left( ax^2 + bx + c \right) \, dx = Y_t
\]

(6.9)

Integrating and solving the three resulting simultaneous equations for \( a, b, \) and \( c \) gives
\[ a = 0.5Y_{t+1} - 1.0Y_t + 0.5Y_{t-1} \]
\[ b = -1.0Y_{t+1} + 3.0Y_t - 2.0Y_{t-1} \]  \hspace{1cm} (6.10)
\[ c = 0.333Y_{t+1} - 1.167Y_t + 1.833Y_{t-1} \]

The quarterly figures within any year can be approximated by dividing annual intervals into equal quarterly sub-intervals, and then approximating each sub-quarter by using equations similar to (6.10). Here we use the following integrals:

First Quarter \((Q_1)\): \[ \int_{1}^{1.25} \left( ax^2 + bx + c \right) dx \]

Second Quarter \((Q_2)\): \[ \int_{1.25}^{1.50} \left( ax^2 + bx + c \right) dx \]  \hspace{1cm} (6.11)

Third Quarter \((Q_3)\): \[ \int_{1.50}^{1.75} \left( ax^2 + bx + c \right) dx \]

Fourth Quarter \((Q_4)\): \[ \int_{1.75}^{2.00} \left( ax^2 + bx + c \right) dx \]

The following fundamental equations for interpolation observations into quarterly figures can be estimated by integration and substitution for \( a, b, \) and \( c \) from (6.10).

\[ Q_1 = -0.039Y_{t+1} + 0.2344Y_t + 0.0547Y_{t-1} \]
\[ Q_2 = -0.0234Y_{t+1} + 0.2656Y_t + 0.0078Y_{t-1} \]  \hspace{1cm} (6.12)
\[ Q_3 = 0.0078Y_{t+1} + 0.2656Y_t - 0.234Y_{t-1} \]
\[ Q_4 = 0.0547Y_{t+1} + 0.23440Y_t - 0.0391Y_{t-1} \]

The relation in equation (6.12) is used to generate quarterly series that can be used when estimating the model. Goldstein and Khan (1976) argued that the statistical and graphical examinations of the interpolated series were as reliable as officially published.
data. In this study, both annual and quarterly time-series of the national income and government spending are used. Figures 6.3 and 6.4 graph both the original annual data and the quarterly data series respectively for the GDP of Saudi Arabia.

Figure 6.3 Annual Data for Saudi Arabian GDP

![Figure 6.3 Annual Data for Saudi Arabian GDP](image)

Figure 6.4 Quarterly Data for Saudi Arabian GDP

![Figure 6.4 Quarterly Data for Saudi Arabian GDP](image)
6.5 Econometric Methodology

After examining the academic literature, it was found that some studies of Wagner’s law used traditional regression analysis such as OLS, while others used causality testing. Recent studies used co-integration analysis, which allows researchers to investigate the possibility of a long-run relationship between government expenditure and economic growth. This study adopted the latter methodology, using Granger-causality regression (1969) to investigate the direction of the causality after testing the data properties.

Most macroeconomic time-series data have shown a stochastic trend and a non-stationary component (Nelson and Plosser, 1982). In most cases they contain unit roots, which cause different statistical problems such as spurious regression. For instance, if non-stationary data is used to estimate models, this may generate spurious and inconsistent relationships, which may lead to misleading conclusions. In this study, the long-run relationship among variables is tested by applying Engle-Granger co-integration technique (1987) to investigate the nature of the time-series properties.

6.5.1 Unit Root Test

It is important to test the time-series properties of the variables under investigation for unit roots. This helps to avoid possible problems in estimating spurious relationships, which can lead to misleading results. If the variables under investigation are stationary (i.e., they do not contain a unit root), it is said to be $I(0)$ or integrated of order zero. In this case, running ordinary least square regression would be acceptable. On the other hand, any time-series can be stationary in difference form. In this case, it is said to be integrated of order ($d$); here $d$ is the number of times it must be differenced before the
series becomes stationary. The Augmented Dickey Fuller test (ADF) (1981), which was
developed to test for the existence of a unit root, is used in this study to test for the data
set stationarity. The general models used in the ADF test can be written either for
levels as
\[
\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 t + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + e_t
\]
(6.13)
or for differences as
\[
\Delta \Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 t + \sum_{i=1}^{p} \beta_i \Delta \Delta y_{t-i} + \mu_t
\]
(6.14)
Here \(\Delta\) is the difference operator, \(p\) is the number of lags (where, \(i = 1,2,3 \ldots p\)), \(t\) is
the time trend variable and \(e_t\) and \(\mu_t\) are normal error distribution terms. The null
hypothesis used when testing for a unit root in (6.13) and (6.14) is \(H_0 : \alpha_0 = \alpha_1 = 0\) is
tested against the alternative hypothesis \(H_0 : \alpha_0 \neq \alpha_1 \neq 0\) by comparing the calculated \(t\)
value for \(\alpha_1\) with the corresponding critical value. The calculated \(t\) value should be
negative with a larger absolute value than the critical value for the null hypothesis to be
rejected. In this case, the level of the time-series, \(y_t\), is characterised as \(I(0)\). In other
cases, the individual time-series are integrated of order one \(I(d)\), then a co-integration
test should be performed, to investigate whether these variables are related to each other
and sharing the same trend. Here, regressing one on the other will not necessarily yield
spurious regression.

To test for a unit root when the form of the data-generating process is unknown, Enders
(2004) suggests the following four-step procedure based on Dolado, Jenkinson, and
Sosvilla-Rivero (1990) as follows:
i) Starting with the least restrictive model, which includes the trend and drift terms, estimate the coefficient of $\alpha_1$ in (6.13). If the null hypothesis is rejected, we conclude that $y_t$ does not contain a unit root.

ii) If the null hypothesis is not rejected, a test for trend significance should be performed under the null hypothesis of a unit root. If the trend is not significant, proceed to step iii. If the trend is significant, a re-test for the presence of a unit root should be performed using the normal distribution. If the null hypothesis of the unit root is rejected, proceed no further and conclude that $y_t$ does not have a unit root. Otherwise, proceed to step iii.

iii) Estimate the model without a trend term, and then test for a unit root. If it is concluded that there is no unit root, proceed no further. Otherwise, test for the significance of the drift term. If the drift is significant, compare the $t$ value for $\alpha_1$ with the critical $Z$-value. If this is significant, conclude that $y_t$ is stationary. If it is not significant, proceed to the next step.

iv) Estimate without drift or trend terms to test for the presence of a unit root. If the null hypothesis of a unit root is rejected, conclude that the series $y_t$ does not contain a unit root; otherwise, conclude that $y_t$ contains a unit root.

Following this procedure, if the null hypothesis still cannot be rejected, this means the series is not stationary in levels but it might be stationary in first differences. Therefore, we apply (6.14) to test whether the series is integrated of order $I(1)$. 

151
6.5.2 Co-integration Test

Co-integration is a situation in which two non-stationary data series have a common stochastic component, in that a linear combination of these variables is stationary. Economically, two variables are co-integrated if they have a long-term equilibrium relationship. However, co-integration can be used as a method to avoid both spurious regressions and inconsistency problems that can be found with non-stationary data.

A number of different co-integration tests have been proposed in the literature. The bulk of the co-integration literature focuses on the situation in which each variable contains a single unit root. The reason for this is that traditional regression or time-series analysis normally applies when variables are I(0). The most widely used approaches to test for co-integration between the stationary variables are the two-step Engle-Granger (1987) and Johansen-Juselius (1988, 1992). For the former approach, in order to determine if the variables are actually co-integrated, Engle and Granger proposed a co-integration test by estimating the following form

\[ Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t \]  \hspace{1cm} (6.15)

to test whether the residuals \( \varepsilon_t \) from the regression model are stationary. This test involves estimation of the Dickey-Fuller test on the residuals to be determine their order of integration using the following model

\[ \hat{\varepsilon} = \left( Y_t - \beta_0 - \beta_1 X_t \right) \] \hspace{1cm} (6.16)

\[ \Delta\hat{\varepsilon} = \alpha \hat{\varepsilon}_{t-1} + \ell_t \] \hspace{1cm} (6.17)

If the residuals \( \hat{\varepsilon}_t \) are stationary, differences between the variables tend to be smaller. Therefore a long-run equilibrium exists for these variables. If the residuals do not
appear to be white noise, an augmented form of the test can be performed including a
trend variable to test if the residuals from the new regression are stationary. The co-
integration test has its own critical values which are interpolated using the response
surface in MacKinnon (1991). Holden and Thomson (1992) state that this approach is
suitable for two reasons: first, it can be modelled by ordinary least squares; and second,
this model reduces the likelihood of multicollinearity, since it reduces the number of the
coefficients to be estimated. However, multicollinearity is not a problem with Wagner’s
model.

The second approach, a multivariate approach proposed by Johansen and Juselius
(1988, 1992), is based on the error correction representation of the vector auto
regression (VAR) model. A general VAR model with (I) lag length can be expressed in
a vector formula as

\[
\Delta X_t = \Pi_0 + \Pi_1 \Delta X_{t-1} + \Pi_{p-1} \Delta X_{t-p+1} + \pi X_{t-p} + BZ_t + \mu_t
\]  

(6.18)

where \( X_t \) is \( m \times 1 \) vector of \( I(1) \) variables, \( Z_t \) is an \( S \times 1 \) vector of \( I(0) \) variables, \( \Pi \) are
parameters and \( \mu_t \) is the error term. To test the hypothesis that there are at most \( r \) co-
integrating vectors, the revealed trace and the maximum eigenvalues statistics are used
to test for co-integration based on the null hypothesis that the number of co-integrating
vectors \( r \) against the alternative of \( r+1 \) co-integrating vectors. Johansen-Jueslius (1988)
provide critical values for \( (\lambda \text{ trace}) \) and \( (\lambda \text{ max}) \) statistics. The vectors of the
constants, \( \pi_0 \), allow for the possibility of a drift in the data series. Enders (2004) states
that \( \lambda \text{ trace} \) and \( \lambda \text{ max} \) statistics can conflict, but \( \lambda \text{ max} \) provides the sharper hypothesis
as it is usually tries to pin down the number of co-integrating vectors.
In this project, an augmented Engle-Granger (1987) test for co-integration is employed along with Johansen-Juselius (1988, 1992) to test for co-integration between the suggested variables. The latter approach is known as a multivariate model, but it is preferred and used by different studies, even in a bivariate system. Al-Batel (2002) outlined different reasons regarding this issue. He mentioned that the Engle-Granger procedure depends on the normalisation of the variables that make it sensitive to the choice of dependent and independent variables in the co-integrating equation. Thus, it is possible that the arbitrary choice of one variable as the independent variable and the other as a dependent variable may lead to the conclusion that the variables are co-integrated, whereas reversing the choice of independent and dependent variables may indicate no co-integration. Furthermore, because the Engle-Granger procedure depends on two-step estimator, any errors introduced in the first step might affect the second step.

On the other hand, the Johansen-Juselius approach provides a flexible format to investigate the properties of the estimator under different assumptions about the underlying data generating process. Moreover, unlike Engle-Granger co-integration methodology, the Johansen-Juselius approach is capable of determining the number of co-integrating vectors in the relationship.

In the case of more than two variables, numbers of scholars, including Banerjee, Dolado, Galbraith, and Hendry (1993) and Cuthbertson, Hall and Taylor (1992), showed that the Johansen-Juselius procedure is preferred. Gonzalo (1994) compared the performance of the co-integration tests using a Monte Carlo study and found that the Johansen-Juselius procedure is the most powerful even for the bivariate system. Therefore, this study will adopt the two approaches, but it will consider Johansen-
Juselius estimates. If the data series is found to be co-integrated, the Granger-causality test will be applied using an appropriate error correction term derived from the co-integration equation. If the series are found not to be co-integrated, the Granger-causality test will be applied using the stationary level of the data set, as will be illustrated in the following section.

6.5.3 The Granger-causality Test

The basic concept of the Granger-causality test (Granger, 1969) is based on the idea that a cause cannot accrue after an effect. In other words, X is said to cause Y if the current value of Y depends on the past value of X, and accordingly, the history of X is said to be a convincing factor that helps to predict Y. Moreover, causality could run in either direction or both directions. It is recommended to investigate the time-series properties when testing for causality and include appropriate variables in the model to avoid statistical problems such as the problem of omitted variable bias. In this case, one can make a strong statement about causality.

However, the Granger-causality test is used widely in applied economics as a way of indicating if a variable has been a leading indicator of another during earlier periods. These intuitive ideas can be investigated through regression models incorporating Granger-causality tests for a bivariate system, which uses the following models.

\[ Y_t = \sum_{i=1}^{p} \alpha_i X_{t-i} + \sum_{j=1}^{p} \beta_j Y_{t-j} + \mu_t \]  \hspace{1cm} (6.19)

\[ X_t = \sum_{i=1}^{p} \phi_i X_{t-i} + \sum_{j=1}^{p} \eta_j Y_{t-j} + \nu_t \]  \hspace{1cm} (6.20)
The coefficient $\alpha_i$ in (6.19) measures the influence of $X_{i,t}$ on $Y_t$. If $\alpha_i$ is statistically significant, then we conclude that $X_{i,t}$ Granger causes $Y_t$. Equation (6.20) also, postulates a similar behaviour for $X_t$. The error terms $\mu_t$ and $v_t$ are assumed to be uncorrelated and white noise. The null hypotheses of the Granger-causality test is $\alpha_i = 0$ in equation (6.19) and $\eta_i = 0$ in equation (6.20) for all $i$ and $j$, and these are tested using standard $t$ and $F$-tests. Therefore, if $\alpha_i = 0$ and $\eta_i = 0$ for all $i$ and $j$, this suggests that there is no causality, and that the current value of each variable is influenced only by its own past value.

In this study, when performing the standard Granger-causality test using the six versions of Wagner’s law, four different measures of government expenditure are used. These are: total government expenditure ($GE$), government expenditure for consumption ($GEC$), the share of government expenditure of GDP ($GE/GDP$), and per capita government expenditure ($GE/N$). The independent variable that is used is gross domestic product ($GDP$). Here, two different versions of this variable are used; real GDP and non-oil real GDP.

For the simple bivariate model, the pattern of causality can be identified by estimating the model in logarithmic form as follows:

$$\ln GE_t = a_0 + \sum_{i=1}^{m} \varphi_i \ln GE_{t-i} + \sum_{j=1}^{m} \eta_j \ln GDP_{t-j} + v_t \quad (6.21)$$

$$\ln GDP_t = a_0 + \sum_{i=1}^{p} a_i \ln GE_{t-i} + \sum_{j=1}^{p} \beta_j \ln GDP_{t-j} + u_t \quad (6.22)$$
In these models it is assumed that $\mu_t$ and $\nu_t$ are two uncorrelated white noise series and testing for causality in this case implies four possible findings:

i) Unidirectional causality runs from GE to GDP, which implies that $\sum \alpha_i \neq 0$ and $\sum \eta_j = 0$. The Keynesian model is valid in this case.

ii) Unidirectional causality runs from GDP to GE, which implies that $\sum \alpha_i = 0$ and $\sum \eta_j \neq 0$. The situation is consistent with Wagner’s law.

iii) A bi-directional causality between GE and GDP, which implies that $\sum \alpha_i \neq 0$ and $\sum \eta_j \neq 0$. Both variables are related to current and past effects of the other variables and all parameter estimates are significant. In this case, neither the Keynesian nor Wagner’s approach is valid.

iv) The last case implies no causality running between the two variables, the GDP and GE parameters are not statistically significant, and neither variable Granger-causes the other (Gujarati and Porter, 2009).

This procedure has a substantial drawback, as it is valid only when variables are $I(0)$. For instance, if $(\chi$ and $\gamma)$ are stationary, OLS estimation can be carried out in the usual way and testing for coefficient significance can be applied using standard $t$ and $F$-tests. On the other hand, if the two variables are non-stationary, the causal variable can be made to appear in first differences $I(1)$, and then the test for Granger-causality is permissible. Similarly, the test cannot be performed if the variables are co-integrated. In this case, the estimation suffers from bias and the omitted variable problem. However, if the series has been determined to be co-integrated, the error correction model (ECM) is more appropriate than the Granger-causality test (Enders, 2004).


6.5.4 Error Correction Model (ECM)

The recent development of co-integration analysis indicates that if the null hypotheses of no co-integration between public expenditure and national income are rejected, a more comprehensive procedure for the causality test for variables that are found to be co-integrated was advanced by Engle and Granger (1987). Such an approach is known as the error correction mechanism.

Applying the Granger-causality test in the framework of the error correction model helps to construct a general dynamic model in which the movement of the variables in any period is related to the previous period’s gap from long-run equilibrium. The error correction mechanism allows modelling of both long and short-term forces at the same time in a single statistical model (Gujarati and Porter, 2009) and can be constructed as follows:

\[ Y_t = \beta_0 + \beta_1 X_t + \mu_t \]  

(6.23)

The error correction term can be derived from equation (6.23) as

\[ \hat{\mu} = Y_t - \beta_0 - \beta_1 X_t \]  

(6.24)

The resulting expression of the error correction term can be included in a new regression equation, which becomes

\[ \Delta Y_t = \beta_0 + \beta_1 \Delta X_t + \beta_2 \mu_{t-1} + \epsilon_t \]  

(6.25)

Equation (6.25) states an important theorem known as the Granger representation theorem, which postulates that if the assumption of co-integration between two variables (X and Y) exists, the relationship between them can be expressed as an ECM. Here, \( \mu_{t-1} \) is the error correction term lagged one period, and is the estimated residuals.
from the co-integrated regression of the long-run relationship, and it must be stationary (Koop, 2005). Therefore, the causality model can be expressed as follows:

\[
\Delta Y_t = \lambda_1 ECT_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta X_{t-i} + \sum_{j=1}^{p} \beta_j \Delta Y_{t-j} + \mu_t
\]

(6.26)

\[
\Delta X_t = \lambda_2 ECT_{t-1} + \sum_{i=1}^{p} \phi_i \Delta X_{t-i} + \sum_{j=1}^{p} \eta_j \Delta Y_{t-j} + \nu_t
\]

(6.27)

Here, the error correction term (ECT) is the unique difference between the standard causality formulation in (6.21) and (6.22). It is equivalent to the \( \mu_{i-1} \) term in (6.25) and thus represents the disequilibrium residuals of a co-integrating equation. The sources of causation can be identified by testing for coefficient significance on the dependent variables in both equations. Moreover, the other source of causation is the ECT, which represents how quickly equilibrium is restored. For example, if \( \lambda_1 \) in equation (6.26) is zero, then \( Y \) does not respond to any deviation from the long-run equilibrium in the previous period, and this can be tested using a t-test. If an error correction formulation was applied, the error correction coefficients \( \lambda_1 \) and \( \lambda_2 \) in (6.26) and (6.27) should be negative for \( Y \), which in this study denotes government expenditure as a dependent variable, and positive for \( X \), which denotes the independent variable GDP. In addition, \( Y \) in equation (6.26) should respond negatively and \( X \) in equation (6.27) should respond positively to any positive value of ECT.

To conclude, in order to test for Granger-causality, Anwer, Davies and Sampath (1996) performed three procedures for the test in the frame of an error correction model. First, the joint hypothesis for equation (6.26) to be tested is: \( H_0 : \lambda_1 = 0 \) and \( H_0 : \alpha_i = 0 \) or
If this test fails to reject the null hypothesis, then no further tests are employed, since the variables have been determined to have no causality. However, if the null hypothesis is rejected, an assessment of the causality source is needed. The second procedure of an ECM is to test the significance of $\alpha_i$ and $\phi_i$ to test the possibility of short-run causality. The final procedure is an analysis of the direction of $\lambda_i$ to test if they infer a long-run equilibrium relationship, as mentioned above.
Chapter Seven

Empirical Analysis of

Wagner’s Law in Saudi Arabia

7.1 Overview

The purpose of this study is to investigate evidence supporting Wagner's law for the relationship between economic growth and government expenditure. Therefore, this chapter presents the application of the empirical analysis and concentrates on the application of the methodology that was discussed in chapter six.

As outlined in the methodology chapter, testing whether data is stationary is an important step when applying modern empirical techniques to test for the validity of Wagner’s law. The augmented unit root test, one of the most widely used methods to investigate the time-series properties, is applied. The co-integration test is applied to confirm the nature of the relationship between the examined variables. Both the two-step Granger co-integration test and Johansen-Juselius co-integration test are used to investigate the existence of the long-run relationship between the examined variables. According to the co-integration test result, the Granger-causality test is employed either in the framework of an error correction model or in its standard bivariate form.

This chapter reports the empirical results of testing six common versions of Wagner’s law for the case of Saudi Arabia and it is organised as follows: first, analysis of the data properties including the Augmented Dickey-Fuller test to test the data properties; second, the co-integration testing, using both the Granger co-integration test and the
Johansen-Juselius co-integration test; and finally, the Granger-causality test employed in two forms, in the framework of the error correction model and in its standard short-run form, respectively.

7.2 Empirical Findings

The analysis in this section considers the original series in real terms, which were constructed from two main sources; the International Monetary Fund International Financial Statistics (IFS) and Saudi Arabian Monetary Agency (SAMA) annual reports. The statistics are deflated using the 1999 value of GDP. In addition, the quarterly version of the series which has been constructed mathematically is considered to verify robustness of the econometric work.

7.2.1 Unit Root Test

It is believed that most macroeconomic variables have a unit root that generates a spurious regression (Nelson and Plosser, 1982). Existence of a unit root in a series denotes non-stationarity. An augmented unit root test (Dickey and Fuller, 1981) is employed to test for the presence of a unit root. The test is employed in the levels and first-difference forms to determine the order of integration. Furthermore, the test is employed with and without the assumption of a deterministic trend, so as to account for the possibility of a stochastic or deterministic trend that may impact the test outcome. Five per cent as a significance level for the (ADF) test is used when accepting or rejecting the null hypothesis of the unit root. The test outcomes for the annual data series with real GDP and non-oil real GDP are shown in Tables 7.1 and 7.2, respectively.
The quarterly series contains 140 observations simultaneously for the period from 1974Q1 to 2009Q4 and are shown in Tables 7.3 and 7.4, respectively.

### Table 7.1 Unit Root Test: Annual Data with Real GDP

<table>
<thead>
<tr>
<th>Version</th>
<th>Variable</th>
<th>Test in Levels No Trend</th>
<th>Trend</th>
<th>Test in 1st Diff. No Trend</th>
<th>Trend</th>
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<tbody>
<tr>
<td>Peacock and Wiseman</td>
<td>ln GDP</td>
<td>2.97</td>
<td>-3.09</td>
<td>-4.02**</td>
<td>-4.12**</td>
</tr>
<tr>
<td></td>
<td>ln GE</td>
<td>-1.99</td>
<td>-4.45**</td>
<td>-4.96**</td>
<td>-4.50**</td>
</tr>
<tr>
<td>Pryor</td>
<td>ln GDP</td>
<td>2.97</td>
<td>-3.09</td>
<td>-4.02**</td>
<td>-4.12**</td>
</tr>
<tr>
<td></td>
<td>ln GEC</td>
<td>2.51</td>
<td>-4.26**</td>
<td>-4.81**</td>
<td>-4.00**</td>
</tr>
<tr>
<td>Goffman</td>
<td>ln GDP/N</td>
<td>-0.70</td>
<td>-1.82</td>
<td>-4.05**</td>
<td>-3.94**</td>
</tr>
<tr>
<td></td>
<td>ln GE</td>
<td>-1.99</td>
<td>-4.45**</td>
<td>-4.96**</td>
<td>-4.50**</td>
</tr>
<tr>
<td>Musgrave</td>
<td>ln GDP/N</td>
<td>-0.70</td>
<td>-1.82</td>
<td>-4.05**</td>
<td>-3.94**</td>
</tr>
<tr>
<td></td>
<td>ln GE/GDP</td>
<td>-1.34</td>
<td>-3.78**</td>
<td>-6.09**</td>
<td>-6.11**</td>
</tr>
<tr>
<td>Gupta and Michas</td>
<td>ln GDP/N</td>
<td>-0.70</td>
<td>-1.82</td>
<td>-4.05**</td>
<td>-3.94**</td>
</tr>
<tr>
<td></td>
<td>ln GE/GDP</td>
<td>-1.34</td>
<td>-3.78**</td>
<td>-6.09**</td>
<td>-6.11**</td>
</tr>
<tr>
<td>Mann</td>
<td>ln GDP</td>
<td>2.97</td>
<td>-3.09</td>
<td>-4.02**</td>
<td>-4.12**</td>
</tr>
<tr>
<td></td>
<td>ln GE/GDP</td>
<td>-1.34</td>
<td>-3.78**</td>
<td>-6.09**</td>
<td>-6.11**</td>
</tr>
</tbody>
</table>

Note: Rejection of the null hypothesis at 10%* 5%**

### Table 7.2 Unit Root Test: Annual Data with Non-oil Real GDP

<table>
<thead>
<tr>
<th>Version</th>
<th>Variable</th>
<th>Test in Levels No Trend</th>
<th>Trend</th>
<th>Test in 1st Diff. No Trend</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock and Wiseman</td>
<td>ln Non-oil GDP</td>
<td>0.95</td>
<td>3.28*</td>
<td>-2.73**</td>
<td>-2.79</td>
</tr>
<tr>
<td></td>
<td>ln GE</td>
<td>-1.99</td>
<td>-4.45**</td>
<td>-4.96**</td>
<td>-4.50**</td>
</tr>
<tr>
<td>Pryor</td>
<td>ln Non-oil GDP</td>
<td>0.95</td>
<td>3.28*</td>
<td>-2.73**</td>
<td>-2.79</td>
</tr>
<tr>
<td></td>
<td>ln GEC</td>
<td>2.51</td>
<td>-4.26**</td>
<td>-4.81**</td>
<td>-4.00**</td>
</tr>
<tr>
<td>Goffman</td>
<td>ln Non-oil-GDP/N</td>
<td>0.08</td>
<td>-4.77**</td>
<td>-2.97**</td>
<td>-2.75</td>
</tr>
<tr>
<td></td>
<td>ln GE</td>
<td>-1.99</td>
<td>-4.45**</td>
<td>-4.96**</td>
<td>-4.50**</td>
</tr>
<tr>
<td>Musgrave</td>
<td>ln Non-oil-GDP/N</td>
<td>0.08</td>
<td>-4.77**</td>
<td>-2.97**</td>
<td>-2.75</td>
</tr>
<tr>
<td></td>
<td>ln GE/Non-oil GDP</td>
<td>-0.08</td>
<td>-3.64**</td>
<td>-6.92**</td>
<td>-5.42**</td>
</tr>
<tr>
<td>Gupta and Michas</td>
<td>ln Non-oil-GDP/N</td>
<td>0.08</td>
<td>-4.77**</td>
<td>-2.97**</td>
<td>-2.75</td>
</tr>
<tr>
<td></td>
<td>ln GE/N</td>
<td>-0.47</td>
<td>-2.98</td>
<td>-5.20**</td>
<td>-4.42**</td>
</tr>
<tr>
<td>Mann</td>
<td>ln Non-oil GDP</td>
<td>0.95</td>
<td>3.28*</td>
<td>-2.73**</td>
<td>-2.79</td>
</tr>
<tr>
<td></td>
<td>ln GE/Non-oil GDP</td>
<td>-0.08</td>
<td>-3.64**</td>
<td>-6.92**</td>
<td>-5.42**</td>
</tr>
</tbody>
</table>

Note: Rejection of the null hypothesis at 10%* 5%**
### Table 7.3 Unit Root Test: Quarterly Data with Real GDP

<table>
<thead>
<tr>
<th>version</th>
<th>Variable</th>
<th>Test in Levels</th>
<th>Test in 1st Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No Trend</td>
<td>Trend</td>
</tr>
<tr>
<td>Peacock and</td>
<td>ln GDP</td>
<td>1.49</td>
<td>-2.81</td>
</tr>
<tr>
<td>Wiseman</td>
<td>ln GE</td>
<td>2.60</td>
<td>-1.49</td>
</tr>
<tr>
<td>Pryor</td>
<td>ln GDP</td>
<td>1.49</td>
<td>-2.81</td>
</tr>
<tr>
<td></td>
<td>ln GEC</td>
<td>1.39</td>
<td>-3.54**</td>
</tr>
<tr>
<td>Goffman</td>
<td>ln GDP/N</td>
<td>-0.57</td>
<td>-1.73</td>
</tr>
<tr>
<td></td>
<td>ln GE</td>
<td>2.60</td>
<td>-1.49</td>
</tr>
<tr>
<td>Musgrave</td>
<td>ln GDP/N</td>
<td>-0.57</td>
<td>-1.73</td>
</tr>
<tr>
<td></td>
<td>ln GE/GDP</td>
<td>-1.19</td>
<td>-3.50**</td>
</tr>
<tr>
<td>Gupta and</td>
<td>ln GDP/N</td>
<td>-0.57</td>
<td>-1.73</td>
</tr>
<tr>
<td>Michas</td>
<td>ln GE/N</td>
<td>-0.27</td>
<td>-2.91</td>
</tr>
<tr>
<td>Mann</td>
<td>ln GDP</td>
<td>1.49</td>
<td>-2.81</td>
</tr>
<tr>
<td></td>
<td>ln GE/GDP</td>
<td>-1.19</td>
<td>-3.50**</td>
</tr>
</tbody>
</table>

Note: Rejection of the null hypothesis at 10%* 5%**

### Table 7.4 Unit Root Test: Quarterly Data with Non-oil Real GDP

<table>
<thead>
<tr>
<th>version</th>
<th>Variable</th>
<th>Test in Levels</th>
<th>Test in 1st Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No Trend</td>
<td>Trend</td>
</tr>
<tr>
<td>Peacock and</td>
<td>ln Non-oil GDP</td>
<td>1.12</td>
<td>-9.73*</td>
</tr>
<tr>
<td>Wiseman</td>
<td>ln GE</td>
<td>2.60</td>
<td>-1.49</td>
</tr>
<tr>
<td>Pryor</td>
<td>ln Non-oil GDP</td>
<td>1.12</td>
<td>-9.73*</td>
</tr>
<tr>
<td></td>
<td>ln GEC</td>
<td>1.39</td>
<td>-3.54**</td>
</tr>
<tr>
<td>Goffman</td>
<td>ln Non-oil-GDP/N</td>
<td>0.34</td>
<td>-5.90**</td>
</tr>
<tr>
<td></td>
<td>ln GE</td>
<td>2.60</td>
<td>-1.49</td>
</tr>
<tr>
<td>Musgrave</td>
<td>ln Non-oil-GDP/N</td>
<td>0.34</td>
<td>-5.90**</td>
</tr>
<tr>
<td></td>
<td>ln GE/Non-oil GDP</td>
<td>-0.42</td>
<td>-2.31</td>
</tr>
<tr>
<td>Gupta and</td>
<td>ln Non-oil-GDP/N</td>
<td>0.34</td>
<td>-5.90**</td>
</tr>
<tr>
<td>Michas</td>
<td>ln GE/N</td>
<td>0.27</td>
<td>-2.91</td>
</tr>
<tr>
<td>Mann</td>
<td>ln Non-oil GDP</td>
<td>1.12</td>
<td>-9.73*</td>
</tr>
<tr>
<td></td>
<td>ln GE/Non-oil GDP</td>
<td>-0.42</td>
<td>-2.31</td>
</tr>
</tbody>
</table>

Note: Rejection of the null hypothesis at 10%* 5%**

Figures 7.1 and 7.2 show both the trends for oil GDP and non-oil real GDP with total government expenditure for the study period.

164
Considering the unit root test for each version, the results indicate that the two GDP series versions appear to generate similar conclusion regarding the unit root test. Hence, it can be concluded that the null hypothesis of the unit root cannot be rejected in level form (in most cases) at the 5 per cent significance level, but it can be rejected in first-differences at the 5 per cent significance level. Accordingly, the series may be tested for the existence of a linear combination between the examined variables, which tends to satisfy the long-run relationship between the variables. However, the assumption of data stationarity was not considered in some early studies, which cast doubt on its accuracy when testing Wagner’s law.

### 7.2.2 Co-integration Tests

After determining the order of integration of the data series, the next step is applying co-integration tests across the different versions of Wagner’s law. In this study, the null hypothesis of the unit root has been rejected in first-differences at the 5 per cent significance level and as a result, the co-integration test is employed. Engle and Granger (1987) demonstrated that a linear combination of two non-stationary series can be stationary. Therefore, if such a stationary linear combination exists, the non-stationary time-series are said to be co-integrated of order $I(d)$. The stationary linear
combination is called the co-integrating equation, and it may be interpreted as the long-run equilibrium relationship between the two variables. To test for the presence of a co-integrating relationship between the variables, the study employs two co-integration tests, the two-step Engle-Granger (1987) and Johansen-Juselius (1988–1992). The Engle-Granger co-integration test is employed as an additional test to verify and confirm the Johansen-Juselius co-integration outcome.

The test utilises a unit root technique on the revealed residuals of the regression equation of each version, and it has its own critical values which are interpolated using MacKinnon’s (1991) response surface. If contradictory results are found between the two co-integration test outcomes, the Johansen-Juselius test will be considered, since it has an advantage as stated earlier in chapter six. In this case, the trace and max eigenvalue statistics ($\lambda$) are generally used to test the null hypothesis of no co-integration, but since they might conflict, this study adopts the max ($\lambda$) eigenvalue as it has a more precise hypothesis, as stated by Ender (2004).

The Johansen-Juselius test is employed in two different forms. The first model has the assumption of an intercept and no trend, and the second model has the assumption of an intercept and trend included. Both models can be applied according to the nature of the data. Hence, the study will consider the model for which the output remains consistent with the Engle-Granger approach. The tests are employed on the annual and the quarterly series, respectively.

Additionally, the study conducts two co-integration tests; first, with respect to real GDP, and second, with respect to non-oil real GDP for all six versions of Wagner’s law. These tests are explained in the subsections that follow.
7.2.2.1 Co-integration Test with Real GDP Data

The Engle-Granger co-integration test is applied to investigate for a co-integrating relationship between the examined variables. The test is employed as an auxiliary test to confirm the co-integration test output. Table 7.5 shows the output from the two-step Engle-Granger co-integration test.

Table 7.5 Engle-Granger Co-integration Test with Real GDP

<table>
<thead>
<tr>
<th>Version</th>
<th>Annual Series</th>
<th>Quarterly Series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Trend</td>
<td>With Trend</td>
</tr>
<tr>
<td>Peacock and Wiseman</td>
<td>-3.35</td>
<td>-3.35</td>
</tr>
<tr>
<td>Pryor</td>
<td>-2.76</td>
<td>-2.76</td>
</tr>
<tr>
<td>Goffman</td>
<td>-1.14</td>
<td>-1.14</td>
</tr>
<tr>
<td>Musgrave</td>
<td>-3.29</td>
<td>-3.29</td>
</tr>
<tr>
<td>Gupta and Michas</td>
<td>-3.29</td>
<td>-3.29</td>
</tr>
<tr>
<td>Mann</td>
<td>-3.35</td>
<td>-3.35</td>
</tr>
</tbody>
</table>

Note: Rejection of the null hypothesis at 5%*, 1%**
Critical value for the Engle-Granger Co-integration test annual series are:
-3.46 (5%), -4.12 (1%). Critical values for the quarterly series test are: -3.39 (5%), -4.00 (1%)

As shown from the resulting output, the Engle-Granger test does not show any co-integrating relation between the examined variables for any of the six versions of Wagner’s law using real GDP. The test failed to reject the null hypotheses of no co-integration at both the 5 per cent and 1 per cent levels of significance for both data series. Therefore, the result implies no long-run relationship between the examined variables for all Wagner’s law versions using real GDP data.

For the Johansen-Juseluis test with real GDP, the test is employed considering the assumption of intercept and no trend, and the assumption of an intercept and trend included. The output is summarised in the following four tables: the annual data series
for model one in Table 7.6, and for model two in Table 7.7; and the quarterly data series for model one in Table 7.8, and for model two in Table 7.9. The Schwarz lag-length criterion (SC), one of the most commonly used information criteria, is adopted to decide the most appropriate lag length for each version (Serena, and Perron, 2001).

### Table 7.6 Johansen-Juselius Co-integration Test
**Model (1) Intercept and No Trend with Real GDP Annual Series**

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (1)</td>
<td>None</td>
<td>0.30</td>
<td>12.81</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td>At most</td>
<td>0.03</td>
<td>1.11</td>
<td>6.63</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Pryor (1)</td>
<td>None</td>
<td>0.23</td>
<td>9.71</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td>At most</td>
<td>0.02</td>
<td>1.07</td>
<td>6.63</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Goffman (1)</td>
<td>None</td>
<td>0.20</td>
<td>8.26</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td>At most</td>
<td>0.12</td>
<td>4.87</td>
<td>6.63</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Musgrave(1)</td>
<td>None</td>
<td>0.34</td>
<td>15.50*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td>At most</td>
<td>0.10</td>
<td>4.11</td>
<td>6.63</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Gupta-Michas (1)</td>
<td>None</td>
<td>0.34</td>
<td>15.50*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td>At most</td>
<td>0.10</td>
<td>4.11</td>
<td>6.63</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Mann (1)</td>
<td>None</td>
<td>0.30</td>
<td>12.81</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td>At most</td>
<td>0.03</td>
<td>1.11</td>
<td>6.63</td>
<td>3.84</td>
<td></td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level. CE refers to the number of co-integration equations. (1) is the lag length determined by SC.

### Table 7.7 Johansen-Juselius Co-integration Test
**Model (2) Intercept and Trend with Real GDP Annual Series**

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (1)</td>
<td>None</td>
<td>0.41</td>
<td>18.92</td>
<td>31.15</td>
<td>19.38</td>
</tr>
<tr>
<td>At most</td>
<td>0.14</td>
<td>5.48</td>
<td>16.55</td>
<td>12.51</td>
<td></td>
</tr>
<tr>
<td>Pryor (1)</td>
<td>None</td>
<td>0.41</td>
<td>19.52*</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td>At most</td>
<td>0.19</td>
<td>5.28</td>
<td>16.55</td>
<td>12.52</td>
<td></td>
</tr>
<tr>
<td>Goffman (1)</td>
<td>None</td>
<td>0.44</td>
<td>21.49*</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td>At most</td>
<td>0.14</td>
<td>5.54</td>
<td>16.55</td>
<td>12.52</td>
<td></td>
</tr>
<tr>
<td>Musgrave(1)</td>
<td>None</td>
<td>0.38</td>
<td>17.77</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td>At most</td>
<td>0.01</td>
<td>4.60</td>
<td>16.55</td>
<td>12.52</td>
<td></td>
</tr>
<tr>
<td>Gupta-Michas (1)</td>
<td>None</td>
<td>0.38</td>
<td>17.77</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td>At most</td>
<td>0.01</td>
<td>5.85</td>
<td>16.55</td>
<td>12.52</td>
<td></td>
</tr>
<tr>
<td>Mann (1)</td>
<td>None</td>
<td>0.40</td>
<td>18.92</td>
<td>23.97</td>
<td>25.87</td>
</tr>
<tr>
<td>At most</td>
<td>0.14</td>
<td>5.48</td>
<td>16.55</td>
<td>12.52</td>
<td></td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level. CE refers to the number of co-integration equations. (1) is the lag length determined by SC.
### Table 7.8 Johansen-Juselius Co-integration Test

#### Model (1) Intercept and No Trend with Real GDP Quarterly Series

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (5)</td>
<td>None</td>
<td>0.04</td>
<td>6.64</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>1.00</td>
<td>0.00</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Pryor (5)</td>
<td>None</td>
<td>0.06</td>
<td>10.05</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.00</td>
<td>0.12</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Goffman (4)</td>
<td>None</td>
<td>0.08</td>
<td>11.91</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.00</td>
<td>0.12</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Musgrave (4)</td>
<td>None</td>
<td>0.08</td>
<td>15.61*</td>
<td>18.52</td>
<td>15.49</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.02</td>
<td>3.28</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Gupta-Michas (5)</td>
<td>None</td>
<td>0.10</td>
<td>15.57*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>3.90</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Mann (5)</td>
<td>None</td>
<td>0.07</td>
<td>9.45</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.00</td>
<td>0.27</td>
<td>6.63</td>
<td>3.84</td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level
CE refers to the number of co-integration equations.
(4), (5) are the lag length determined by SC.

### Table 7.9 Johansen-Juselius Co-integration Test

#### Model (2) Intercept and Trend with Real GDP Quarterly Series

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (5)</td>
<td>None</td>
<td>0.09</td>
<td>14.42</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.02</td>
<td>2.50</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Pryor (5)</td>
<td>None</td>
<td>0.16</td>
<td>19.12</td>
<td>31.15</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>5.44</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Goffman (4)</td>
<td>None</td>
<td>0.09</td>
<td>12.85</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.04</td>
<td>5.85</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Musgrave (4)</td>
<td>None</td>
<td>0.10</td>
<td>14.22</td>
<td>23.97</td>
<td>19.38</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>4.19</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Gupta-Michas (5)</td>
<td>None</td>
<td>0.12</td>
<td>17.55</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>4.56</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Mann (5)</td>
<td>None</td>
<td>0.10</td>
<td>14.42</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>5.32</td>
<td>16.55</td>
<td>12.52</td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level
CE refers to the number of co-integration equations.
(4), (5) are the lag length determined by SC.

From the resulting tables, the output of the Johansen-Juseluis test is mostly consistent with the Engle-Granger outcome. While Engle-Granger tests showed no co-integrating relationship between GDP and government expenditure in all versions, the Johansen-Juseluis test shows a co-integrating relationship in the Musgrave and the Gupta-Michas versions only.
The results are outlined in Table 7.6 for model (1). These results are confirmed also by the quarterly data series, shown in Table 7.8 for model (1). Therefore, the conclusion of rejecting the null hypothesis of no co-integration for the Musgrave and Gupta-Michas versions is reinforced, since the max Eigenvalue statistic is greater than the critical value at the 5 per cent level of significance. This result reveals that total government expenditure and per capita GDP versions of Wagner’s law are subject to a long-run equilibrium relationship only in two versions. The other four versions (Peacock and Wiseman, Pryor, Goffman, and Mann) did not show a co-integrating relationship when using the total real GDP data version.

### 7.2.2.2 Co-integration Test with Non-oil Real GDP Data

Firstly, the Engle-Granger co-integration test with non-oil real GDP is applied. The output is shown in Table 7.10. Secondly, the Johansen-Juselius co-integration test is applied, and its outputs are illustrated next.

<table>
<thead>
<tr>
<th>Version</th>
<th>Annual Series</th>
<th>Quarterly Series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Trend</td>
<td>With Trend</td>
</tr>
<tr>
<td>Peacock-Wiseman</td>
<td>-3.91*</td>
<td>-3.78*</td>
</tr>
<tr>
<td>Pryor</td>
<td>-3.93*</td>
<td>-3.97*</td>
</tr>
<tr>
<td>Goffman</td>
<td>-0.79</td>
<td>-2.69</td>
</tr>
<tr>
<td>Musgrave</td>
<td>-4.44**</td>
<td>-4.54**</td>
</tr>
<tr>
<td>Gupta-Michas</td>
<td>-4.44**</td>
<td>-4.54**</td>
</tr>
<tr>
<td>Mann</td>
<td>-3.92*</td>
<td>-3.78*</td>
</tr>
</tbody>
</table>

Note: Rejection of the null hypothesis at 5%*, 1%**
Critical value for the Engle-Granger Co-integration test annual series are: -3.46 (5%), -4.12 (1%).
Critical values for the quarterly series test are: -3.39 (5%), -4.00 (1%)
The Engle-Granger test rejected the null hypothesis of no co-integration at a 5 per cent level of significance for all versions except Goffman’s version, which shows no co-integration between its variables for the annual data series. On the other hand, the quarterly data series shows no co-integrating relationship between the examined variables in all Wagner’s law versions except for the Musgrave and Gupta-Michas versions, which show a significant co-integration relationship at the 5 per cent level of significance.

The contradictory outcome of the two data series, the quarterly data series and the annual data series, can be attributed to the data nature, or it might be due to some of the criticisms of the Engle-Granger co-integration test that have been outlined in chapter six. The application of the Engle-Granger approach can achieve a better outcome, if employed in a higher-order system that includes extra variables in the analyses, since the omission of important variables may generate the no co-integration outcome. Muscatelli and Hurn (1992) stated that inclusion or omission of certain variables from co-integration analysis can affect the outcome dramatically. Therefore, the inability to observe a long-run relationship between the examined variables when applying the Engle-Granger co-integration test might be the result of a number of factors, and not necessarily a rejection of co-integration. In this case, further emphasis will be given to the Johansen-Juseluis test, which might achieve a better performance.

The outcome of the Johansen-Juselius co-integration test is shown in Tables 7.11 and 7.12 for the annual data series model (1) and model (2), respectively. Consistent outcomes for the quarterly data series are shown in Tables 7.13 and 7.14 for model (1) and model (2), respectively. The Schwarz lag-length criterion was adopted to decide the most appropriate lag length for each version.
Table 7.11 Johansen-Juselius Co-integration Test
Model (1) Intercept and No Trend with Non-oil Real GDP, Annual Series

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (1)</td>
<td>None</td>
<td>0.36</td>
<td>16.17*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.20</td>
<td>8.42*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Pryor (1)</td>
<td>None</td>
<td>0.42</td>
<td>19.80**</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.15</td>
<td>6.18*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Goffman (1)</td>
<td>None</td>
<td>0.42</td>
<td>19.77*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.05</td>
<td>1.69</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Musgrave(1)</td>
<td>None</td>
<td>0.39</td>
<td>17.78*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.29</td>
<td>12.37*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Gupta-Michas (1)</td>
<td>None</td>
<td>0.39</td>
<td>17.78*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.29</td>
<td>12.38*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Mann (1)</td>
<td>None</td>
<td>0.36</td>
<td>16.17*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.21</td>
<td>8.42*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level.
CE refers to the number of co-integration equations.
(1) is the lag length determined by SC.

Table 7.12 Johansen-Juselius Co-integration Test
Model (2) Intercept and Trend with Non-oil Real GDP, Annual Series

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (1)</td>
<td>None</td>
<td>0.68</td>
<td>41.86**</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.36</td>
<td>16.15*</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Pryor (1)</td>
<td>None</td>
<td>0.58</td>
<td>31.65**</td>
<td>23.97</td>
<td>19.38</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.40</td>
<td>18.21**</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Goffman (1)</td>
<td>None</td>
<td>0.53</td>
<td>27.30**</td>
<td>23.97</td>
<td>19.38</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.21</td>
<td>8.38</td>
<td>16.55</td>
<td>12.51</td>
</tr>
<tr>
<td>Musgrave(1)</td>
<td>None</td>
<td>0.48</td>
<td>23.45*</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.33</td>
<td>14.63*</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Gupta-Michas (1)</td>
<td>None</td>
<td>0.48</td>
<td>23.44*</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.33</td>
<td>14.63*</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Mann (1)</td>
<td>None</td>
<td>0.69</td>
<td>41.86**</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.36</td>
<td>16.15*</td>
<td>16.55</td>
<td>12.52</td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level.
CE refers to the number of co-integration equations.
(1) is the lag length determined by SC.
### Table 7.13 Johansen-Juselius Co-integration Test

**Model (1) Intercept and No Trend with Non-oil Real GDP, Quarterly Series**

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (5)</td>
<td>None</td>
<td>0.25</td>
<td>40.34**</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>4.20*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Pryor (5)</td>
<td>None</td>
<td>0.13</td>
<td>20.02*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.05</td>
<td>6.10*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Goffman (4)</td>
<td>None</td>
<td>0.25</td>
<td>40.20**</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.00</td>
<td>0.48</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Musgrave(4)</td>
<td>None</td>
<td>0.13</td>
<td>19.70*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.09</td>
<td>12.61**</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Gupta-Michas (5)</td>
<td>None</td>
<td>0.11</td>
<td>17.52*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.09</td>
<td>12.61**</td>
<td>6.63</td>
<td>3.84</td>
</tr>
<tr>
<td>Mann (5)</td>
<td>None</td>
<td>0.11</td>
<td>18.45*</td>
<td>18.52</td>
<td>14.26</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.06</td>
<td>9.33*</td>
<td>6.63</td>
<td>3.84</td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level
CE refers to the number of co-integration equations.
(4), (5) are the lag length determined by SC.

### Table 7.14 Johansen-Juselius Co-integration Test

**Model (2) Intercept and Trend with Non-oil Real GDP, Quarterly Series**

<table>
<thead>
<tr>
<th>Version (Lags)</th>
<th>CE</th>
<th>Eigenvalue</th>
<th>Max Eigenvalue</th>
<th>1% critical value</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacock-Wiseman (5)</td>
<td>None</td>
<td>0.50</td>
<td>99.23**</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>4.64</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Pryor (5)</td>
<td>None</td>
<td>0.30</td>
<td>51.77**</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.09</td>
<td>13.75*</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Goffman (4)</td>
<td>None</td>
<td>0.28</td>
<td>46.36*</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.03</td>
<td>3.62</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Musgrave(4)</td>
<td>None</td>
<td>0.23</td>
<td>38.45*</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.09</td>
<td>12.84</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Gupta-Michas (5)</td>
<td>None</td>
<td>0.12</td>
<td>19.80*</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.08</td>
<td>13.80*</td>
<td>16.55</td>
<td>12.52</td>
</tr>
<tr>
<td>Mann (5)</td>
<td>None</td>
<td>0.20</td>
<td>32.37**</td>
<td>23.97</td>
<td>19.39</td>
</tr>
<tr>
<td></td>
<td>At most</td>
<td>0.09</td>
<td>12.90*</td>
<td>16.55</td>
<td>12.52</td>
</tr>
</tbody>
</table>

Note: *, ** Rejection of no co-integration hypothesis at (5%), (1%) significance level
CE refers to the number of co-integration equations.
(4), (5) are the lag length determined by SC.

The Johansen-Juselius test result confirms a co-integrating relationship for all versions for both models with the non-oil real GDP. The null hypothesis of no-co-integration is rejected because the maximum eigenvalue is greater than the critical value at both the 5 per cent and 1 per cent levels of significance, as shown in the tables. These results
imply that non-oil real GDP version is subject to a long-run equilibrium relationship. However, Saudi Arabian GDP would show a sustained growth, if GDP is calculated without oil transactions. This finding reflects the dependence of the Saudi economy on oil exports, whereas oil price volatility contributes to high level of GDP fluctuations (Ministry of Planning, 2009).

7.2.3 Granger-causality Test

The Granger-causality test is employed in this study to determine the causal structure of the variables in the different Wagner versions. The patterns of causality for both short and long-run relationships are presented for each version of Wagner’s law bellow.

i) A unidirectional causality runs from government expenditure to GDP, which implies the validity of the Keynesian model. Following the macroeconomic propositions, where in a stage of economic development, it is required for governments to invest in infrastructure to enhance the development process, this leads in turn to increases in government spending to cause an increase in GDP.

ii) Unidirectional causality runs from GDP to government expenditure as the situation is consistent with Wagner’s law. Over time, the role of governments in providing public goods, such as health care services, education and social development, is increasing. Therefore, the process of economic development causes government expenditure to grow.

iii) Bi-directional causality, which runs from one variable to the other when there is an interaction between government spending and GDP due to reasons of
economic development, is shown to have an impact from one variable to the other. In this case, neither the Keynesian nor Wagner approach is valid.

iv) The final case implies no causality running between the two variables, where GDP and government spending parameters are not statistically significant, and neither variable Granger-causes the other (Gujarati and Porter, 2009).

Accordingly, the Granger-causality test can be employed in two cases. The first is in the case of the co-integrated variables, where the long-run equilibrium relationship is tested. This can be achieved by applying the Granger-causality test in the framework of the error correction model to determine the direction of the causality. The second is in the case of no co-integration, where the short-run equilibrium is tested, using the short-run Granger-causality test in bivariate form to examine the direction of the causality between the variables.

In summary, Wagner’s hypothesis suggests that a unidirectional causal relationship runs from the independent variable, GDP, to the dependent variable, government expenditure, in its different forms, while the Keynesian proposition suggests a causal flow that runs in the opposite direction, from government expenditure to GDP. Therefore, the following subsection applies the error correction model with respect to the variable in level form, and the standard Granger-causality procedure for the variables in first differences.

7.2.3.1 Granger-causality Test with Error Correction Model

For the versions that were found to be co-integrated, the long-run relationship with the Granger-causality test within the framework of the error correction model was applied.
To apply the Granger-causality test, the same lag length that has been utilised when we tested for the co-integration is used, as required by the test technique.

Equations (6.26) and (6.27) in chapter six show the coefficient ($\lambda_3$) point estimates of the error correction term ($ECT_{t-1}$), which is lagged one period. To fulfill Wagner’s conditions, this coefficient should be negative for $\bar{Y}$, which denotes government expenditure as a dependent variable. Further, $X_t$ is positive, which denotes the independent variable, GDP, in different forms of Wagner’s law. The $t$-statistics on the estimate of ($\lambda_3$) indicate the level of significance of the long-run causality between the examined variables. The $t$-statistic level of significance should be 5 per cent at most for the dependent variable.

The co-integration analysis for the real GDP data indicates that for the Musgrave version (4) and the Gupta-Michas version (5), in model one (intercept and no trend included) there exists a long-run relationship for both series. The Granger-causality test with the error correction model is applied for these versions. Table 7.15 presents the resulting $ECT_{t-1}$ estimates. To conclude that Wagner’s law is valid, the $ECT_{t-1}$ statistic for the dependent variable, government expenditure, in its difference forms, should be negative and statistically significant. Also, the $ECT_{t-1}$ statistic for the real GDP independent variable in its different forms, should either be negative or its estimate should be statistically insignificant. However, at this point, the result suggests either Wagner’s or the Keynesian hypothesis. Furthermore, it is possible to generate bi-directional causality or no causality between the examined variables in the long run.
Table 7.15 Granger-causality Test with ECM Real GDP

<table>
<thead>
<tr>
<th>Versions</th>
<th>Variables</th>
<th>Annual Series</th>
<th>Quarterly Series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ECT_{t-1}</td>
<td>t-stat</td>
</tr>
<tr>
<td>(4) Musgrave</td>
<td>Δln GE/GDP</td>
<td>-0.31</td>
<td>-2.11</td>
</tr>
<tr>
<td></td>
<td>Δln GDP/N</td>
<td>-0.01</td>
<td>-2.46</td>
</tr>
<tr>
<td>(5) Gupta-Michas</td>
<td>Δln GE/N</td>
<td>-0.46</td>
<td>-3.47</td>
</tr>
<tr>
<td></td>
<td>Δln GDP/N</td>
<td>-0.16</td>
<td>-2.45</td>
</tr>
</tbody>
</table>

The resulting Granger-causality test for both data series, in the framework of the error correction model with real GDP series for the Musgrave and Gupta-Michas versions, shows a significant ECT_{t-1} estimate for both dependent variables in both versions: Δln GE/GDP and Δln GE/N. These coefficients indicate the speed of adjustment to the long-run equilibrium, and the direction of causality that runs from the independent variable Δln GDP/N to the dependent variables Δln GE/GDP and Δln GE/N. Therefore, the Musgrave and Gupta-Michas versions support the validity of Wagner’s law in Saudi Arabia for the period studied. This conclusion has been outlined because the signs of the dependent variables Δln GE/GDP and Δln GE/N in both versions are negative, and their estimates are statistically significant. In addition, the sign of the independent variable Δln GDP/N in both versions is negative, which confirms the validity of Wagner’s law.

Regarding the non-oil real GDP data version, when the Johansen-Juseluis co-integration tests were employed, all of the Wagner’s law versions showed a significant co-integrating relationship. Therefore, the ECM is applied when testing for long-term causality.
Table 7.16 summarises the results of the long-run causality test using the sign of \( \text{ECT}_{t-1} \). The annual series reveals that Wagner’s law is supported for all versions. A unidirectional relationship runs between the examined variables. This result has been drawn because of the generated coefficient sign of the dependent variables; \( \ln \text{GE} \) in versions (1 and 3); \( \ln \text{GEC} \) in version (2); \( \ln \text{GE/non-oil real GDP} \) in versions (4 and 6); and \( \ln \text{GE/N} \) in version (5), are all negative and statistically significant at 5 per cent. Meanwhile the generated signs of the independent variable coefficients, that is \( \text{GDP} \) in its difference forms, are either negative or statistically insignificant. The long-run causality relationship in this case runs from non-oil real GDP to \( \text{GE} \) and \( \text{GEC} \), as in versions (1) and (2); from non-oil real GDP/N to \( \text{GE} \), as in version (3); from non-oil real GDP/N to \( \text{GE/non-oil real GDP} \), as in version (4); from non-oil real GDP/N to \( \text{GE/N} \) as in version (5); and from non-oil real GDP to \( \text{GE/non-oil real GDP} \), as in version (6). Thus, the six versions are supported by the annual non-oil real GDP.

### Table 7.16 Granger-causality Test with ECM Non-oil Real GDP

<table>
<thead>
<tr>
<th>Versions</th>
<th>Variables</th>
<th>Annual Series</th>
<th>Quarterly Series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ECT(_{t-1})</td>
<td>( t)-stat \</td>
</tr>
<tr>
<td>(1) Peacock-Wiseman</td>
<td>( \ln \text{Non-oil GDP} )</td>
<td>-0.91</td>
<td>-4.02</td>
</tr>
<tr>
<td></td>
<td>( \ln \text{GE} )</td>
<td>-0.14</td>
<td>-1.14</td>
</tr>
<tr>
<td>(2) Pryor</td>
<td>( \ln \text{Non-oil GDP} )</td>
<td>-0.47</td>
<td>-2.47</td>
</tr>
<tr>
<td></td>
<td>( \ln \text{GEC} )</td>
<td>0.17</td>
<td>1.55</td>
</tr>
<tr>
<td>(3) Goffman</td>
<td>( \ln \text{Non-oil-GDP/N} )</td>
<td>-0.07</td>
<td>-2.46</td>
</tr>
<tr>
<td></td>
<td>( \ln \text{GE} )</td>
<td>-0.06</td>
<td>-4.82</td>
</tr>
<tr>
<td>(4) Musgrave</td>
<td>( \ln \text{Non-oil-GDP/N} )</td>
<td>-0.90</td>
<td>-4.31</td>
</tr>
<tr>
<td></td>
<td>( \ln \text{GE/Non-oil GDP} )</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>(5) Gupta-Michas</td>
<td>( \ln \text{Non-oil-GDP/N} )</td>
<td>-0.87</td>
<td>-3.06</td>
</tr>
<tr>
<td></td>
<td>( \ln \text{GE/N} )</td>
<td>0.04</td>
<td>0.30</td>
</tr>
<tr>
<td>(6) Mann</td>
<td>( \ln \text{Non-oil GDP} )</td>
<td>-0.77</td>
<td>-4.14</td>
</tr>
<tr>
<td></td>
<td>( \ln \text{GE/Non-oil GDP} )</td>
<td>-0.14</td>
<td>-1.14</td>
</tr>
</tbody>
</table>

Results for the quarterly data series with non-oil real GDP conflict with the results for the annual data. Only the Mann version, number (6), shows a statistically consistent output to the annual data, and confirms the validity of Wagner’s law. The other versions
show the following outcome: versions (1) and (3) show no long-run causality between GE, as dependent variables, and non-oil real GDP as an independent variable for the first version, and non-oil real GDP/N for the third. Versions (2) and (5) suggest a Keynesian relationship between the examined variables, and assume that a long-run relationship runs from GEC to non-oil real GDP in the Pryor version (2), and that a long-run relationship runs from GE/N to non-oil real GDP/N as in the Gupta-Michas version (5). A bi-directional long-run relationship is suggested in the Musgrave version (4), since the signs of all variables are as hypothesised, and statistically significant. In such a case, if the coefficient of each variable is significant in explaining one another, Granger-causality cannot be established. There is a third party that is determining the movement of both variables, which suggests that causality flows from a third source. Therefore, neither the Keynesian hypothesis nor Wagner’s law is supported by this version.

The conflict revealed between the annual data and quarterly data estimations in testing for long-run causality might be attributable to the effects of the lag interval that has been used when testing for co-integration, using the Johansen-Juseluis co-integration test, since it is sensitive to the lag length used and to the study span and sequences. It might be also attributed to how the government makes decisions with an annual base. However, the annual data has confirmed the validity of Wagner’s propositions in all versions when using non-oil real GDP. The Mann version (6) only confirmed Wagner’s propositions when quarterly data are employed. Further statistics and conclusions can be generated when applying the short-run Granger-causality test in the next subsection.
7.2.3.2 Short-run Granger-causality Test

The short-run causality test is employed to examine the direction of the causality between the non-co-integrated variables. The test indicates the direction of the causality between the examined variables with respect to first differences (i.e., the stationary series). Wagner’s law assumes that causality runs from GDP to government expenditure, while the Keynesian approach assumes the opposite. However, the Granger-causality test in this subsection is applied to determine the direction of the causality and whether the pair of series have a unidirectional or bi-directional relationship in the short run.

The test considers the F-statistics for the joint hypothesis to test for Wagner’s law. The probability value used to reject the hypothesis of no causality between the examined variables should be less than 10 per cent, as suggested by Alkhuzaim (2005). Therefore, rejecting the null hypothesis would confirm the existence of a short-run causality between the variables. To conduct this test, series values in first differences are used.

The statistics obtained from the Johansen-Juselius co-integration test with respect to real GDP, shown in Tables 7.6 and 7.8, suggest four versions of Wagner’s law that have no co-integrating relationship. These versions are Peacock-Wiseman, Pryor, Goffman, and Mann. Therefore, the outcomes in Tables 7.17, 7.18, 7.19, and 7.20 reveal pairwise Granger-causality in the short run for these versions. The result is based on the probability value of the F-statistics of Granger-causality.

To confirm the validity of Wagner’s law for each version, the probability of rejecting the null hypothesis of no causality between the examined variable should be less than
10 per cent. Hence, as shown in Table 7.17, the Peacock-Wiseman version rejects the null hypothesis that \( \ln \text{GDP} \) does not Granger-cause \( \ln \text{GE} \), since the probability of accepting the null hypothesis is only 0.01 per cent while there is a 99.9 per cent probability of rejecting this hypothesis for the annual series.

On the other hand, the quarterly series estimates confirm the annual outcome, a rejection of the null hypothesis with probability value of 0.01 per cent. Thus, the Peacock-Wiseman version confirms Wagner’s law for Saudi Arabia.

| Table 7.17 Short-run Granger-causality Test, Peacock-Wiseman Version |
|---------------------------|----------------|----------------|----------------|
| Version                   | Null Hypothesis                          | Annual Series | Quarterly Series |
| Peacock-Wiseman           | \( \ln \text{GDP} \) does not Granger-cause \( \ln \text{GE} \) | 6.56   | 0.01  | 420.83 | 0.01  |
|                           | \( \ln \text{GE} \) does not Granger-cause \( \ln \text{GDP} \) | 0.06   | 0.80  | 0.09   | 0.76  |

Lags included for the annual and quarterly data respectively are (1) and (5).

For the Pryor version, the annual statistics shown in Table 7.18 indicate no causality between the variables, since the probability of rejecting the null hypothesis is more than 10 per cent in both directions. In such a case, the Granger-causality test approach assumes that no causality exists between the two variables; \( \ln \text{GDP} \) does not Granger-cause \( \ln \text{GEC} \), nor does \( \ln \text{GEC} \) Granger-cause \( \ln \text{GDP} \).

On the other hand, the quarterly data shows a unidirectional relationship that follows Wagner’s law, since it rejects the null hypothesis of no causality by more than 99 per cent. Therefore, this result postulates that \( \ln \text{GDP} \) is Granger-causing \( \ln \text{GEC} \) for the quarterly series only.
Table 7.18 Short-run Granger-causality Test, Pryor Version

<table>
<thead>
<tr>
<th>Version</th>
<th>Null Hypothesis</th>
<th>Annual Series</th>
<th></th>
<th>Quarterly Series</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pryor</td>
<td>ln GDP does not Granger-cause ln GEC</td>
<td>1.05</td>
<td>0.31</td>
<td>11.18</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>ln GEC does not Granger-cause ln GDP</td>
<td>1.36</td>
<td>0.25</td>
<td>2.05</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Lags included for the annual and quarterly data respectively are (1) and (5).

A similar outcome was observed for the Goffman version. The quarterly data series statistics do not confirm the annual data result. Table 7.19 shows that the annual data rejects the null hypothesis, which is ln GDP/N, and does not Granger-cause ln GE, where the probability of accepting the null hypothesis is less than 10 per cent. The quarterly data does not support this result since it does not reject the null hypothesis, where the probability value is more than 10 per cent; in fact, as shown in the resulting table, the probability value is 16 per cent. Such an outcome suggests a unidirectional relationship, which supports Wagner’s law for the Goffman version only on an annual basis. Hence, the Goffman version does not reject the null hypothesis on a quarterly basis. Thus, Goffman’s version confirms Wagner’s law for the yearly series, and it confirms the Keynesian proposition for the quarterly series. This is because the probability value of rejecting ln GE does not Granger-cause ln GDP, is only 2 per cent for the quarterly version, as shown in Table 7.19.

Table 7.19 Short-run Granger-causality Test, Goffman Version

<table>
<thead>
<tr>
<th>Version</th>
<th>Null Hypothesis</th>
<th>Annual Series</th>
<th></th>
<th>Quarterly Series</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Goffman</td>
<td>ln GDP/N does not Granger-cause ln GE</td>
<td>6.87</td>
<td>0.01</td>
<td>1.66</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>ln GE does not Granger-cause ln GDP</td>
<td>0.06</td>
<td>0.42</td>
<td>6.07</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Lags included for the annual and quarterly data respectively are (1) and (4).
The last version that did not show a co-integrating relationship between its variables is the Mann version. The outcome in Table 7.20 shows that the null hypothesis of ln GDP does not Granger-cause ln GE/GDP is rejected, which assumes a unidirectional relationship that supports Wagner’s law. The p-value is 0.06 for the annual series and 0.01 for the quarterly series, which confirms this result.

Table 7.20 Short-run Granger-causality Test, Mann Version

<table>
<thead>
<tr>
<th>Version</th>
<th>Null Hypothesis</th>
<th>Annual Series</th>
<th>Quarterly Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann</td>
<td>ln GDP does not Granger-cause ln GE/GDP</td>
<td>3.68</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>ln GE/GDP does not Granger-cause ln GDP</td>
<td>0.06</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Lags included for the annual and quarterly data respectively are (1) and (5).

However, the resulting outputs are with respect to the real GDP series only, and the non-oil real GDP version has shown a co-integrating relationship between the examined variables in all Wagner’s versions. Hence, no short-run causality test is required, since it has already been tested in the error correction mode earlier in this section.

The Musgrave and Gupta-Michas versions suggest long-run equilibrium, and the Peacock-Wiseman, Goffman, and Mann versions suggest short-run equilibrium, supporting Wagner’s law. It can be concluded that the preponderance of the statistics confirm the existence of Wagner’s law in Saudi Arabia. Pryor’s version does not support the existence of the law for the annual data, but the quarterly data shows a short-run relationship in the same direction.
Chapter Eight

Summary of the Statistical Findings

Conclusions and Suggestions

8.1 Overview

The existence of a possible long-run equilibrium relationship between national income and public expenditure growth has been extensively tested, both in developed and less-developed countries. There are different interpretations of the resulting outcomes regarding this issue. Therefore, economic studies have been concerned with the relationship between government expenditure and national income in different ways.

The examined versions of Wagner’s law have attributed government expenditure growth to increasing national output, according to factors that enhance the growth rate. These factors include the following: expansion of productive administrative government roles; expansion of government activities and functions in relation to education, health services, and culture; and increasing technological progress and its increasing returns to scale, which indicate that these high cost technological projects are in some cases better provided initially by government. Hence, these technologies and services are usually characterised by high income-demand elasticities.

Considering the empirical analysis of the estimated output presented in chapter seven, this chapter sets forth the conclusion that growth in government activities implies Wagner’s law terms and conditions. However, the study findings support the validity of Wagner’s law in Saudi Arabia, which implies that government expenditure in Saudi
Arabia is dependent upon GDP growth. Government expenditure is found to be ineffective as a policy instrument. Thus, one of the most important contributions of this study is its examination of the success of fiscal policy in promoting GDP growth across all economic activities. This trend of government growth implies that there are limits to which government expenditure can be monitored and investigated by policy makers.

This chapter is organised as follows: firstly, it summarises the statistical findings and the empirical analysis of chapter seven; secondly, it discusses the importance of the study and the policy implications; thirdly, it presents the study conclusion and recommendations; fourthly, this study is compared with other studies for Saudi Arabia; and finally, it lists suggestions for future studies.

8.2 Summary of the Statistical Findings

The study has examined six common versions of Wagner’s law to investigate long-run and short-run relationships between government expenditure and economic growth during the period from 1974 to 2009. Thus, different measurements of government expenditure and economic growth are used, as implied by Wagner’s versions. The study introduced a quarterly data series for the purpose of comparison and verification. Real domestic product, GDP, is used in terms of real GDP and non-oil real GDP, to eliminate the impact of oil-price volatility on the economy and to compare the resulting outcome. The statistical outcome is presented in the next subsection, as a finding with real GDP and a finding with non-oil real GDP.
8.2.1 Total Real GDP

When applying the empirical analysis in terms of real GDP, testing the data series properties is the first step. The Dickey-Fuller unit root test shows that the series contain a unit root; most of the examined variables are non-stationary in the level form, but stationary in the first-difference form. Therefore, a conclusion of rejecting the null hypothesis of the unit root at the 5 per cent level of significance is maintained after differencing. A finding that both variables in each version of Wagner’s law have the same order of integration $I(1)$ would imply a need to test if both variables are moving together over time. Accordingly, the series are tested for the existence of a stationary linear combination between the examined variables, which can be interpreted as the long-run equilibrium relationship.

Testing for the existence of a long-run relationship between the variables in each version is performed using two tests of co-integration analysis, the Engle-Granger two-step co-integration test (1987) and the Johansen-Juselius multivariate test (1988). The Engle-Granger test indicates no co-integration relationship between total real GDP and government expenditure in the examined versions. On the other hand, the Johansen-Juselius test shows a co-integrating relationship in both the Musgrave and Gupta-Michas versions, but it did not reveal co-integration for the other versions. Interestingly, this result also has been confirmed when the quarterly data series is used.

The contradictions revealed in the co-integration test between these versions can be attributed to the different measures and components used by the different authors, which explains observed differences when interpreting Wagner’s hypothesis. The per capita versions that were found to be co-integrated in this study for Saudi Arabia would appear to predict growth in population combined with an increment in oil revenue.
Economically, the result of no co-integration between the examined variables in some versions can be attributed to two possible reasons. Firstly, the dramatic drop in oil prices in the mid-1980s decreased oil revenues in the short run, causing a huge deficit in the government budget, but revenues gradually rebounded in later stages. Since the Saudi Arabian economy is considered to be oil-based, such a shock can affect its long-term equilibrium. Moreover, the Saudi government, during some stages of development, cannot stop or cut certain infrastructure projects. Secondly, the Gulf War I, in the early 1990s, has affected the stability of the economy since it caused another deficit in the budget. However, in the case of no co-integration, short-run equilibrium is achieved when testing for Granger-causality in the standard bivariate form.

The Granger-causality test has been applied in two forms. The first form is applied in the framework of the error correction model, for the Musgrave and Gupta-Michas versions, where a long-run equilibrium relationship existed. A unidirectional relationship running from economic growth, as per capita GDP, to government expenditure is confirmed by the statistics, which support the validity of Wagner’s law.

The second form employed the Granger-causality test in the standard short-run bivariate form for the other four versions that were found not to be co-integrated (Peacock and Wiseman, Pryor, Goffman, and Mann). These versions, except Pryor, supported the existence of a short-run relationship running from economic growth to government expenditure. Further investigation may be required for Pryor version in regard to its propositions and components, because Pryor excludes subsidies, transfers, and capital formation from the definition of government expenditure. Nevertheless, this point is beyond the scope of this study.
8.2.2 Non-oil Real GDP

One contribution of this study is to examine the impact of oil price fluctuations and oil shocks on government expenditure. To isolate these effects, a separate non-oil real GDP series is adopted to examine Wagner’s hypothesis. Testing the law for co-integration using non-oil real GDP shows that a long-run relationship is found between the variables in the preponderance of the resulting outputs. In this case, the outcome of the Engle-Granger co-integration test is consistent with the Johansen-Juselius test. Hence, both tests confirm each other, with only one exception. When applying the Engle-Granger co-integration test, the only version that demonstrates no co-integration is the Goffman version.

According to these results, the Granger-causality test is employed in the framework of the error correction model. Hence, the pattern of causality in this case will be tested in the long run. Unidirectional causality running from non-oil real GDP to government expenditure is confirmed, as suggested by Wagner. This result shows that Saudi Arabian government expenditure tends to grow over time, which means increasing the government’s role in the process of the development. This can be noticed by looking at the growing figures of government involvement and expenditure to facilitate free public goods, such as health, education, and social services.

On the other hand, the resulting statistics of the quarterly series are significantly varied. Only Mann’s version (6) supports Wagner’s law. The other versions show the following outcomes: versions (1) and (3) show no causality in any direction; versions (2) and (5) suggested a Keynesian proposition between the examined variables, which can be explained by the government tendency to spend extensively on infrastructure to expedite the development process in some stages. The Musgrave version (4) for the
quarterly data series suggests that the Granger-causality test cannot be established, since it assumes that causality flows from a third source. Therefore, neither the Keynesian nor Wagner’s hypothesis is supported by this version. However, the quarterly data series was adopted to confirm some of the statistical tests and to compare with the annual outcome. It might differ in its final outcome according to its nature and seasonality. Notably, annual data is adopted for most of the microeconomic studies.

In conclusion, Wagner’s law is upheld by the six examined versions when using annual non-oil real GDP. On the other hand, when total real GDP is used, only Musgrave version (4) and Gupta-Michas version (5) supports the validity of Wagner’s’ law in Saudi Arabia during the examined period from 1974 to 2009.

This result shows that non-oil real GDP has a higher impact on the government expenditure, since it validate the six versions of Wagner’s law. Government expenditure increments are not only affected by oil revenues, but they might be also attributed to other factors related to private sector participation or any non-oil sector. Hence, explaining the growth of the government sector requires more consideration to be given to these factors. Despite the belief that oil revenues contributed the most to the Saudi Arabian budget, which might be true, these revenues can be used to support the growth in non-oil sector, which in turn enhances the economic growth.

8.3 Policy implications

Wagner’s propositions are supported by the preponderance of the evidence, as the statistics of Saudi Arabia suggest, where government expenditure is positively related to level of income growth. This finding suggests certain policy implications, such as the
conclusion that government does not have to be concerned about maintaining a particular level of government spending to enhance economic growth. In addition, government should carefully choose the type of expenditure category for the short and long term. This is to avoid any divers’ effects on short- and long-term on non oil sectors. In addition, the role of the private sector cannot be ignored in boosting and maintaining a sustainable rate of non-oil economic growth to generate new jobs for a rapidly rising population.

The Saudi economy is an oil-based one, where most economic activities are linked to oil revenues. This basic and important characteristic has an impact on most economic activities. Therefore, it can be argued that Saudi Arabian real GDP cannot be an accurate measure for economic growth and output. This might be attributed to the country’s inability to increase oil production levels or determine price levels in the world markets. During past decades, the significance of oil revenues in the national budget has declined, but it still contributes the largest portion. Hence, non-oil real GDP is preferable over real GDP for use as a significant measure and indicator economic growth.

Since the oil-based economy cannot avoid outside shocks, the Saudi government usually maintains sensible reserves during boom periods to maintain government expenditure during periods of low income. Thus, the suggested reasons by Wagner for increasing the government sector apply to Saudi Arabia. These reasons are summarised as follows: i) economic growth would lead to an enhancement in cultural and welfare spending; ii) the productive functions of the state would substitute public expenditure to the private sector; iii) it is sometimes required for the government to intervene in economic activity to eliminate monopolies in public-enterprise firms.
The dramatic increase in government expenditure continued over time even with the decline in oil prices and revenues. These increases in government expenditure forced the government to run a huge deficit, which started to pile up since 1984 after using up early reserves between 1982 and 1988. In a later stage after 1988, the government has resorted to financing this deficit by borrowing from the domestic market. It can be argued that government consumption and services continued to increase even with the decline in oil revenues.

It is notable that while government activities in Saudi Arabia have grown extensively, it is recognised that there is a need to reduce the size and role of the government to activate and support the private sector. This has been implemented as a strategic choice to reduce the government size. The primary object of the Seventh Development Plan (2002) is increasing private sector participation in government activities. This goal can be achieved by further diversification of the sources of revenues.

However, encouraging the private sector to take a more active role in economic activities implies increasing privatisation projects to enhance efficiency and reduce the influence of the government sector. This view is based on the assumption that the private sector is more efficient than the public sector in delivering services to the public. Thus, substitution from budget-maximisation bureaucrats to profit-maximisation firms is argued to enhance economic efficiency (Al-Batel, 2002).

In the case of Saudi Arabia, it seems that the balanced growth theory is the most important strategy to be adopted for development in the future. The idea that investments have to be directed towards various channels at the same time, to overcome the difficulty of complementarity of demand, constitutes the basis for the balanced
growth theory. This places emphasis on capital formation and the role it plays in increasing productivity in developing nations (Ghamdi, 1983).

Dramatic population increases impose greater burdens upon the government. The government is assumed to continue providing most public services. This is because oil revenues go directly to the government. This flow has created a high expectation among the public regarding different services provided by the government. Hence, despite the increasing size of the deficit in some stages, a high level of government expenditure should still be maintained. Such a situation means that social and cultural services are less vulnerable to cuts than infrastructure projects. In this case, public spending on infrastructure should be reduced during periods of low government income to reduce the budget deficit.

In summary, the study suggests that the government sector in Saudi Arabia is growing as a result of the growth in national income. Non-oil activities show more support in relation to the growth of the government sector, specifically they show a long-run relationship between the level of output and government expenditure. In this case, short-run cuts in government expenditure, or on the other hand, surges in government outlays, will finally be erased as government spending divided by GDP ratio returns to its long-term average. Short-run spending cuts should ensure that it be associated with longer-term structural growth. However, a consideration should be given to the private sector to support sustained growth for the government size and the economic growth. One of the suggested reasons by Wagner for increasing the government sector, is productive functions of the state would substitute public expenditure to the private sector.
In conclusion, government expenditure is found to be ineffective as a policy instrument. Thus, the study findings are supporting the existence of Wagner’s law in Saudi Arabia, which implies that government expenditure in Saudi Arabia depends on GDP growth. Thus, one of the main important policy implications of this study is to define the best fiscal policy tools to promote GDP growth in economic activities.

8.4 Conclusions and Recommendations

The importance of promoting government expenditure to maintain a level of national output varies from one country to another according to its economic structure, condition, and growth rate. The relationship between the government expenditure and economic growth could be a mutuality relationship, where economic growth enhances total demand, and in turn, increases government expenditure, as suggested by Wagner. A counter-relationship could also be true, where increasing government expenditure enhances the economic growth, as suggested by Keynesian theory. In addition, understanding economic condition, as well as cultural and institutional differences among nations, impacts significantly on the growth of government expenditures.

According to the results of the study, Wagner’s law is supported by the preponderance of Wagner’s law versions for Saudi Arabia, particularly for the non-oil real GDP version. Hence, the nature of the development process causes government expenditure to grow, which verifies Wagner’s propositions.

In a developing country such as Saudi Arabia, the development process varies according to the importance of the category in causing economic growth. Thus, it is expected that some government spending categories grow faster than others. While
most of the investment on infrastructure and capital goods, such as road construction, schools, and hospitals, is assumed to persist in the early stages of economic development, government spending in recent years focused on investing in both infrastructure projects and public consumption goods and social services. Accordingly, the Saudi Arabian government had begun by improving the infrastructure, and supporting non-oil activities. This support was obvious among the five-year development plans since the early 1980s. It is widely believed that diversity in the production and development processes is crucial, and the private sector should be involved in the development process to reduce pressures on the government (Ministry of Planning, 1980–2007). However, the study findings suggest that Saudi Arabia should exhibit less reliance on government spending to promote economic growth. Hence, government does not need to worry about maintaining a particular level of spending to achieve economic growth.

The fact that social rights are well-protected in Saudi Arabia suggests high political costs associated with reducing government spending (Krimly, 1999). Thus, the option for government policy is to reduce public capital spending, rather than other categories of public outlays, since this can be done without higher social cost. This might be true for the assumption of long-term consequences of reducing government investment expenditure in the short run.

To maintain a proper public spending scheme, the government should adopt a strategy that aims to maximise social welfare and long-run increases in output. This should be combined with devoting more investment to the natural resource and industrial sectors. In this context, it is beneficial to introduce some suggestions that may enhance and support the development process and maintain a sustainable development, as follows:
i) Reliance on the government and the oil sector as a main resource of income should be reduced, by encouraging the growth of the non-oil sector to diversify the economy. The diversification efforts should focus on large projects due to their importance, such as telecommunications, power generation, and some infrastructure projects to enhance the private sector role;

ii) To promote sustained economic development, government should offer suitable investment incentives to encourage foreign investments to participate in the development process. This can be achieved by adopting a flexible investment policy, and offering more freedom for foreign capital to enter the Saudi market;

iii) Non-oil real GDP shows sustainable growth as it impacts the growth of the government’s expenditures. More consideration should be given to the non-oil activities to maintain support of economic growth;

iv) The fall in oil prices and the global economic slowdown has reduced Saudi economic growth. Therefore, oil revenues should be used as a tool to speed up economic projects particularly in infrastructure, and developing the non-oil activities during the oil boom periods;

v) Enhancing efficiency, by the optimal use of the available resources and applying advanced technology in production;

vi) Oil revenues and reserves should be used to maintain stability of the development process, and protect economic growth from any non-anticipated shocks. Thus, securing some reserves is crucial to maintain sustained growth;

vii) Saudi Arabia’s economy is characterised as an oil-based economy with strong government controls over major economic activities. It is likely to involve the private sector in the development process by increasing its participation in the oil projects, such as petrochemical industries and oil and gas exploration. This
can be achieved by entering into partnership projects with the private sector in development projects (World Fact Book, 2010). For the same reason, it is risky for Saudi Arabia to continue with the oil sector as a dominant sector. Therefore, improving the performance of the other sectors is crucial and can be achieved through more subsidies for the other sectors, such as supporting use of the new technologies and modern equipment and methods, as suggested by Wagner.

viii) With a strong population growth rate, there is an emphasis on the need to upgrade the infrastructure of the country, such as building more independent water and power plants. Thus, the main driver of such kinds of projects in the country is investment. There are a number of mega-projects under construction. Capital spending should be boosted by the private sector and foreign investment in the development of the country projects, such as hydrocarbon and power and water sectors (Malek, 2006);

ix) Because of the possibility suggested by the study results that government expenditure can be affected positively by non-oil real GDP growth, public expenditure should be directed toward productive activities that enhance economic growth and encourage private sector investment, which in turn enhances capital formation. Thus, public spending that promotes economic growth is required to put the economy on a long-term growth path;

x) There should be a perception of the consequences of any inefficient use of government revenues or decreases in government expenditure that might have long-term negative impacts on the economy. Therefore, if government expenditure needs to be reduced, reductions should only occur to these expenditures that are not related to the development of social and economic infrastructure. Expenditure on defence seems to be one of the highest of these
To maintain economic growth, it is crucial to validate effective fiscal and monetary policy tools that allow these policies to perform better. Therefore, development of economic tools including financial and capital markets is important for public policy reasons. Moreover, developing financial and capital institutions can be an incentive for savings and production, which in turn enhances economic growth.

8.5 Comparisons with Other Studies for Saudi Arabia

There are just a few studies that investigated Wagner’s propositions for Saudi Arabia. The two most extensive studies were conducted by Ghamdi (1983) and Al-Obaid (2004). These studies have tested Wagner’s law for Saudi Arabia using basic econometric techniques and simple OLS regression, but they are now dated and may need to be revised. Still, the country has experienced massive changes during the last few decades, including changes in economic, social, and technological factors that would certainly impact macroeconomic and microeconomic behaviours for the entire nation. Closer investigation of these changes and factors is warranted.

This study has presented some new features of Wagner’s propositions that can be differentiated from the other works. For example, it has employed the use of a separate non-oil real GDP series to measure national output. Since the Saudi Arabian economy is oil-based, using non-oil real GDP as an additional measure of national output might be advantageous. Moreover, this study featured an extensive period and longer study span than the prior studies. While Ghamdi (1983) investigated only the period from 1960 to 1980 and Al-Obaid (2004) investigated the period from 1971 to 2001, this
study examined a significantly longer span, from 1974 to 2009. Furthermore, the study used a mathematical method to generate a quarterly data series. Since there are no macroeconomic quarterly data series available for the Saudi Arabian economy for the first three decades of the study period, this study is the first of its kind to use a quarterly data series to examine the validity of Wagner’s law for Saudi Arabia.

In order to distinguish the econometric technique, the Granger-causality tests in the framework of the error correction model and co-integration analysis are used in this project. The long- and short-run relationships between the examined variables have been tested using six versions of Wagner’s law; however, some of these newer econometric techniques were not available during Ghamdi’s study in 1983. Ghamdi tested only five versions of Wagner’s law.

On the other hand, Al-Obaid (2004) did not use the technique of the error correction model, which is required in the case of co-integrated variables; he applied only the standard Granger-causality test. In addition, he did not investigate the non-oil real GDP as a measure for national output, which is considered a major indicator.

The outcomes of the studies vary according to the econometric technique, study span, economic conditions, and level of development. However, all three studies reached the same conclusion, that Wagner’s law is supported by most versions. Therefore, estimating this relationship using new empirical techniques could be beneficial for evaluating future phases of Saudi economic growth and their impact on government expenditure. Table 8.1 summarises and compares the findings of this study with the findings of Ghamdi (1983) and Al-Obaid (2004), including the methodologies and outcomes.
Table 8.1 Comparing Findings of Wagner’s Law Studies for Saudi Arabia

<table>
<thead>
<tr>
<th>Study</th>
<th>Data and Period</th>
<th>Methodology</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bagadeem (2012)</td>
<td>1974-2009 Real Yearly and Quarterly data</td>
<td>Co-integration and error correction model</td>
<td>For total real GDP in the short run, six versions support Wagner’s law. In the long run, only the Musgrave and Gupta-Michas versions support the law. For non-oil real GDP, all versions support Wagner’s law in the long run.</td>
</tr>
</tbody>
</table>

8.6 Suggestions for Future Research

Wagner’s law has been tested in several ways using a variety of econometric methods. New techniques have been applied extensively in several studies when testing the validity of Wagner’s law. As new econometric techniques are introduced in the future, they can be used to develop new specifications for tests of Wagner’s propositions.
To some extent, it was not clear what Wagner’s propositions were in relation to increasing state activities or which metric Wagner may have considered to be the most accurate measure of national output. In other words, Wagner in his original vision did not clarify whether increases in public expenditure should be measured by the absolute level of public expenditure, the ratio of total public expenditure to GNP, or the proportion of the size of the government sector to the total economy.

In later contributions, several studies have tried to measure increments in government size by using different measures as an absolute value or proportion. In new academic literature, different specifications of Wagner’s hypothesis have been tested. These specifications have attempted to approximate the theoretical variables of state activities and economic growth.

In summary, Wagner’s law offers a wide range of implications that can be analysed with several econometric techniques. The law was unspecified empirically, but it can now be analysed using different econometric techniques and specifications. Wagner made several references to techniques and specifications in his body of work, however, ranging from an early formulation in 1883 to a final statement of his position in 1911.

For a future modelling for Saudi Arabia, disaggregating government expenditure into different categories including expenditures for consumption, health, education, defence, social services, etc., could be beneficial for analysis of the income growth impact on each of these classifications, and identifying the most important categories would be helpful for planning purposes. Calculating the income elasticities of these categories of government expenditure will enable researchers to understand the price relationship between changes in government expenditure and changes in GDP. This should be
investigated in Saudi Arabia after the massive expansion of government expenditure in recent years, particularly if recent gradual increases in government revenues caused by increases in oil prices are taken into account.

Another future study could be conducted using the technique of the structural break (Hendry, 2004; Perron, 2005) when estimating Wagner’s law. Since oil-price fluctuations over time can have a profound impact on national macroeconomic variables, disaggregating the study span into different periods, according to the economic conditions in each period, might generate a better outcome. The model should specify both the timing and size of breaks, and it could be used to investigate the impact of large economic shocks on the stability of macroeconomic variables and their relationships (Kapetanios and Tzavalis, 2006). This technique might require access to massive macroeconomic data in yearly and quarterly frequencies. Although such extensive data was not available at the time of this study, but may be available in the future.
Bibliography


