

Global
FORECASTS and **PREDICTIONS**

for the ESCWA Region

*Debt Investment
and Endogenous
Economic Growth
in the ESCWA Region*

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**GLOBAL FORECASTS AND PREDICTIONS
FOR THE ESCWA REGION:
DEBT INVESTMENT AND ENDOGENOUS ECONOMIC
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Preface

The objective of the *Global forecasts and predictions* series is to provide material that will assist the Economic and Social Commission for Western Asia (ESCWA) member countries in designing fiscal, monetary and economic development policies aimed at further enhancing macroeconomic, development and economic policy cooperation. The series also develops forecasting econometric models for the ESCWA region and reviews the time series properties of macroeconomic, fiscal and monetary variables, with the purpose of establishing economic trends and making global forecasts and predictions for the ESCWA region.

Issue No. 1 of the series assessed the impact of monetary and fiscal policies by offering a close examination of some monetary and fiscal aggregates. Forecasting econometric tests are used in the study in order to generate predictions of fiscal policy sustainability in the ESCWA region. In issue No. 2, the roles of investment and public expenditure in economic growth in the ESCWA region were studied and levels of public expenditure that would allow optimal GDP growth were forecast.

In this issue, the nature and type of growth mechanisms in the ESCWA region are established and identified. The main focus of the study is to explore whether public and private debt and public and private investment in the ESCWA region can enhance economic growth.

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ABBREVIATIONS AND EXPLANATORY NOTES

ADF	Augmented Dickey-Fuller (unit root test)
AIC	Akaike information criterion
AMF	Arab Monetary Fund
ESCWA	Economic and Social Commission for Western Asia
EU	European Union
FD	first difference
FDI	foreign direct investment
GCC	Gulf Cooperation Council
GDP	gross domestic product
I(1)	integrated of order 1
IMF	International Monetary Fund
IFS	International Financial Statistics
LDE	less diversified economies
MDE	more diversified economies
PD	public debt
PI	public investment
PP	Phillips-Perron (unit root test)
PRD	private debt
PRI	private investment
SC	Shwartz criterion
TB	treasury bills
VAR	vector autoregression
VECM	vector error correction model
Y	natural logarithm of GDP

The following symbols are used in tables throughout the study:

Two dashes (--) indicate that the item is not applicable.

A full stop (.) is used to indicate decimals.

Use of a hyphen between years (for example, 1990-1991) signifies the full period involved, including the beginning and end years.

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Secretariat concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitations of its frontiers or boundaries.

The term "country" as used in the text of this report also refers, as appropriate, to territories or areas.

Bibliographical and other references have, wherever possible, been verified.

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Executive summary

Since the early 1970s, weak growth developments and prospects in member countries of the Economic and Social Commission for Western Asia (ESCWA) have contributed to the gradual deterioration of regional economies. Slow gross domestic product (GDP) growth rates, a large public sector and low levels of investment in human capital and infrastructure have presented major challenges. However, the recent rises in oil prices and revenues have reversed the downward trend in GDP growth rates in the less diversified economies (LDEs) of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates and, subsequently, through the effect of workers' remittances, in the more diversified economies (MDEs) of Egypt, Jordan, Lebanon and Syrian Arab Republic.

In that context, this study will explore whether capital accumulation and public and private investment in the ESCWA region can enhance growth. To that end, it assesses growth performance and policies, offering a close examination of macroeconomic aggregates for the purpose of identifying current problems and establishing potential remedies. Once the economic growth trends in the region have been clearly identified and the sources of growth imbalances pinpointed, a set of adjustment measures is proposed for implementation in future policy formulations. After testing for cointegration, a vector error correction model (VECM) or vector auto regression (VAR) model will be used in this study in order to highlight the factors that may contribute to growth in the ESCWA region. The advantage of employing such models is that it permits the short-run dynamics of each variable in the system to be anchored to long-run equilibrium relationships. The objective is to facilitate the formulation of policies that will: (a) further enhance growth performance in the ESCWA region, and (b) offer the region's policymakers appropriate options for enhanced growth prospects.

With the above in mind, this study first identifies the macroeconomic factors that may contribute to GDP growth and highlights prospects for enhancing economic growth in the ESCWA region. After a review of the major macroeconomic developments in the region and related literature on growth theory, the empirical section of the study uses VECM, VAR and Granger causality models to highlight the main determinants of GDP growth in member countries, empirically establishing the relationships between the GDP growth rate, public and private debt and public and private investment. It also highlights the nature of the growth mechanism in ESCWA member countries and establishes the type of those mechanisms.

The empirical results and policy recommendations may be summarized as follows:

(a) Because domestic public debt in Egypt crowd-out GDP, that country should direct public investment towards improving human capital, mainly through investment in education, health and infrastructure. That should generate GDP growth of the endogenous type. Increased public debt aimed at increasing public investment in infrastructure is shown to have a positive impact on the private sector, stimulating further private borrowing and investment;

(b) The massive privatization scheme introduced in Egypt in the early 1990s should be revisited and efforts should again be devoted to reducing public debt and the size of the public sector. Domestic public debt has been increasing since the early 1990s, despite earlier privatization efforts, and the significant increase in such debt has been accompanied by only modest increases in public investment, which is therefore not increasing the GDP growth rate. On the contrary, public debt appears to be offsetting GDP growth;

(c) Because public investment in Jordan has had a positive impact on private investment, Jordan should try to stimulate further public investment in infrastructure and human capital. Public investment in health and education will generate GDP growth of the endogenous type. Furthermore, public investment in infrastructure appears to play a central role in stimulating private sectors' initiatives. The privatization efforts of the early 1990s should be enhanced, as should the private sector initiative;

(d) Empirical results indicate that the massive privatization schemes introduced in the early 1990s in Egypt and Jordan have been very successful in stimulating growth in those two countries. There are clear

indications that both countries appear to have substantially improved productivity and efficiency, and achieved larger private sectors that are conducive to higher GDP growth;

(e) That is, however, not the case in Lebanon and the Syrian Arab Republic, which have significantly higher public investment levels. Albeit public investment in infrastructure appears to be generating growth of the endogenous type, Lebanese GDP may begin to be crowded-out by the high level of accumulated domestic public debt and high interest rates. The Lebanese Government must therefore exert significant efforts in the near future in order to reduce the size of public debt. That will not only help Lebanon to contain recurrent budget deficits and the huge accumulated public debt, but will also improve and reinvigorate the growth of the domestic economy;

(f) Public debt in Lebanon is shown to have a significant positive effect on private debt: it appears to have a crowding-in effect on growth through its positive impact on private debt, which has a favourable impact on GDP. That demonstrates the existence of an important short term endogenous growth mechanism resulting from public investment in infrastructure. Albeit the GDP growth rate increased somewhat during the 1990s, those gains appear to be rapidly dissipating: the Lebanese economy has been experiencing relatively low GDP growth rates ever since;

(g) The same applies to the Syrian Arab Republic, where the size of the public sector has always significantly crowded-out private sectors' consumption and investment, bringing higher unemployment and reduced productivity and efficiency that have had serious consequences for economic growth. It is therefore clear that structural reform is required in that country in order to increase public investment efficiency and stimulate private investment. Private investment has been shown to have a positive effect on public investment through its positive impact on the economy. The Syrian Arab Republic should therefore further enhance the role of the private sector. Private initiative needs to be stimulated, whereas that economy has always previously relied on the public sector to stimulate growth;

(h) The LDEs of the ESCWA region need to diversify their economies away from the oil sector towards non oil-based private sector investment and output. That will help to reduce the relative size of the oil sector and, consequently, of the public and private sectors. Greater reliance on private initiatives will also reduce some of the economic inefficiency of the public sector and may enhance growth and productivity. Bahrain, with only a small oil sector, has been devoting considerable efforts to the privatization of some public entities and the diversification of its economy, and has a relatively significant private sector;

(i) The LDEs remain vulnerable to fluctuations in oil prices and revenues. The size of the oil sector appears to dwarf the size of any other sector in those economies. Kuwait, Saudi Arabia and the United Arab Emirates should reduce reliance on the oil sector and diversify their economies towards industry and services. They will also need to increase investment in human capital, thereby reducing reliance on the more highly skilled categories of foreign labour and generating growth of the endogenous type;

(j) Those three countries also need to reduce the oil and public sectors in favour of the private sector. Reducing reliance on public investment in favour of private investment may enhance growth performance. Private initiative may also reduce some public sector economic inefficiency and enhance growth and productivity.

Introduction

Since the early 1970s, the Economic and Social Commission for Western Asia (ESCWA) region has exhibited disappointing growth performance, which may in part be attributed to over-dependence on oil and expanding bureaucracies that dwarf the private sector, coupled with difficulties posed by low levels of human capital and private investment. All those factors, added to highly volatile oil prices and revenues, have hindered sustained economic growth in the region. Furthermore, most member countries have been significantly expanding the public sector, accumulating sizeable debt levels and recurrent budget deficits.

Because of disappointing growth performances in the region over the past three decades, it is of paramount importance to identify what factors, if any, can enhance growth in ESCWA member countries. Policymakers should then be able to formulate appropriate growth-stimulating policies and design and reform economic and structural policies that are appropriate to the rapidly-changing external macroeconomic environment.

After considering the traditional growth literature, this study will establish whether capital accumulation and public and private investment in the ESCWA region can enhance growth. It will also identify endogenous factors that could enhance growth in each member country. One given in the ESCWA region is that the size of the public sector in each member country is significant, and most capital expenditure is undertaken by that sector. The endogenous growth literature argues that public investment in infrastructure, education and health services has a positive effect on growth. However, if sustained by public borrowing, public investment may have the opposite effect, particularly if the public sector relies on domestic borrowing to raise funds, because interest will offset private consumption and investment. It is therefore imperative to explore whether public debt and investment have been growth-enhancing or have crowded-out private investment in each ESCWA member country.

This study sets out to explore the sources of economic growth in the ESCWA region and, in particular, the contribution of private and public sector investment to gross domestic product (GDP) growth. The empirical section of the study uses time series vector error correction models (VECM) and vector auto regression (VAR) econometric models to forecast the contribution of private and public investment and public and private debt to the GDP growth rate in the ESCWA region, and studies the importance and contribution of such investment and public sectors' expenditure to national GDP. It also puts forward economic policies that member countries may use to forecast the size of public and private investment that is concomitant with an optimal GDP growth rate.

A further purpose of this study is to consider whether public and private debt has positive or negative effects on growth in ESCWA member countries. Using a VAR (Granger causality) model, the study will also highlight the empirical and inter-temporal links between different macroeconomic variables, including public and private debt, public and private investment and GDP. The nature and signs of those links will help to identify the relation between debt and growth.

The study is divided as follows: chapter I presents an overview of recent trends in the GDP growth rate, investment and the relevant macroeconomic variables; chapter II comprises a review of related literature on growth theory; chapter III uses Granger causality, VAR and VECM models to identify the sources of economic growth in the ESCWA region and highlight the dynamic inter-relationships between the variables of interest; chapter IV concludes with some policy recommendations.

I. OVERVIEW OF MACROECONOMIC DEVELOPMENTS

A. REAL GDP GROWTH RATES IN ESCWA MEMBER COUNTRIES

In general, growth in the ESCWA region between 1985 and 2002 was disappointing. Causes included, inter alia, political instability, a deteriorating regional macroeconomic environment, inadequate infrastructure, low human capital accumulation and an inefficient public sector that expanded at the expense of the private sector.

Of the MDEs of the region, Egypt's real GDP growth rate has been on the decline since 1999, with a mild trend reversal since 2003 (see figure IA (a)). In early 2000, that country moved to a flexible exchange rate regime after a series of forced devaluations, a step which was mainly intended to stimulate exports and, consequently, GDP growth. However, it did not increase the overall real GDP growth rate, largely because of the deteriorating regional environment.

In Jordan, the real GDP growth rate declined significantly in 1992 and has been below 6 per cent since 1997 (see figure IA (b)). The country has not yet been able to stimulate its GDP growth rate, notwithstanding the bilateral trade agreements it recently concluded with the European Union (EU) and the United States of America and the consequent increases in Jordanian exports.

The real GDP growth rate in Lebanon was highly volatile before 1996 and has since stagnated (see figure IA (c)). An expansionary fiscal policy has led to relatively high real interest rates, which has crowded-out private investment, exerting downward pressure on the GDP growth rate. Lebanon has still not been able to recover from the negative implications of a huge and growing public debt, which is putting further strains on the overall economy.

An expanding public sector in the Syrian Arab Republic and the virtual absence of a private sector there have lowered economic efficiency and productivity and contributed negatively to the real GDP growth rate (see figure IA (d)). Recently, after the assassination of the former Lebanese Prime Minister Rafic Hariri and the subsequent withdrawal of Syrian troops from Lebanon, the country's situation has become even more critical. The wholesale exodus of Syrian workers from Lebanon reduced remittance inflows, estimated at about \$2 billion per year, and sanctions recently put in place by the United States of America have hindered the inflow of capital to the country. If those sanctions are not soon lifted, reduced levels of foreign direct investment (FDI) and portfolio inflows will have a negative impact on the overall economy.

Real GDP growth rates in the less diversified economies (LDEs) of the ESCWA region have, in general, been volatile over the past 20 years, largely as the result of greater oil price volatility, expanding public sectors, the accumulation of sizeable debts and recurrent budget deficits. Kuwait's growth was extremely volatile in 1990-1991, which included the Gulf War period (see figure IB (b)). Over the past decade, those rates have consistently been below 5 per cent. In Bahrain, Qatar, Saudi Arabia and United Arab Emirates, growth rates have also been volatile (see figures IB (a), (d), (e) and (f)). A reversal in those trends may be expected in 2005 and 2006 because of the recent sharp rise in oil prices, which reached an all-time high of \$60/barrel in June 2005. Furthermore, estimates of recent gains in Gulf Cooperation Council (GCC) capital markets indicate a sharp increase in stock market capitalization, which by the end of 2004 stood at some \$533 billion.¹ If an oil price reversal does not occur in the near future, those significant increases may contribute positively to the real GDP growth rate in 2006.

¹ Arab Monetary Fund, 4th *Quarterly Bulletin*, 2004.

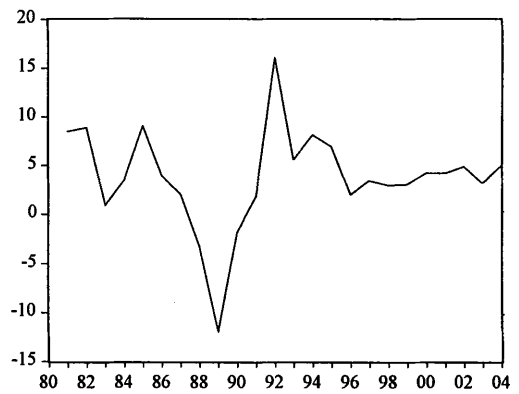
Figure I. Real GDP growth rates in ESCWA member countries, 1980-2004
(Percentages)

A. More diversified economies

(a) Egypt



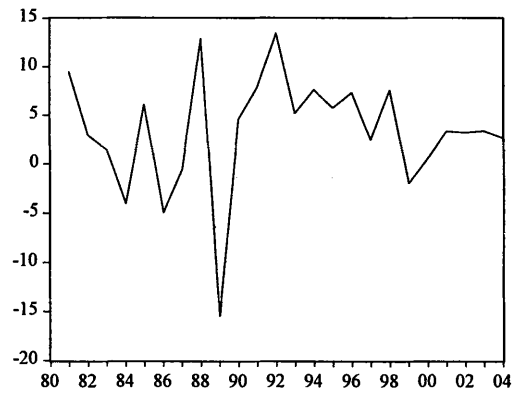
(b) Jordan



(c) Lebanon



(d) Syrian Arab Republic

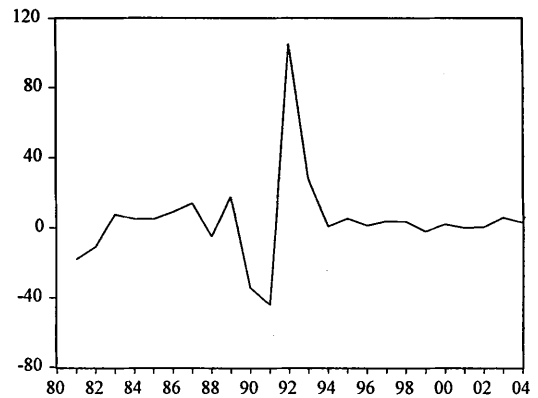


B. Less diversified economies

(a) Bahrain



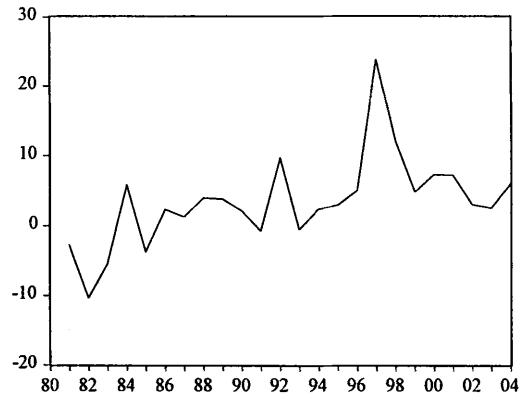
(b) Kuwait



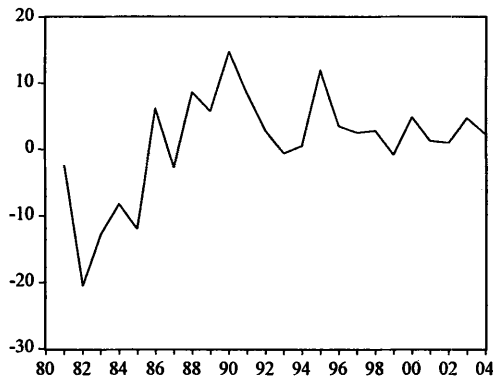
(c) Oman



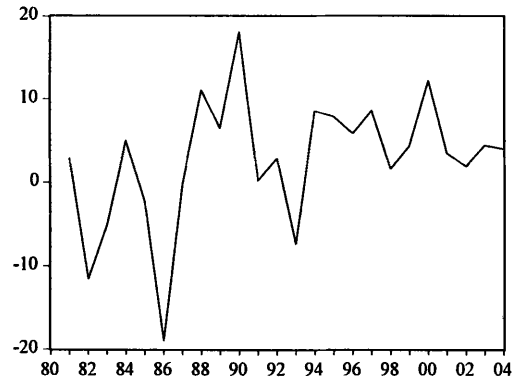
(d) Qatar



(e) Saudi Arabia



(f) United Arab Emirates



Source: ESCWA, *National Accounts Studies of the ESCWA Region*, Bulletin Nos. 17-23.

Note: Iraq, the Palestinian Authority and Yemen are excluded because of lack of data.

B. PRIVATE INVESTMENT IN ESCWA MEMBER COUNTRIES

The ESCWA region in general continues to experience low private investment levels, largely because of inadequate institutions and infrastructure, and large public sectors, the size of which is largely determined by Government command of oil revenue. In the ESCWA member more diversified economies (MDEs), and as shown in figure IIA (a), between 1995 and 2002, rates of private investment in Egypt were significant. Private investment levels peaked in 2002 at some \$11 billion, but appear to have fallen to some \$9 billion by the end of 2004. The significant increase between 1995 and 2002 may be explained by the privatization of some public entities, thereby increasing the significance of the role of the private sector. Similar dynamics may be observed in Jordan, where private investment increased significantly between 1994 and the end of 1995, to reach \$1.6 billion. It has since fallen slightly to a low of \$1.4 billion (see figure IIA (b)). Private investment in Lebanon has increased steadily since the early 1990s, which may be attributed to the end of the civil war and the resumption by the private sector of its role as the main engine of growth. From a mere \$0.5 billion in 1990, private investment had increased to some \$2.8 billion by the end of 2001. The rate seems to have fallen somewhat since 2001, because of the prevailing high interest rates which crowd-out private investment (see figure IIA (c)). In contrast, investment levels in the Syrian Arab Republic before 1990 were highly volatile and have been on the decline since 1995 (see figure IIA (d)). Relative to the size of its economy, private investment in that country is low. That may be explained by the fact that, since the early 1970s, the private sector has not made a significant contribution to economic activity.

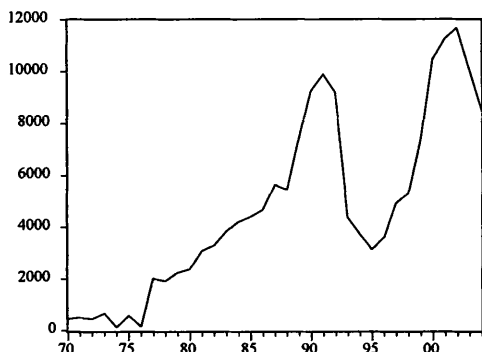
In the LDEs of Bahrain and Kuwait, private investment has been extremely volatile over the past 20 years, standing at \$0.8 and 1.5 billion respectively at the end of 2004 (figures IIB (a) and (b)). Private investment in Kuwait does not seem to have recovered from the devastating consequences of the second Gulf War, while in Bahrain, a large public sector dwarfs the private sector, and private investment is under

\$1 billion. Saudi Arabia is in a similar situation: there has been a significant decline in private investment since 1996. However, relative to the size of its GDP, the low level of private investment in Saudi Arabia, namely, less than \$5 billion, point to the insignificance of the role of the private sector (see figure IIB (e)). Private investment trends in Oman, Qatar and the United Arab Emirates have been volatile but on the increase since the early 1990s. A significant reversal in private investment trends in those three countries has been observable since early 2000 (see figures IIB (c), (d) and (f)). Those trends are expected to continue as the result of the recent significant rises in oil prices and the return of more investment capital to the region.

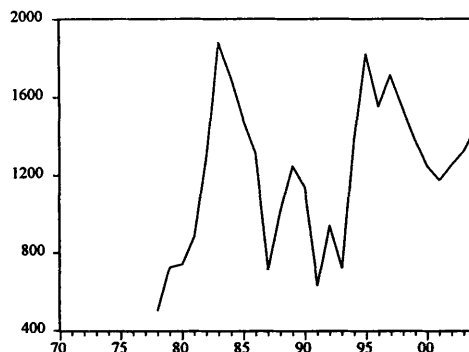
Figure II. Private investment in ESCWA member countries, 1970-2004
(Millions of United States Dollars at current prices)

A. More diversified economies

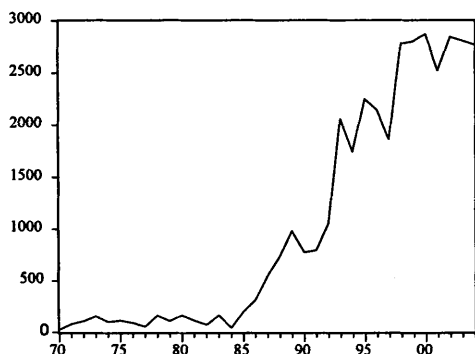
(a) Egypt



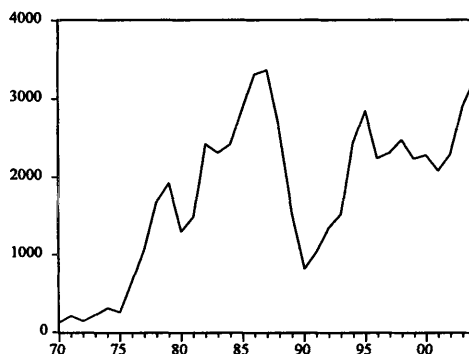
(b) Jordan



(c) Lebanon

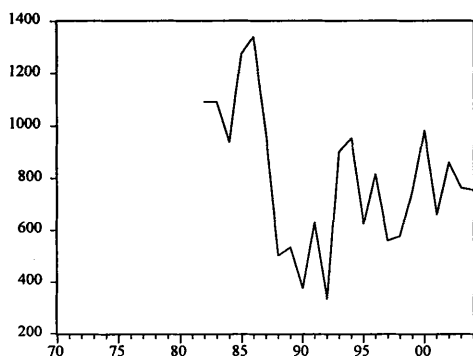


(d) Syrian Arab Republic

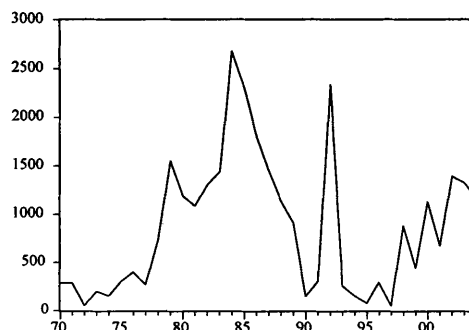


B. Less diversified economies

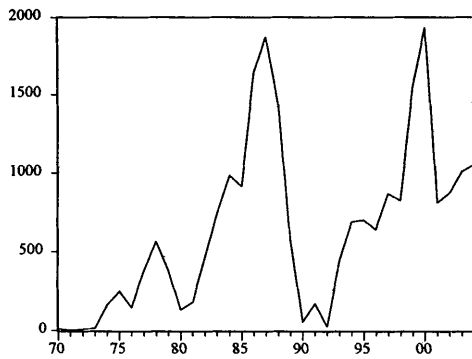
(a) Bahrain



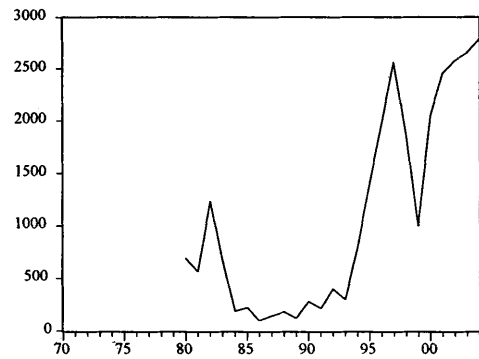
(b) Kuwait



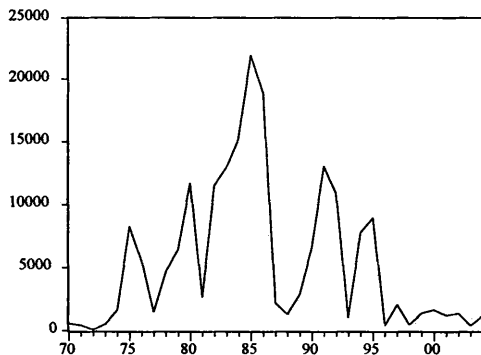
(c) Oman



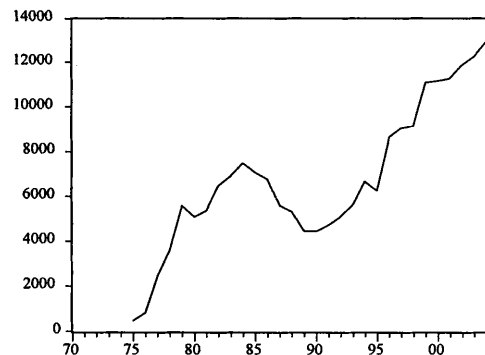
(d) Qatar



(e) Saudi Arabia



(f) United Arab Emirates



Sources: International Monetary Fund (IMF), International Financial Statistics database; World Bank, World Development Indicators database.

Note: Iraq and the Palestinian Authority are excluded because of lack of data.

C. PUBLIC INVESTMENT IN EDUCATION, HEALTH AND INFRASTRUCTURE, AND GROWTH

Since the early 1990s, Egypt and Jordan have devoted considerable efforts to reducing the size of the in public sectors, using plans for massive privatization aimed at enhancing the productive capacity and efficiency of the respective economies and the GDP growth rate. Nevertheless, in Egypt public investment appears to have continued to rise since 1990, peaking at some \$7 billion in 2001. Figure IIIA (a) shows that, from a low of some \$3 billion in 1991, public investment has increased steadily. However, that trend seems to have been reversed in 2002. Similar dynamics may be observed in Jordan, where there has been a steady increase in public investment since the early 2000s, from some \$0.3 billion in 1990 to just under \$1 billion in 2004 (see figure IIIA (b)). Lebanon has always been characterized by an open market economy, where the private sector initiative has always been greater than that of the public sector. However, as shown in figure IIIA (c), public investment has been increasing steadily since the early 1990s. That may be explained by the significant expansion of the public sector since 1993, when the Government embarked on an aggressive scheme to rebuild its infrastructure. From a mere \$0.5 billion in 1992, public investment has dramatically increased, to \$2.3 billion in 2004. That constitutes a five-fold increase over the 1992 figure. Notwithstanding its positive contribution to the GDP growth rate between 1993-1998, the increase in public investment is having a devastating impact on the whole economy. In order to borrow from the domestic and international financial markets, the Lebanese Government had to boost real interest rates on treasury bills (TBs) to make them more attractive to domestic and international investors. The significantly high real interest rates which have prevailed since 1993 have exerted negative pressures on real GDP growth and, since 1998, the Lebanese economy. While the same scenario prevails in the Syrian Arab Republic, the expansion in public investment before 1990 appears to have declined since (see figure IIIA (d)). The question of whether the increase in public investment has been growth-enhancing in Egypt, Jordan, Lebanon and Syrian Arab Republic will be considered in the empirical section of the study.

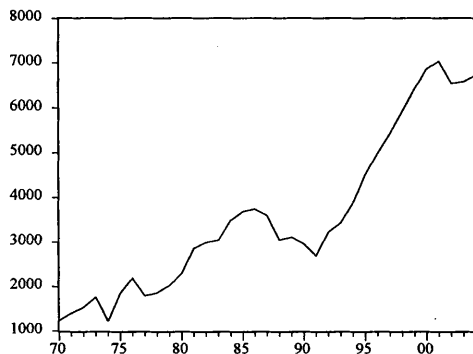
Public investment in the LDEs of the ESCWA region has always been sizeable, largely because those economies rely heavily on Government revenue oil. Such revenue is channeled to various sectors of the economy in order to improve infrastructure, pay public sectors' employees provide public benefits or in order to encourage productive investment. That structural aspect of the Gulf Cooperation Council economies has emphasized the public sector at the expense of the private sector. Moreover, with every fall in oil prices and revenues, the various Governments attempt to reduce the impact of shrinking oil revenues by maintaining high levels of public investment.

As a result, public investment in general shows an upward trend in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates (see figure IIIB). In particular, there has been a four-fold increase in public investment in Oman since the early 1970s (see figure IIIB (c)). In Bahrain, public investment increased from some \$0.2 billion in 1980 to \$0.6 billion in 2004 (see figure IIIB (a)). Similar dynamics may be observed in Kuwait and Qatar, with six- and three-fold increases in public investment respectively, from below \$1 billion in 1970 in Kuwait to \$6 billion in 2004, and from \$0.8 billion in 1980 in Qatar to some \$1.6 billion in 2004 (see figures IIIB (b) and (d)). There were greater, namely, in four- and three-fold increases respectively public investment in Saudi Arabia and the United Arab Emirates. In Saudi Arabia, such investment rose from \$3 billion in 1970 to \$35 billion in 2004, and in the United Arab Emirates from below \$1 billion in 1970 to \$3 billion in 2004 (see figures IIIB (e) and (f)).

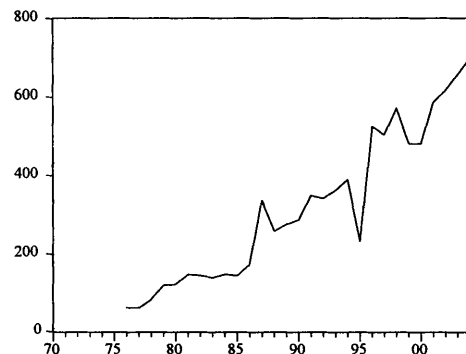
Figure III. Public investment in ESCWA member countries, 1970-2004
(Millions of United States Dollars at current prices)

A. More diversified economies

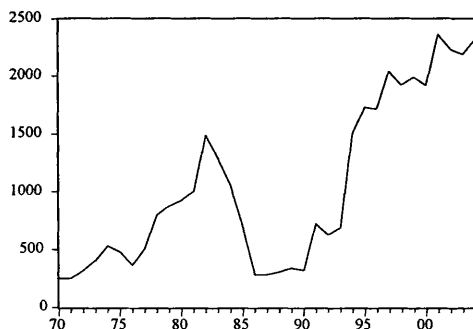
(a) Egypt



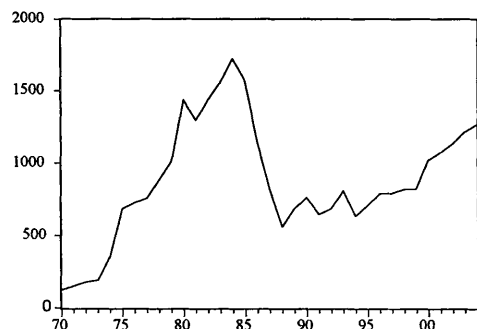
(b) Jordan



(c) Lebanon

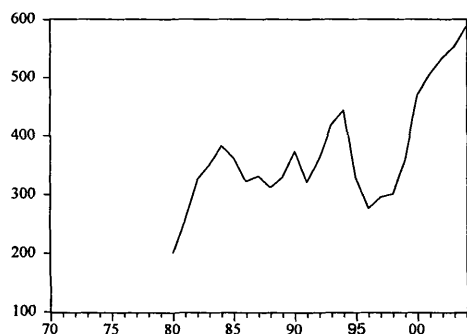


(d) Syrian Arab Republic

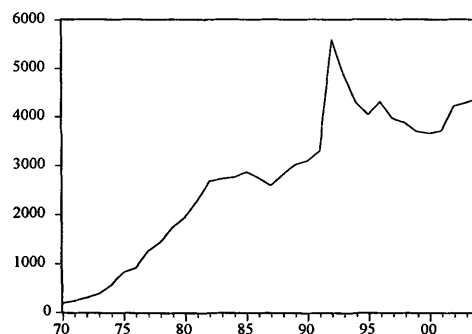


B. Less diversified economies

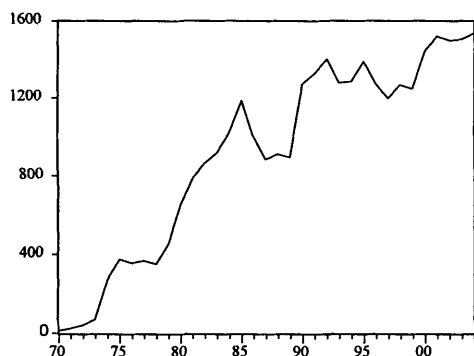
(a) Bahrain



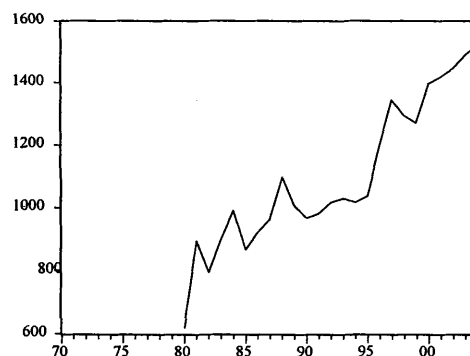
(b) Kuwait



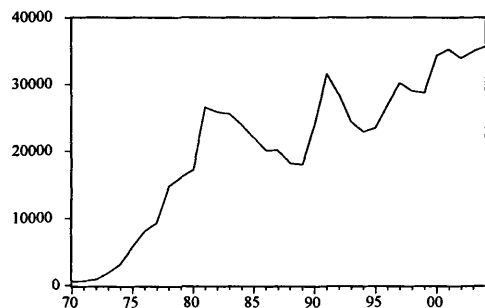
(c) Oman



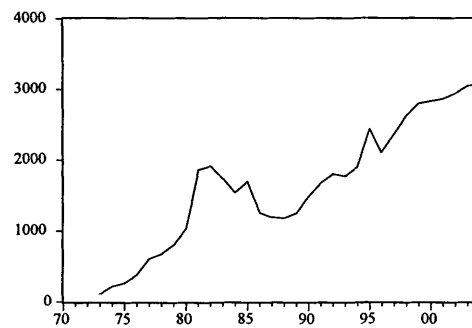
(d) Qatar



(e) Saudi Arabia



(f) United Arab Emirates



Sources: IMF, International Financial Statistics database; World Bank, World Development Indicators database.

Note: Iraq, the Palestinian Authority and Yemen are excluded because of lack of data.

D. PUBLIC AS OPPOSED TO PRIVATE DOMESTIC DEBT

In the MDEs of the ESCWA region fiscal policy has recently become critical to those countries' future economic and fiscal situations given the accumulation since the early 1990s of sizable levels of domestic public debt. The cumulation of consecutive budget deficits, high interest rates and high levels of Government spending coupled with inadequate revenue are the main causes of huge domestic public debt.²

² Total public debt, namely, Government debt added to national debt, is the amount of money owed by Government, at any level (central Government, federal Government, national Government, municipal government or local government, public enterprises and official entities). Public debt includes Government bonds, bank loans, and according to some measures, such unfounded liabilities as pension plan payments. Total public debt may be divided into external debt, owed to foreign lenders, and internal (domestic) debt, owed to lenders within the country. Because of lack of consistent data on total public debt, this study will use total central Government claims, (IMF, IFS lines 12a and 22a).

The MDEs have been financing their budget deficits mainly by domestic borrowing, which has had a direct bearing on interest rates, private investment and capital accumulation and the GDP growth rate. Deficit financing has also directly affected private sectors' growth by crowding-out private investment.

In Egypt, domestic public debt, proxied by total claims on central Government, has been increasing steadily since the early 1970s. From a figure of below \$5 billion, public debt has increased 11-fold, to slightly over \$55 billion in 2004 (see figure IVA (a)). There was, however, a short-lived trend reversal in the early 1990s, largely as a result of the massive privatization scheme that Egypt implemented during that period. The same scenario applies to Jordan, where there was a steady increase since the early 1970s, and a trend reversal which lasted about five years, also resulting from privatization. In 2004, domestic public debt reached \$2.8 billion (see figure IVA (b)). The figures are even more alarming in the Syrian Arab Republic and, in particular, Lebanon. In the former, domestic public debt has steadily increased since 1989, to reach \$40 billion at the end of 2004³ (see figure IVA (d)). The increase in domestic public debt is even more significant in Lebanon: since 1992, public debt has steadily increased, to reach \$25 billion by the end of 2004 (see figure IVA (c)). The question of whether domestic public debt has crowded-out private investment and undermined GDP growth in Egypt, Jordan, Lebanon and Syrian Arab Republic will be addressed in the empirical section of the study.

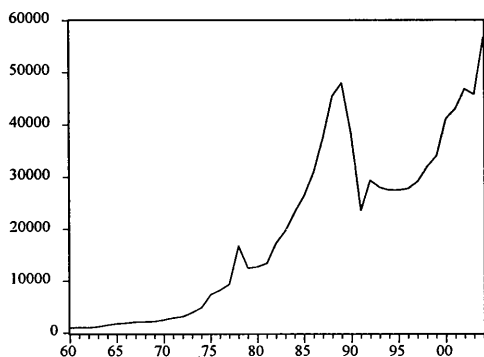
Since the early 1990s, the LDEs of the ESCWA region have also accumulated sizeable levels of domestic public debt, notwithstanding the fact that those Governments receive considerable foreign currency revenues from oil exports. The cumulation of recent budget deficits, coupled with high levels of Government spending, are largely responsible for recent domestic public debt. The fact that LDEs have been financing their budget deficits mainly by domestic borrowing has had a direct bearing on private investment and capital accumulation, as well as GDP growth rate. Deficit financing has also directly affected private sector growth by crowding-out private investment.

Since the 1990s, domestic public debt in all the LDEs with the exception of Kuwait has risen. The most significant accumulation is in Saudi Arabia, where public debt has increased four-fold since 1990, to stand at some \$40 billion at the end of 2004 (see figure IVB (e)). Similarly, such debt in the United Arab Emirates increased eight-fold, to some \$8 billion at the end of 2004 (see figure IVB (f)). In Oman and Qatar, public debt figures are less significant, standing at \$1.2 and \$6 billion respectively at the end of 2004 (see figures IVB (c) and (d)). Kuwait appears to have largely contained its domestic public debt: there has been a significant decline since 1995, from some \$25 billion to \$15 billion at the end of 2004 (see figure IVB (b)).

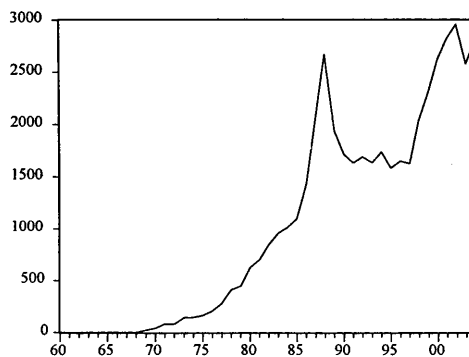
Figure IV. Domestic public debt in ESCWA member countries, 1960-2004
(Millions of United States Dollars at current prices)

A. More diversified economies

(a) Egypt

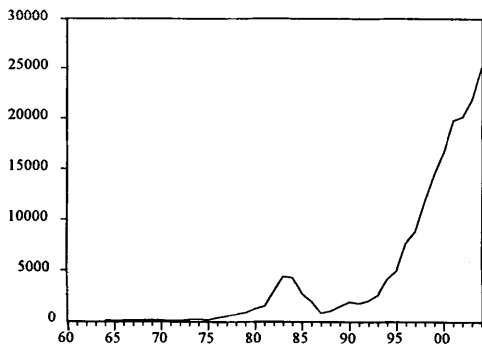


(b) Jordan

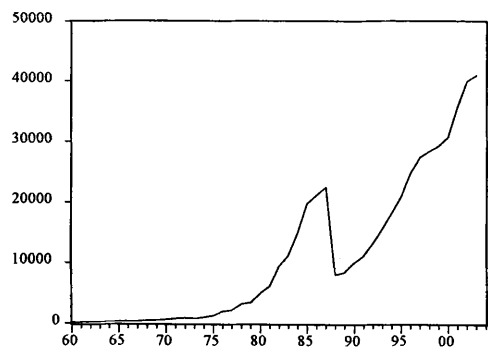


³ This figure is based on an official exchange rate of 11 Syrian pounds to \$1.

(c) Lebanon

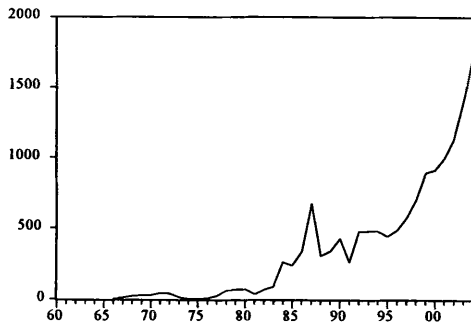


(d) Syrian Arab Republic

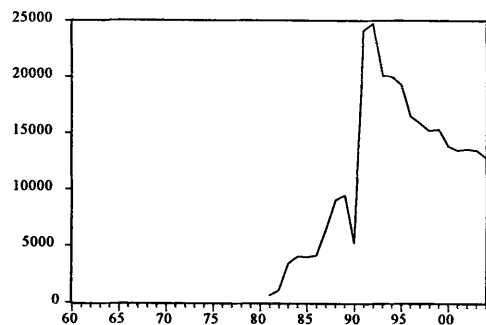


B. Less diversified economies

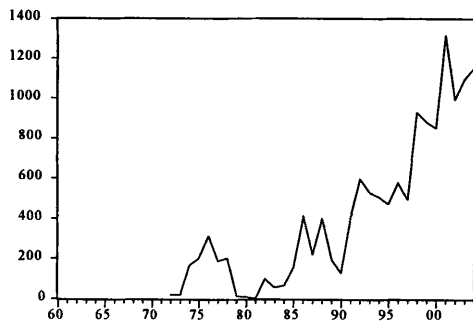
(a) Bahrain



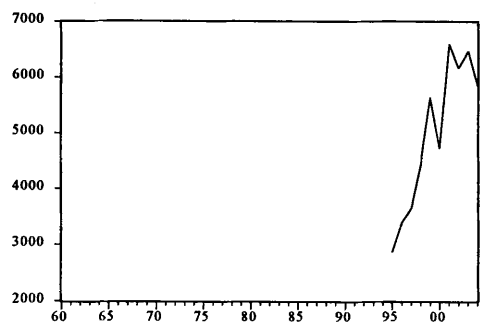
(b) Kuwait



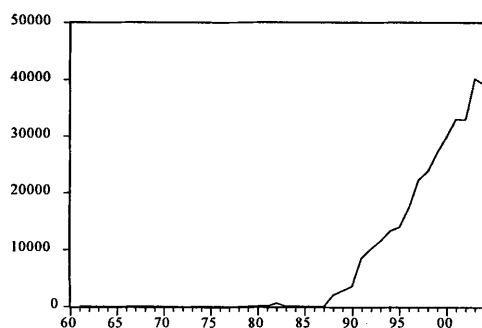
(c) Oman



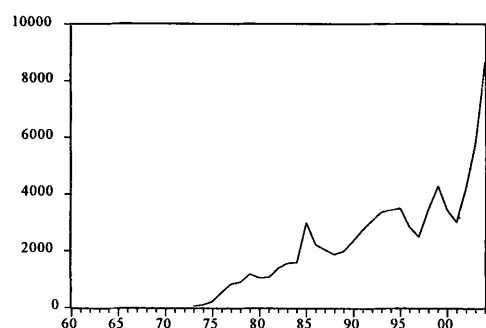
(d) Qatar



(e) Saudi Arabia



(f) United Arab Emirates



Source: IMF, International Financial Statistics database.

Notes: (a) Domestic public debt is proxied by the claims on central Government, see IMF, IFS line 12a plus 22a; (b) Iraq, the Palestinian Authority and Yemen are excluded because of lack of data.

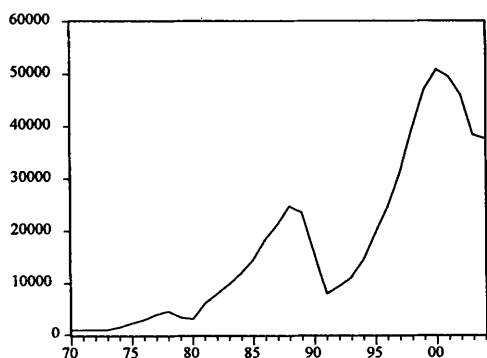
The successful privatization of public entities in both Egypt and Jordan has stimulated greater participation by the private sector in overall economic activity. That was reflected in a five-fold increase in Egypt's private debt, measured by claims on the private sector, since an aggressive privatization scheme was launched in the early 1990s. Accordingly, private debt increased from \$10 billion in 1991 to some \$50 billion in 2000, with a slight decrease to \$40 billion at the end of 2004 (see figure VA (a)). Similarly, in Jordan, private debt increased from some \$3 billion in 1990 to some \$8 billion in 2004 (see figure VA (b)). The scenario is very similar in both Lebanon and the Syrian Arab Republic. In the former, private debt has increased from \$2 billion in 1991 to more than \$15 billion at the end of 2004 (see figure VA (c)). In the Syrian Arab Republic, the increase has been less significant: at the end of 2004, it stood at some \$10 billion (see figure VA (d)).

Similar dynamics may be observed in the LDEs of the ESCWA region. Private debt, as measured by claims on the private sector, appears to be on the rise in Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. In Kuwait, private debt increased from \$2 billion in 1991 to more than \$33 billion in 2004 (see figure VB (b)). In Oman and Qatar, private debt has been steadily increasing, peaking in both at some \$8 billion at the end of 2004 (see figure VB (c) and (d)). Those figures are even more significant in both Saudi Arabia and the United Arab Emirates. In the former, private debt stood at \$83 billion at the end of 2004, and at \$55 billion in the latter (see figures VB (e) and (f)).

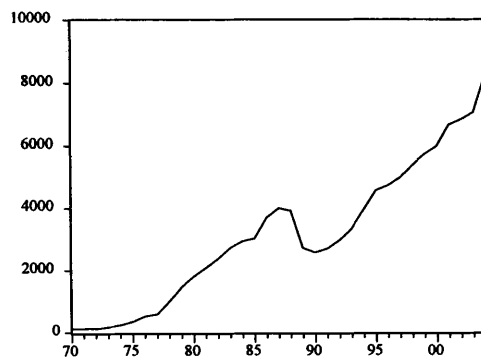
Figure V. Domestic private debt in ESCWA member countries, 1970-2004
(Millions of United States Dollars at current prices)

A. More diversified economies

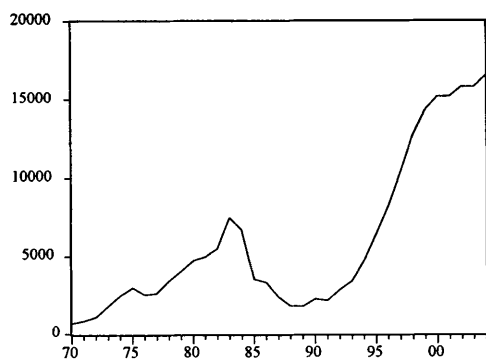
(a) Egypt



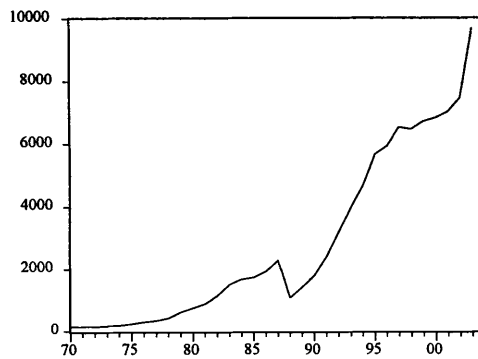
(b) Jordan



(c) Lebanon

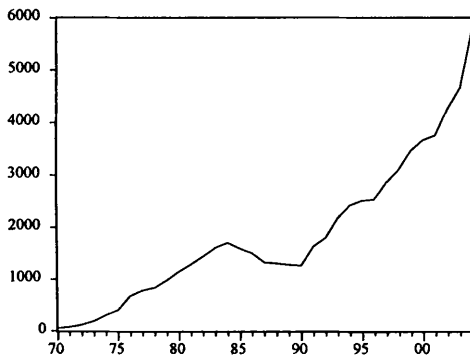


(d) Syrian Arab Republic

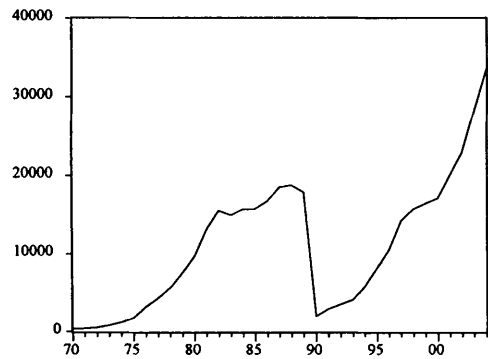


B. Less diversified economies

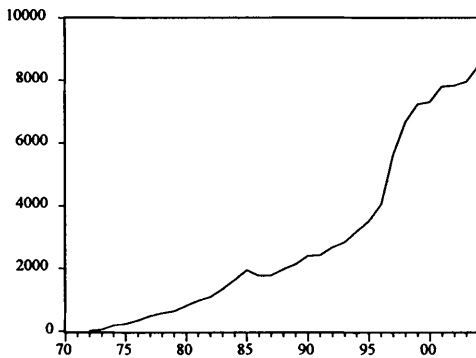
(a) Bahrain



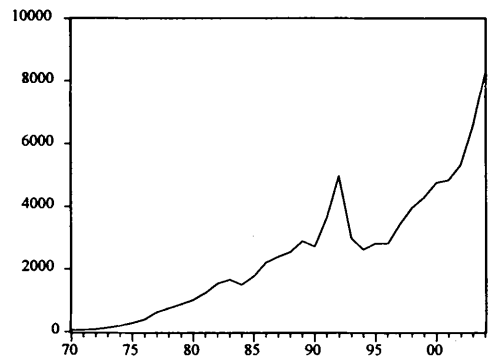
(b) Kuwait



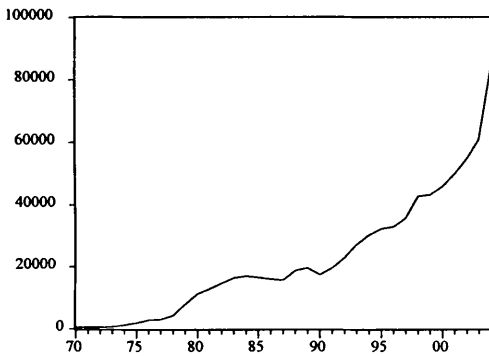
(c) Oman



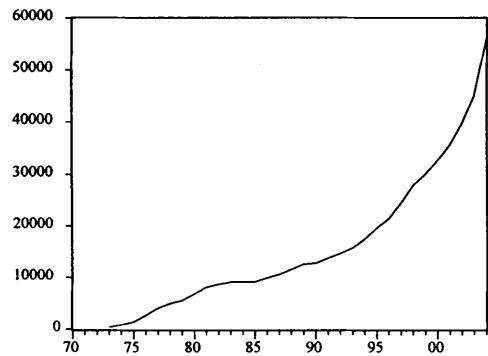
(d) Qatar



(e) Saudi Arabia



(f) United Arab Emirates



Source: IMF, International Financial Statistics database.

Notes: (a) Domestic private debt is proxied by the claims on the private sector, see IMF, IFS line 32d; (b) Iraq, the Palestinian Authority and Yemen are excluded because of lack of data.

II. REVIEW OF GROWTH THEORY RELATED LITERATURE

The relationship between GDP growth rates and factor inputs has attracted a great deal of attention from academics and policymakers. An extensive theoretical and empirical literature examines the relationship between capital, labour and the GDP growth rate. One strand of the literature, which rests mainly on the pioneering work of Solow and the augmented Solow model, considers technological progress as a main determinant of economic growth. However, if Government spending on infrastructure were taken into account in those models, better explanations of long-term growth would be forthcoming.

Another strand of the literature, namely, that of Barro (1990), which rests mainly on the pioneering work of Romer (1986 and 1990) on the theory of endogenous growth, has generated a significant body of theoretical and empirical work which tries to explain growth through factors other than capital and labour. Those factors, which have for some time been ignored, have constituted important determinants of economic growth. In his 1990 paper, Barro presents an extension of endogenous growth models that assumes constant returns to a broad concept of capital by including tax-financed Government services. The paper finds that growth and savings initially rise with productive Government expenditure, only to subsequently decline. With an income tax, the decentralized choices of growth and savings are found to be too low, but when the production function is Cobb Douglas, the optimizing Government still satisfies a natural condition for productive efficiency. Barro also reviews the empirical evidence in support of the hypothesis that Government expenditure on infrastructure induces economic growth. Palivos and Yip (1995) attempt to find an optimal policy to finance Government expenditure. From a growth perspective, the paper finds that seigniorage⁴ is always preferred to income tax financing of expenditure. Income tax financing results, however, in a lower inflation rate. Finally, from a welfare perspective, the paper finds that the optimal policy depends crucially on the proportion of investment purchases that are subject to liquidity constraints.

Romer (1986) presents a fully-specified model of long-run growth in which knowledge is assumed to be an input into production with an increasing marginal productivity. He uses a competitive equilibrium model with endogenous technological change. The paper finds, firstly, that the growth rate of the world's technological leader has been rising over time, not falling, which can happen in the neoclassical model only if the pace of exogenous technological progress steadily accelerates. Secondly, countries appear not to be converging to a common level of per capita income as they do in the neoclassical model when they share similar saving behaviour and technologies.

In his 1990 paper, Romer argues that growth is driven by technological change that arises from intentional investment decisions made by profit-maximizing agents. The model presented in the paper is the one-sector neoclassical model, with technological change augmented to give an endogenous explanation of the source of such change. The main finding of the model is that an economy with a larger total stock of human capital will experience faster growth. The paper also finds that having a large population is not sufficient to generate growth. That model helps to explain why a country with such a large population as China may benefit from economic integration with the rest of the world.

In another paper, Romer (1994) describes two strands of the literature that converge under the heading of endogenous growth. One strand, which is primarily empirical, considers whether there is a general tendency for poor countries to catch up with rich countries. Using cross-country regression, he finds a slow rate of convergence. The other strand, which is primarily theoretical, considers the modifications necessary in order to construct a theory of aggregate growth that takes seriously the economics of discovery, innovation and technological change. The paper argues that the first strand captures only part of the essence of endogenous growth, and that the second strand of work has a more significant impact on the understanding of growth and the approach to aggregate theory.

Aschauer (1988) considers the relationship between aggregate productivity and stock and flow Government-spending variables. The empirical results show that the non-military public capital stock is significantly more important in determining productivity than is either the flow of nonmilitary or military

⁴ Seigniorage is the ability of a Government to tax its citizens indirectly through inflation.

spending. Furthermore, the paper shows that military capital bears little relation to productivity, which is best explained by core infrastructure. In another paper, Aschauer (1989) studies the relation between public and private capital, finding that higher public capital accumulation raises the national investment rate above the level chosen by rational agents and induces an ex-ante crowding-out of private investment. However, an increase in public capital stock also increases return to private capital, which crowds-in private capital accumulation.

Using an endogenous growth model, Devarajan, Xie and Zou (1997), consider alternative ways of providing public capital, using distortionary taxes. The main conclusion of their paper is that when the Government provides the goods, the resulting growth rate and welfare may or may not be higher than under *laissez-faire*; whereas when the Government subsidizes private providers, not only are growth and welfare higher than under public provision, they are also unambiguously higher than under *laissez-faire*.

Along the same lines, Grossman and Helpman (1994) make the case that purposive and profit-seeking investment in knowledge play a critical role in the long-run growth process. Their paper reviews the implications of neoclassical growth theory and the more recent theories of endogenous growth before discussing the empirical evidence that bears on long-run growth modeling. In conclusion, it describes in greater detail a model of growth based on endogenous technological progress.

Temple (1999) reviewed the main findings on growth theory. To that end, he addresses six main questions about the world's income distribution, convergence and the rate of diminishing returns to inputs. He finds that poor countries are not catching up with the rich, and that to a certain extent, international income distribution is becoming polarized. The reason for that disparity is that countries catch up by adopting technologies from abroad, as well as by investing in physical capital and education. The paper also finds that rates of efficiency growth have varied widely across countries over the past 30 years. The final section of the paper reviews the main reasons for the disparity between national growth rates, finding that macroeconomic stability, by affecting capital investment, and equipment investment plays a crucial role in that divergence. Furthermore, contrary to popular belief, population growth does not seem to have much negative effect. Democracies do not perform noticeably better than autocratic regimes; however, countries that extend economic freedoms and protect property rights grow faster. On Governmental issues, the paper finds that big Government and high taxation may have a negative effect, and that Government spending on infrastructure is beneficial.

Azariadis and Drazen (1990) explore the possibility that sustainable differences in per capita growth rates could appear even between economies with identical structures, in contrast to convergence theory. To capture the effect of non-convergent long-term growth paths, the authors extended the neoclassical model of economic growth with a feature that is sufficient to produce multiple, locally-stable balanced growth paths in equilibrium. That feature comprises technological externalities with a threshold property that permits returns to scale to rise very rapidly whenever such economic state variables as the quality of labour take on values in a relatively narrow "critical mass" range. Using cross-section data and ordinary least squares, it found that rapid growth cannot occur without overqualified labour, namely, without a high level of human investment relative to per capita income.

Barro and Sala-I-Martin (1992) study the role of tax policy in various models of endogenous economic growth, finding that if the social rate of return on investment exceeds the private return, then tax policies that encourage investment can raise the growth rate and thereby increase the utility of the representative household. Furthermore, in growth models that incorporate public services, the optimal tax policy hinges on the characteristics of the services. If the public services are rival and excludable or non-rival and non-excludable then lump sum taxation is superior to income taxation. If the public services are rival but non-excludable, for instance, transportation facilities, courts, national defence and police services, then income taxation is superior to lump sum taxation.

Easterly and Rebelo (1993) describe the empirical regularities relating fiscal policy variables, level of development and rate of growth. Their paper employs historical data, recent cross-section data, and newly constructed public investment series. The main findings are firstly, that there is a strong association between development level and fiscal structure: poor countries rely heavily on international trade taxes, while income

taxes are only important in developed economies; secondly, that fiscal policy is influenced by the scale of the economy, measured by its population; and thirdly, that investment in transport and communication is consistently correlated with growth, while the effects of taxation are difficult to isolate empirically.

Using a regression analog of growth accounting, Fischer (1993) presents cross-sectional and panel regressions showing that growth is negatively associated with inflation, large budget deficits and distorted foreign exchange markets. Supplementary evidence suggests that the causation runs from macroeconomic policy to growth. The paper also identifies the channels of those effects: inflation reduces growth by reducing investment and productivity growth; budget deficits also reduce both capital accumulation and productivity growth. Finally, the paper examines exceptional cases and finds that, while low inflation and small deficits are not necessarily conducive to high growth even over long periods, high inflation is not consistent with sustained growth.⁵

Using cross-country estimates of physical and human capital stocks, Benhabib and Spiegel (1994) study the growth-accounting regressions implied by a Cobb-Douglas aggregate production function. The results indicate that human capital is of little significance in explaining per capita growth rates. The paper provides an alternative model in which the growth rate of total factor productivity depends on a nation's human capital stock level: there is therefore a positive role for human capital.

Using cross-section data on the average level of seigniorage of 90 countries for the period 1971-1990, Click (1998) finds that optimum tax theory explains up to 40 per cent of the cross-section variation in seigniorage, and that practical concerns about financing transitory Government spending, central bank independence and political stability explain some of the remaining variation in seigniorage. In contrast, 90 per cent of the cross-country variation in conventional taxation appears to be determined by the level of Government spending and deadweight loss.

Lucas (1988) considers the prospects for constructing a neoclassical theory of growth and international trade that is consistent with some of the main features of economic development. Three models are considered and compared to evidence: one that emphasizes physical capital accumulation and technological change; one that emphasizes human capital accumulation through schooling; and one that emphasizes specialized human capital accumulation through learning-by-doing.

Bahmani-Oskooee (1999) tries to shed some empirical light on the crowding-in versus crowding-out controversy in macroeconomics. Using quarterly data from the United States over the 1947-1992 period and cointegration analysis, the paper investigates the long-run relationship between budget deficits and real fixed investment. The methodology is based on the Johansen cointegration technique. The results reveal that there are three cointegrating vectors in investment: income, interest rates and budget deficits. Estimates of those cointegrating vectors and further analysis show that a cointegrating vector, in which all four variables carry their expected signs, supports the Keynesian view that in the long run the United States real federal deficits crowd-in real investment.

⁵ For a good review of macroeconomic literature that attempts to determine the relationship between growth and inflation and, in particular, the optimal inflation target, see Brook et al. (2000).

III. EMPIRICAL METHODOLOGY AND RESULTS

Economic theory suggests that the effect of domestic public debt on GDP growth rates is ambiguous, because it can be either negative, through the crowding-out effect, or positive, through the crowding-in effect. The mechanisms leading to crowding-out effects are well known. An increase in public debt causes financing problems to corporations because of the shortage of loanable funds. That shortage of funds can be direct, where firms may have difficulty in finding parties willing to finance them; or indirect, through a rise in interest rates that discourages borrowers. A high real interest rate can also divert corporate investment decisions away from productive projects to the purchase of treasury instruments. That underinvestment incentive will hamper growth both in the short term, given that investment is an element of demand, and in the long term, through a decrease in productive capacity. According to the endogenous growth theory (Barro, 1990, and Barro and Sala-I-Martin, 1992), public debt and Government intervention in infrastructure may have a positive effect on growth, if debt is used to finance such productive public projects as education, health and infrastructure. That will increase growth through two effects: firstly, through the well-known Keynesian multiplier, and secondly through the endogenous growth effect. Such growth can increase the profitability of corporations, thereby increasing the possibilities for auto-financing through internal equity (slack), leading to greater investment opportunities.

This section uses time series VAR and VECM models to establish the determinants of the GDP growth rate in the ESCWA region in the period 1970-2004. The ESCWA region is divided into two distinct groups. The first includes the oil-producing GCC countries and LDEs, namely, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. Iraq is excluded from the sample because of the lack of robust time series data and the impact of war, occupation and civil conflict. The second group comprises the non-oil producing ESCWA member countries or MDEs, namely, Egypt, Jordan, Lebanon and Syrian Arab Republic. The Occupied Palestinian Territory and Yemen are excluded because of the lack of adequate time series data in the latter and the turbulence caused by occupation and related conflict in the former.

The purpose of this section is to test whether public debt has a positive or negative effect on GDP growth in ESCWA member countries, highlighting the empirical and intertemporal links between public and private debt, private and public investment and GDP. The nature and signs of those links will help to identify the relationship between debt and growth in ESCWA member countries. The nature of those links during the period 1970-2004 will be identified on the basis of the available yearly data. The variables used are domestic public debt of member countries as a percentage of GDP, private debt as a percentage of GDP, private investment and public investment as a percentage of GDP, and the natural logarithm of GDP.

In order to test for the correlations between the different variables, we also use Granger causality tests. Those econometric tools allow a deeper analysis of the temporal and empirical relations between the various variables. In order to test for long-term relationships, the methods proposed by Johansen (1991) for multivariate systems are employed. The methodology proposed by Toda and Phillips (1993) is also closely followed.

This section aims to achieve two broad objectives. The first is to determine any cointegrating or long-term relationship between the above variables, and the other is to identify the causal relationship and the direction of causality. The methodology for performing cointegration tests between two or more series requires the order of integration of each variable to be initially determined in a model. We use Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) (1988) tests to identify the order of integration. Perron (1992) studied the effects of allowing for structural breaks when testing for unit roots, showing that a unit root test (which does not take account of any break(s) in the series) would have low power.

Once the order of integration is determined, the next task is to perform cointegration tests between the series in order to identify any long-term relationship. The Johansen and Juselius (1990) test, which uses the maximum likelihood method in order to determine the exact number of cointegrating vectors in the system is employed. Causality tests are then used to test the causal relationship between the different series, and to identify the direction of such causality. Engle and Granger (1987) have proposed testing Granger causality based on an error-correction model (ECM), if the series are cointegrated. Recent econometrics research such

as that carried out by Toda and Phillips (1993), Toda and Yamamoto (1995) and Rambaldi and Doran (1996) suggests some alternative procedures to test for Granger causality.

A. DATA AND SAMPLE

Data are based on annual time series ranging from 1970 to 2004. The data were mainly collected from the various issues of the IMF *International Financial Statistics* (IFS), the World Bank's *World Development Indicators* and ESCWA estimates and projections. The time series variables involved in this analysis are the natural logarithm of GDP, the ratio of domestic public debt⁶ to GDP, the ratio of public investment⁷ to GDP and the ratio of private investment⁸ to GDP and the ratio of private debt⁹ to GDP.

B. EMPIRICAL MODEL

A five-variable VAR and, where relevant, a VECM model will be estimated for each ESCWA member country. The choice of lag-length for the VAR model will be based on the requirement that the equations errors are not serially correlated and that the VAR is capturing the potential dynamics of the model. The Akaike Information Criterion (AIC) and the Shwartz Criterion (SC) will be used to determine the lag-length. The five equations VAR model for the individual ESCWA member country i is given by the following:

$$Y_{i,t} = \alpha + \alpha_1 Y_{i,t-1} + \alpha_2 (PD_{i,t-1}/Y_{i,t-1}) + \alpha_3 (PRD_{i,t-1}/Y_{i,t-1}) + \alpha_4 (PI_{i,t-1}/Y_{i,t-1}) + \alpha_5 (PRI_{i,t-1}/Y_{i,t-1}) + \varepsilon_{1,t} \quad (1)$$

$$(PD_{i,t}/Y_{i,t}) = \beta + \beta_1 (PD_{i,t-1}/Y_{i,t-1}) + \beta_2 Y_{i,t-1} + \beta_3 (PRD_{i,t-1}/Y_{i,t-1}) + \beta_4 (PI_{i,t-1}/Y_{i,t-1}) + \beta_5 (PRI_{i,t-1}/Y_{i,t-1}) + \varepsilon_{2,t} \quad (2)$$

$$(PRD_{i,t}/Y_{i,t}) = \delta + \delta_1 (PRD_{i,t-1}/Y_{i,t-1}) + \delta_2 Y_{i,t-1} + \delta_3 (PD_{i,t-1}/Y_{i,t-1}) + \delta_4 (PI_{i,t-1}/Y_{i,t-1}) + \delta_5 (PRI_{i,t-1}/Y_{i,t-1}) + \varepsilon_{3,t} \quad (3)$$

$$(PI_{i,t}/Y_{i,t}) = \lambda + \lambda_1 (PI_{i,t-1}/Y_{i,t-1}) + \lambda_2 Y_{i,t-1} + \lambda_3 (PD_{i,t-1}/Y_{i,t-1}) + \lambda_4 (PRD_{i,t-1}/Y_{i,t-1}) + \lambda_5 (PRI_{i,t-1}/Y_{i,t-1}) + \varepsilon_{4,t} \quad (4)$$

$$(PRI_{i,t}/Y_{i,t}) = \rho + \rho_1 (PRI_{i,t-1}/Y_{i,t-1}) + \rho_2 Y_{i,t-1} + \rho_3 (PD_{i,t-1}/Y_{i,t-1}) + \rho_4 (PRD_{i,t-1}/Y_{i,t-1}) + \rho_5 (PI_{i,t-1}/Y_{i,t-1}) + \varepsilon_{5,t} \quad (5)$$

where $Y_{i,t}$ is the natural logarithm of GDP of ESCWA member country i in period t ; $PD_{i,t}$ is public debt of country i in period t ; $PRD_{i,t}/Y_{i,t}$ is the ratio of private debt to GDP of country i in period t ; $PI_{i,t}/Y_{i,t}$ is the ratio of public investment to GDP of country i in period t , and $PRI_{i,t}/Y_{i,t}$ is the ratio of private investment to GDP of country i in period t . The inclusion of public investment in health, education and infrastructure in the model would proxy for public investment in the ESCWA region.

Finally, since the current GDP growth rate depends on current and past levels of GDP, the inclusion of lagged GDP values accounts for that specification. If the series are integrated of order 1, I(1) but not cointegrated, then we estimate a VAR model in first difference for the individual ESCWA member country. However, if the series are I(1) and cointegrated, then we estimate a VECM for the individual ESCWA member country, where an error correction term is added to each equation in models (1)-(5) in order to account for the long-term adjustments of the different variables (see annex tables 1-30).

C. GRANGER CAUSALITY AND GROWTH MECHANISMS

We next use Granger causality tests to identify growth mechanisms and determine the direction of causality between the natural logarithm of GDP, the ratio of public debt to GDP, the ratio of public

⁶ Public debt is proxied by the claims on central Government. See IMF, IFS entry 12a plus 22a.

⁷ Public investment includes public investment in education, public health, public work and transport, telecommunications and capital expenditure.

⁸ Computed as gross capital formation minus public investment.

⁹ Private debt proxied by total claims on the private sector. See IMF, IFS entry 32d.

investment to GDP, the ratio of private investment to GDP and the ratio of private debt to GDP for each individual ESCWA member country.

The causality tests are conducted for 2 lags. Formally, let X and Y represent two series. Granger causality addresses the question whether X is linearly informative about a future Y . That would hold true only when event X precedes event Y . Stated differently, the presumption is that current and past observations of X help in the forecast of Y . To conduct those tests, each series is represented as a difference vector autoregression and regressed on its lag and those of the other series, as set forth below:

$$\Delta X_t = \sum_{i=1}^p \alpha_i \Delta X_{t-i} + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \sigma_t, \quad (6)$$

$$\Delta Y_t = \sum_{i=1}^p \alpha_i \Delta Y_{t-i} + \sum_{i=1}^p \beta_i \Delta X_{t-i} + \varepsilon_t. \quad (7)$$

The estimated parameters β_s ' capture the impact of the exogenous or independent variable on the endogenous or dependent variable. The causality tests consist of an F test for the null hypothesis:

$$H_0 : \beta_1 = \beta_2 = 0 \quad (8)$$

For equation (7) in the model above, the null hypothesis is the lagged difference X does not Granger cause the difference Y .

For each individual ESCWA member country, if the time series are non stationary but not cointegrated, a VAR model is estimated. If the time series are non-stationary but cointegrated, a VECM model is estimated (see annex tables 1-30). In a VECM, two types of causality exist, namely, short term and long term. Long term causality is identified through the cointegration relations between the variables and by the weight of those relations. Short term causality is identified by the polynomial matrix associated with each variable taken in its lagged form.

The empirical findings set forth in the annex indicate that the variables are cointegrated in Egypt, Jordan, Kuwait, Qatar, Oman, Syrian Arab Republic and Saudi Arabia, whereas there is a lack of evidence for cointegration in Bahrain and the United Arab Emirates. Where countries show evidence of cointegration, the Granger causality tests are carried out on the levels of the ratio of private and public debt to GDP, the ratio of private and public investment to GDP and the natural logarithm of GDP. The ratio to GDP is used because GDP growth may be a factor linking everything together and it should either be explicitly controlled for or it should be a common denominator of the variables under investigation.

The issue of testing Granger causality in such scenarios has been the subject of considerable recent empirical literature, including, inter alia, Engle and Granger (1987), Sims, Stocks and Watson (1990), Toda and Phillips (1993), and Toda and Yamamoto (1995). If all variables are known to be integrated of order 1 but not cointegrated, then Sims et al. (1990) and Toda and Phillips (1993) argue that one should estimate a VAR model in first difference. In addition, Granger causality tests on variables in their first differences are likely to have more power in finite samples. However, if the variables are cointegrated then Granger causality within an error correction model is most commonly used. In addition, Granger causality tests on variables in their levels are likely to have more power, and the usual F-tests are valid in that case.

1. *Egypt*

Annex tables 1 and 2 indicate that all variables are non stationary I(1) series and cointegrated. We therefore estimate a VECM for Egypt. Granger causality test results in table 1 indicate that public debt has a negative crowding-out effect on GDP in the short term, which becomes positive in the second year (see also annex table 3). That indicates that public debt going into investment affects GDP positively, with a time-lag. The massive privatization scheme introduced in Egypt in the early 1990s should be linked to greater

efficiency and efforts should again be devoted to reducing public debt, which may be linked to the size of the public sector. Public debt has been increasing since the early 1990s, despite earlier privatization efforts. The significant increase in public debt was accompanied by modest increases in public investment. The increase in public investment is therefore not contributing to an increase in the GDP growth rate. Public debt appears, rather, to be crowding-out that growth rate. Egypt will have to direct public investment towards improving its human capital, mainly by increasing investment in education, health and infrastructure. That may be expected to generate GDP growth of the endogenous type in the long-term.

Table 1 also indicates that public debt crowds-in private debt at the 11 per cent significance level. That is explained by the fact that increases in public debt for the purpose of increasing public investment in infrastructure is having a positive impact on the private sector, stimulating further private borrowing and investment. Finally, private debt crowds-in public investment and crowds-out private investment at the 11 and 8 per cent significance levels respectively. The detected negative causality from private debt to private investment in that case must be capturing the huge increase in private debt between 1990 and 1995 that resulted from high interest rates and, consequently, the sharp decrease in private investment over the same period.

TABLE 1. GRANGER CAUSALITY TESTS: EGYPT

Null hypothesis	Observations	F-statistic	Probability
Public debt does not Granger cause GDP	33	2.39*	0.11
GDP does not Granger cause public debt		0.72	0.50
Public investment does not Granger cause GDP	33	0.81	0.45
GDP does not Granger cause public investment		1.74	0.19
Private debt does not Granger cause GDP	33	1.48	0.24
GDP does not Granger cause private debt		4.99***	0.01
Private investment does not Granger cause GDP	33	1.98	0.16
GDP does not Granger cause private investment		0.18	0.84
Public investment does not Granger cause public debt	33	1.93	0.16
Public debt does not Granger cause public investment		0.57	0.57
Private debt does not Granger cause public debt	33	1.57	0.23
Public debt does not Granger cause private debt		2.38*	0.11
Private investment does not Granger cause public debt	33	1.23	0.31
Public debt does not Granger cause private investment		0.81	0.46
Private debt does not Granger cause public investment	33	2.34*	0.11
Public investment does not Granger cause private debt		0.73	0.49
Private investment does not Granger cause public investment	33	0.08	0.92
Public investment does not Granger cause private investment		1.14	0.33
Private investment does not Granger cause private debt	33	0.30	0.74
Private debt does not Granger cause private investment		2.80**	0.08

Source: ESCWA estimates.

Note: *, ** and *** denote rejection of the null hypothesis at the 15, 10 and 5 per cent levels of significance respectively.

2. Jordan

Annex tables 4 and 5 indicate that all variables are non stationary I(1) series and cointegrated. We estimate a VECM for Jordan. Granger causality test results in table 2 indicate that, after one year, GDP has crowding-out effects on both public and private debt and on public investment at the 15, 1 and 14 per cent significance levels respectively. However, the situation reverses the following year and GDP has positive crowding-in effects on all of the above variables.

Public investment is found to have positive crowding-in effects on private investment after one year, which indicates that public and private investment in Jordan is complementary (see also annex table 6). That is because an increase in public investment in infrastructure makes the investment climate more favourable to private investors. However, that phenomenon reverses in the subsequent year, and public investment appears to have an indirect negative crowding-out effect on private investment because of its positive effect on public debt, which puts upward pressure on interest rates. Jordan should therefore try to stimulate further public investment in infrastructure and human capital. Public investment in health and education are expected to generate GDP growth of the endogenous type. Furthermore, public investment in infrastructure appears to be playing a central role in stimulating private sectors' initiatives. The privatization efforts of the early 1990s should be enhanced, and Jordan should further enhance its private initiative.

On the other hand, private debt has a negative crowding-out effect on GDP after one year and a positive crowding-in effect in the second year, a reversal which can be explained by the fact that private investment positively affects GDP. Thus, private investment stimulates GDP but with a lag, because it takes time for private investment to impact positively on the GDP growth rate. Indeed, private debt has a positive, crowding-in effect on private investment after one year. However, that causal relationship lasts no more than one year; the results show a reversal to a negative relationship after two years.

There is an interesting transmission mechanism from private debt to GDP. GDP responds positively to increases in private debt with a lag of one year, a lag that is needed for private debt to affect private investment, which in turn affects GDP. Private investment has negative crowding-out effects on private debt after one year and positive crowding-in effects after two years, at the 3 per cent significance level.

TABLE 2. GRANGER CAUSALITY TESTS: JORDAN

Null hypothesis	Observations	F-statistic	Probability
Public debt does not Granger cause GDP	33	1.47	0.25
GDP does not Granger cause public debt		2.06*	0.15
Public investment does not Granger cause GDP	27	1.61	0.22
GDP does not Granger Cause Public Investment		2.17*	0.14
Private debt does not Granger cause GDP	33	19.59***	0.00
GDP does not Granger cause private debt		5.12***	0.01
Private investment does not Granger cause GDP	25	1.02	0.38
GDP does not Granger cause private investment		1.00	0.39
Public investment does not Granger cause public debt	27	0.82	0.45
Public debt does not Granger cause public investment		0.90	0.42
Private debt does not Granger cause public debt	33	1.76	0.19
Public debt does not Granger cause private debt		0.84	0.44
Private investment does not Granger cause public debt	25	0.46	0.64
Public debt does not Granger cause private investment		1.21	0.32
Private debt does not Granger cause public investment	27	1.48	0.25
Public investment does not Granger cause private debt		0.75	0.48
Private investment does not Granger cause public investment	25	0.03	0.97
Public investment does not Granger cause private investment		2.42*	0.11
Private investment does not Granger cause private debt	25	4.32***	0.03
Private debt does not Granger cause private investment		3.23**	0.06

Source: ESCWA estimates.

Note: *, ** and *** denote rejection of the null hypothesis at the 15, 10 and 5 per cent levels of significance respectively.

3. Lebanon

Annex tables 7 and 8 indicate that all variables are non stationary series I(1) but are cointegrated. We therefore estimate a VECM for Lebanon. The Granger causality test results set out in table 3 indicate that public debt does not seem to cause GDP. Thus, there is no crowding-in or -out effect of public debt on GDP. That may be explained by the fact that public debt in Lebanon began to be accumulated in the mid-1990s, and that effect is not being captured by our empirical tests (see also annex table 9).

The most interesting result is that private investment Granger causes positively with a two year lag GDP at the 6 per cent significance level. Private investment also increases private debt at the 5 per cent level of significance. Thus, private investment has three distinct effects: it reduces public debt, and increases private debt and GDP. That may be explained by the fact that the private sector has always had an important role in growth in Lebanon.

On the other hand, public debt is causing both private debt and private investment at the 15 per cent significance level, and there is a bi-directional causality between private investment and private debt at the 5 and 12 per cent significance levels respectively. Interestingly, public debt has a significant positive effect on private debt. In other words, public debt appears to have a crowding-in effect on growth through its positive impact on private debt, which is causing positively GDP. However, public debt has a negative, crowding-out effect on private investment after one year which becomes positive in the second year.

That short-term weak positive causation from public investment to GDP (see annex table 9) is explained by the fact that, from the mid 1990s, the Lebanese Government started spending heavily on its devastated infrastructure, particularly on education, public health, public works, transport and telecommunications. That demonstrates the existence of an important short-term endogenous growth mechanism resulting from public investment in infrastructure.

The other two significant results indicate that public debt causes private debt at the 15 per cent level, while public debt causes public investment at the 9 per cent level. Those short-term linkages between private and public debt and public debt and public investment indicate the following: with respect to the second, public debt appears to have an indirect positive effect on growth (crowding-in) via its positive effects on public investment. That reinforces the earlier results that point to the existence of an endogenous growth effect resulting from public debt and investment. With respect to the first, public debt appears to have a complementary effect on private debt in the short-term, which may be attributed to the fact that public debt results in an increase in investment and, consequently, GDP. Aggregate demand therefore increases, stimulating private sector borrowing for both consumption and investment purposes. In that regard, asset prices increase with GDP growth, thus creating greater collateral for borrowing.

TABLE 3. GRANGER CAUSALITY TESTS: LEBANON

Null hypothesis	Observations	F-statistic	Probability
Public debt does not Granger cause GDP	33	0.33	0.72
GDP does not Granger cause public debt		4.71***	0.02
Private debt does not Granger cause GDP	33	1.80	0.18
GDP does not Granger cause private debt		1.52	0.24
Private investment does not Granger cause GDP	33	3.16**	0.06
GDP does not Granger cause private investment		0.01	0.99
Private debt does not Granger cause public debt	33	0.31	0.73
Public debt does not Granger cause private debt		2.01*	0.15
Private investment does not Granger cause public debt	33	1.00	0.38
Public debt does not Granger cause private investment		2.13*	0.14
Private investment does not Granger cause private debt	33	3.32**	0.05
Private debt does not Granger cause private investment		2.33*	0.12

Source: ESCWA estimates.

Note: *, ** and *** denote rejection of the null hypothesis at the 15, 10 and 5 per cent levels of significance respectively.

4. Syrian Arab Republic

Given that annex tables 10 and 11 indicate that all variables are non stationary I(1) series but cointegrated, we estimate a VECM for the Syrian Arab Republic. The Granger causality test results set out in table 4 point to mixed causality test results between GDP and both private and public investment. GDP appears to have crowding-in effects on public investment, while having crowding-out effects on private investment at the 15 and 3 per cent significance levels respectively.

One significant aspect of the results depicts crowding-in effects from the private sector to the public sector: private investment is crowding-in public debt, and private debt is crowding-in public investment at the 9 per cent significance level. Those results are attributed to the fact that private investment stimulates the economy and creates a need for public investment. Private investment indirectly affects public debt through its positive effect on public investment, while private debt positively affects public investment, through its positive effect on private investment. Those indirect effects point to strong complementary effects between private and public investment (see also annex table 12).

Thus, the Syrian Arab Republic should further enhance the role of the private sector and increase public investment. Private sector initiatives need to be developed. Given that the country has always relied on the public sector to stimulate growth, more room should be given to the private sector if an optimal GDP growth rate is desired.

Overall, there are clear indications that both Egypt and Jordan have gained substantially from the privatization schemes of the early 1990s in terms of improving productivity and efficiency. However, efforts to improve productivity and efficiency need to be sustained in order to achieve higher GDP growth rates.

That scenario does not apply to the other MDEs, namely, Lebanon and the Syrian Arab Republic. In Lebanon the high level of public investment is not surprising and is largely the result of heavy investment in the devastated infrastructure. Most of the growth in GDP in the early and late 1990s was of the endogenous type. While Lebanon was perhaps obliged to pursue an expansionary fiscal policy in the past decade, the significant increase in the size of its public sector may start to have devastating consequences on the whole economy in the near future, when serious crowding-out effects may begin to appear. Albeit the GDP growth rate did increase slightly during the 1990s, those gains appear to be quickly dissipating. Furthermore, an expansionary fiscal policy had put significant pressure on the real rate of interest, which has subsequently translated into a huge servicing of the public debt and recurrent budget deficits. The same applies in the Syrian Arab Republic, where the size of the public sector has always been significant, crowding-out private consumption and investment and resulting in reduced productivity and efficiency, with consequences for the economy. It is therefore clear that structural change is required in the Syrian Arab Republic in order to stimulate initiative by the private sector.

TABLE 4. GRANGER CAUSALITY TESTS: SYRIAN ARAB REPUBLIC

Null hypothesis	Observations	F-Statistic	Probability
Public debt does not Granger cause GDP	33	0.88	0.43
GDP does not Granger cause public debt		1.17	0.33
Public investment does not Granger cause GDP	33	0.76	0.48
GDP does not Granger cause public investment		2.01*	0.15
Private debt does not Granger cause GDP	33	0.91	0.41
GDP does not Granger cause private debt		1.07	0.36
Private investment does not Granger cause GDP	33	0.12	0.89
GDP does not Granger cause private investment		4.04***	0.03
Public investment does not Granger cause public debt	33	0.66	0.52
Public debt does not Granger cause public investment		1.04	0.37
Private debt does not Granger cause public debt	33	1.95	0.16
Public debt does not Granger cause private debt		0.60	0.56

TABLE 4 (continued)

Null hypothesis	Observations	F-Statistic	Probability
Private investment does not Granger cause public debt	33	2.63**	0.09
Public debt does not Granger cause private investment		1.01	0.38
Private debt does not Granger cause public investment	33	2.62**	0.09
Public investment does not Granger cause private debt		0.49	0.62
Private investment does not Granger cause public investment	33	1.82	0.18
Public investment does not Granger cause private investment		1.22	0.31
Private investment does not granger cause private debt	33	1.10	0.35
Private debt does not Granger cause private investment		0.12	0.89

Source: ESCWA estimates.

Note: *, ** and *** denote rejection of the null hypothesis at the 15, 10 and 5 per cent levels of significance respectively.

5. Bahrain

Annex tables 13 and 14 indicate that all variables are non stationary I(1) series but not cointegrated. We therefore estimate a VAR for Bahrain. The Granger causality tests are thus performed on the first differences of the respective variables. The causality test results set out in table 5 point to complementary effects between private and public investment after one year, namely, that increased private investment leads to greater public investment, and crowding-out effects after two years, at the 7 per cent significance level (see also annex table 15). The second year effects may be attributed to the fact that private investment necessitates more private debt, which in turn crowds-out public debt through the market of loanable funds, and hence public investment.

TABLE 5. GRANGER CAUSALITY TESTS: BAHRAIN
(In first differences)

Null hypothesis	Observations	F-statistic	Probability
Δ Public investment does not Granger cause Δ GDP	22	0.45	0.64
Δ GDP does not Granger cause Δ public investment		0.60	0.56
Δ Private investment does not Granger cause Δ GDP	20	0.16	0.86
Δ GDP does not Granger cause Δ private investment		1.76	0.21
Δ Private investment does not Granger cause Δ public investment	20	3.29**	0.07
Δ Public investment does not Granger cause Δ private investment		0.95	0.41

Source: ESCWA estimates.

Notes: ** denotes rejection of the null hypothesis at the 10 per cent level of significance.

Δ denotes first difference.

6. Kuwait

Annex tables 16 and 17 indicate that all variables are non stationary I(1) series and cointegrated. We therefore estimate a VECM for Kuwait. The Granger causality test results set out in table 6 point to the existence of a bi-directional causality effect between private investment and GDP at the 10 and 5 per cent significance levels. After one year, private investment has negative crowding-out effects on GDP and positive crowding-in effects after two years (see also annex table 18). Thus, in the long-term, private investment appears to be contributing positively to the GDP growth rate. GDP also has positive crowding-in effects on private debt at the 4 per cent significance level. On the other hand, private debt has negative crowding-out effects on both public debt and public investment at the 8 and 3 per cent significance levels respectively, whereas public debt has significant positive crowding-in effects on private investment.

There is another interesting and significant bi-directional causality effect between private investment and public investment. That causal relationship appears to be negative, depicting crowding-out effects after one year, but becoming positive, depicting crowding-in effects after two years, and demonstrating the complementary nature of private and public investment. The first year's negative relationship may be explained by the fact that higher private investment leads to higher private debt. As mentioned earlier, private debt crowds-out public investment. But that effect reverses after two years, because an increase in private investment also necessitates improvements in infrastructure and public goods. A new factory, for example, would increase the need for public infrastructure and services near that facility. In such a case, public and private investment goes hand-in-hand to enhance the productive capacity of an economy. The converse is also true: by providing better infrastructure higher public investment encourages private investment.

TABLE 6. GRANGER CAUSALITY TESTS: KUWAIT

Null hypothesis	Observations	F-statistic	Probability
Public debt does not Granger cause GDP	33	1.66	0.21
GDP does not Granger cause public debt		1.72	0.20
Public investment does not Granger cause GDP	33	0.93	0.41
GDP does not Granger cause public investment		1.13	0.34
Private debt does not Granger cause GDP	33	0.49	0.62
GDP does not Granger cause private debt		3.78***	0.04
Private investment does not Granger cause GDP	33	2.45**	0.10
GDP does not Granger cause private investment		3.23**	0.05
Public investment does not Granger cause public debt	33	1.25	0.30
Public debt does not Granger cause public investment		0.68	0.51
Private debt does not Granger cause public debt	33	2.82**	0.08
Public debt does not Granger cause private debt		0.05	0.95
Private investment does not Granger cause public debt	33	0.67	0.52
Public debt does not Granger cause private investment		15.30***	0.00
Private debt does not Granger cause public investment	33	4.20***	0.03
Public investment does not Granger cause private debt		0.80	0.46
Private investment does not Granger cause public investment	33	2.01*	0.15
Public investment does not Granger cause private investment		6.67***	0.00

Source: ESCWA estimates.

Note: *, ** and *** denote rejection of the null hypothesis at the 15, 10 and 5 per cent levels of significance respectively.

7. Qatar

Annex tables 19 and 20 indicate that all variables are non stationary I(1) series and cointegrated. We therefore estimate a VECM for Qatar. The Granger causality test results set out in table 7 indicate strong bi-directional causality effects between public investment and GDP, at the 6 and 1 per cent significance levels respectively. Both variables appear to have negative crowding-out effects on each other (see also annex table 21). Public debt in Qatar has been steadily increasing since the early 1990s, which appears to be crowding-out private investment and consumption and, consequently, the GDP growth rate. The significant increase in public debt was not accompanied by increases in public investment and is therefore not contributing to an increase in GDP growth rate. On the contrary, public debt appears to be crowding-out such growth. Qatar will have to direct public investment towards improving its infrastructure and human capital. That can be expected to generate GDP growth of the endogenous type.

On the other hand, GDP appears to have positive crowding-in effects on private investment at the 15 per cent significance level. With regard to the effects of private investment on public investment, there appears to be positive crowding-in effects at the 8 per cent significance level. As mentioned earlier, that result is not surprising, given that an increase in private investment creates the need for more public investment, leading to the observed crowding-in effect.

TABLE 7. GRANGER CAUSALITY TESTS: QATAR

Null hypothesis	Observations	F-statistic	Probability
Public investment does not Granger cause GDP	23	3.39***	0.06
GDP does not Granger cause public investment		6.33***	0.01
Private investment does not Granger cause GDP	23	1.37	0.28
GDP does not Granger cause private investment		2.13*	0.15
Private investment does not Granger cause public investment	23	2.88**	0.08
Public investment does not Granger cause private investment		0.78	0.47

Source: ESCWA estimates.

Note: *, ** and *** denote rejection of the null hypothesis at the 15, 10 and 5 per cent levels of significance respectively.

8. Oman

Annex tables 22 and 23 indicate that GDP, public and private debt, and private investment are non stationary I(1) series and cointegrated. We therefore estimate a VECM for Oman. The Granger causality test results set out in table 8 point to the existence of bi-directional causality effects between private debt and GDP at the 6 and 2 per cent significance levels respectively. Private debt appears to have positive crowding-in effects on GDP, whereas GDP has negative crowding-out effects on private debt (see also annex table 24).

With respect to causality between public investment and public debt, the results are mixed. There are both crowding-in and crowding-out effects, depending on the time horizon under consideration. After one year, public investment has negative effects on public debt, whereas after two years, the direction of causality reverses and becomes positive. That is due to the fact that after two years there may be a need to issue further debt in order to sustain the required level of public investment. Another mixed result appears while considering the causality between GDP and public investment. After one year, GDP has crowding-out effects on public investment, whereas after two years, GDP crowds-in public investment.

A notable causality relationship between private debt and public investment is also obvious. Private debt has a crowding-out effect on public investment at the 6 per cent significance level, which may be attributed to the fact that the private sector competes with the public sector for funds. Whenever private debt increases, loanable funds become scarce, making it more difficult for the public sector to borrow. The scarcity of funds makes it harder for the public sector to invest. The reciprocal causality is more complicated, because public investment has crowding-in effects on private debt after one year, and crowding-out effects after two years at the 2 per cent significance level. The detected positive causality in the immediate future is a result of the positive effect public investment has on the productive capacity of the economy, which in turn encourages private investment, creating a need for private funds. However, the positive relationship becomes negative after two years. As mentioned earlier, that may be attributed to the competition for funds between the public and private sectors.

TABLE 8. GRANGER CAUSALITY TESTS: OMAN

Null hypothesis	Observations	F-statistic	Probability
Public debt does not Granger cause GDP	31	0.78	0.47
GDP does not Granger cause public debt		1.08	0.35
Public investment does not Granger cause GDP	33	0.14	0.87
GDP does not Granger cause public investment		8.94***	0.00

TABLE 8 (continued)

Null hypothesis	Observations	F-statistic	Probability
Private debt does not Granger cause GDP	31	3.05***	0.06
GDP does not Granger cause private debt		4.31***	0.02
Private investment does not Granger cause GDP	33	0.13	0.88
GDP does not Granger cause private investment		0.06	0.94
Public investment does not Granger cause public debt	31	11.61***	0.00
Public debt does not Granger cause public investment		0.92	0.41
Private debt does not Granger cause public debt	31	0.36	0.70
Public debt does not Granger cause private debt		0.28	0.76
Private investment does not Granger cause public debt	31	1.14	0.33
Public debt does not Granger cause private investment		0.56	0.58
Private debt does not Granger cause public investment	31	3.19***	0.06
Public investment does not Granger cause private debt		4.57***	0.02
Private investment does not Granger cause public investment	33	1.00	0.38
Public investment does not Granger cause private investment		0.87	0.43
Private investment does not Granger cause private debt	31	0.63	0.54
Private debt does not Granger cause private investment		0.59	0.56

Source: ESCWA estimates.

Note: *** denotes rejection of the null hypothesis at the 5 per cent level of significance.

9. Saudi Arabia

Annex tables 25 and 26 indicate that all variables are non stationary I(1) series and cointegrated. We therefore estimate a VECM for Saudi Arabia. The Granger causality test results set forth in table 9 indicate a positive causality between GDP and public investment. GDP crowds-in public investment at the 14 per cent significance level, while private investment crowds-in GDP at the 7 per cent significance level (see also annex table 27).

TABLE 9. GRANGER CAUSALITY TESTS: SAUDI ARABIA

Null hypothesis	Observations	F-statistic	Probability
Public debt does not Granger cause GDP	33	0.65	0.53
GDP does not Granger cause public debt		0.36	0.70
Public investment does not Granger cause GDP	33	0.77	0.47
GDP does not Granger cause public investment		2.10*	0.14
Private debt does not Granger cause GDP	33	0.21	0.81
GDP does not Granger cause private debt		1.39	0.27
Private investment does not Granger cause GDP	33	2.93**	0.07
GDP does not Granger cause private investment		1.25	0.30
Public investment does not Granger cause public debt	33	1.78	0.19
Public debt does not Granger cause public investment		0.41	0.67
Private debt does not Granger cause public debt	33	2.84**	0.08
Public debt does not Granger cause private debt		1.43	0.26
Private investment does not Granger cause public debt	33	0.89	0.42
Public debt does not Granger cause private investment		3.28***	0.05

TABLE 9 (continued)

Null hypothesis	Observations	F-statistic	Probability
Private debt does not Granger cause public investment	33	1.42	0.26
Public investment does not Granger cause private debt		0.28	0.76
Private investment does not Granger cause public investment	33	0.25	0.78
Public investment does not Granger cause private investment		0.26	0.78
Private investment does not Granger cause private debt	33	0.06	0.95
Private debt does not Granger cause private investment		1.39	0.27

Source: ESCWA estimates.

Note: *, ** and *** denote rejection of the null hypothesis at the 15, 10 and 5 per cent levels of significance respectively.

The test results reveal a negative relationship between public and private debt. Private debt crowds-out public debt at the 8 per cent significance level. As was the case for Oman, that may be attributed to the fact that an increase in private debt creates a shortage in the market of loanable funds that causes financing problems for the Government.

Finally, the effect of public debt on private investment is mixed. There are both crowding-in and crowding-out effects, depending on the time horizon. After one year, public debt has a negative effect on private investment, whereas after two years, that effect is reversed and becomes positive. That may indicate that initially, public debt competes for finance with private debt in financing investment, but that the demand expansion ensuing from spending public debt stimulates private investment.

10. United Arab Emirates

Annex tables 28 and 29 indicate that all variables are non stationary I(1) series but not cointegrated. We therefore estimate a VAR for the United Arab Emirates. As with Bahrain, the Granger causality tests for the United Arab Emirates are performed on the first differences of the variables of interest, because of lack of cointegration.

TABLE 10. GRANGER CAUSALITY TESTS: UNITED ARAB EMIRATES
(In first differences)

Null hypothesis	Observations	F-statistic	Probability
Δ Public debt does not Granger cause Δ GDP	29	1.70	0.20
Δ GDP does not Granger cause Δ public debt		1.30	0.29
Δ Public investment does not Granger cause Δ GDP	29	1.91	0.17
Δ GDP does not Granger cause Δ public investment		2.81**	0.08
Δ Private debt does not Granger cause Δ GDP	29	2.82	0.08
Δ GDP does not Granger cause Δ private debt		0.28	0.76
Δ Private investment does not Granger cause Δ GDP	27	0.86	0.44
Δ GDP does not Granger cause Δ private investment		3.15**	0.06
Δ Public investment does not Granger cause Δ public debt	29	0.23	0.79
Δ Public debt does not Granger cause Δ public investment		0.90	0.42
Δ Private debt does not Granger cause Δ public debt	29	1.80	0.19
Δ Public debt does not Granger cause Δ private debt		1.57	0.23
Δ Private investment does not Granger cause Δ public debt	27	0.64	0.54
Δ Public debt does not Granger cause Δ private investment		4.43***	0.02
Δ Private debt does not Granger cause Δ public investment	29	1.11	0.35
Δ Public investment does not Granger cause Δ private debt		1.25	0.30

TABLE 10 (continued)

Null hypothesis	Observations	F-statistic	Probability
Δ Private investment does not Granger cause Δ public investment	27	0.11	0.90
Δ Public investment does not Granger cause Δ private investment		5.57	0.01
Δ Private investment does not Granger cause Δ private debt	27	0.17	0.85
Δ Private debt does not Granger cause Δ private investment		0.55	0.58

Source: ESCWA estimates.

Notes: ** and *** denote rejection of the null hypothesis at the 10 and 5 per cent levels of significance respectively.

Δ denotes first difference.

The results set out in table 10 reveal only mixed causality effects, depending on the time horizon under consideration. GDP is causing public investment at the 8 per cent significance level. The first year effect is a crowding-in effect, whereas after two years, it becomes a crowding-out effect. The first year effect is quite intuitive: an increase in growth enables more public spending, but as more and more debt is accumulated in order to sustain the level of spending, it ends by crowding-out investment through higher interest rates.

GDP is also causing private investment at the 6 per cent significance level. After one year, GDP crowds-out private investment; after two years, GDP crowds-in private investment. The crowding-in of private investment takes place with a two-year lag. GDP initially crowds-in public investment, which in turn positively affects private investment because it enhances the productive capacity of the economy. Results show that the transmission mechanism from GDP to private investment operates through public investment and has a two-year lag.

Finally, public debt is causing private investment at the 2 per cent significance level. After one year, public debt crowds-in private investment, whereas after two years it crowds-out private investment. Those two opposite effects of public debt on private investment indicate that public debt appears to have an indirect positive effect on private investment through its positive effect on public investment, while the negative indirect effect is a result of the positive effect of public debt on interest rates.

In the LDEs of Kuwait, Saudi Arabia and the United Arab Emirates, the size of the oil sectors that provide revenues to their Governments yields public investment at higher levels than in other ESCWA member countries. At one stage, Kuwait shared some of the characteristics of and problems experienced by Lebanon, especially after the Gulf War and its devastating consequences on the Kuwaiti economy. The Government has had to spend a great deal on reconstruction since the early 1990s. In all three LDEs, the oil sector plays a dominant role in their growth, and all need to diversify their resources away from oil, and reduce their reliance on public expenditure that is financed by oil revenue, by providing incentives for the private sector. Such action should enhance growth, while private initiative should also reduce economic inefficiencies emanating from the public sector and enhance growth and productivity. Bahrain is unique in having a public sector that appears to be smaller than is required for optimal growth: it has been devoting considerable efforts to the privatization of some public entities and diversification of its economy away from oil.

IV. CONCLUSIONS AND POLICY IMPLICATIONS

After providing an overview of major macroeconomic developments in the ESCWA region over the past 30 years, this study has shown that the region in general has exhibited disappointing growth performances since the mid 1990s. A deteriorating regional political and macroeconomic environment, coupled with inadequate infrastructure, low accumulation of human capital and an inefficient public sector expanding at the expense of the private sector, have all been contributing factors.

In MDEs, GDP growth rates have been declining since 1996. Declining GDP growth rates in LDEs are largely the outcome of expanding public sectors and the recent accumulation of sizeable public debt, albeit those economies receive considerable foreign currency revenues from oil exports every year. Recent budget deficits, coupled with high levels of Government spending, are largely responsible for the accumulation of public debt. The fact that LDEs have been financing their budget deficits by domestic and external borrowing has had a direct bearing on private investment, capital accumulation and GDP growth. Deficit financing has also directly affected private sector growth by crowding-out private investment.

The empirical part of the study employed times series econometric models to explore the linkages in each ESCWA member country between GDP growth rates and certain macroeconomic variables. The main findings may be summarized as follows: Granger causality test results in MDEs have indicated that public debt in Egypt has a negative crowding-out effect on GDP in the short term. The accumulation of such debt has a negative impact on GDP growth rate because there is a shortage of capital. Measures should therefore be taken to improve productivity and efficiency in public enterprises and reduce budgetary deficits. Other measures that may also be needed pertain to the increased reliance on the private sector for certain services and commodities that remained in that sector after the privatization scheme of early 1990s. Public debt has been increasing despite that scheme. The increase in public debt was accompanied by only modest increases in public investment and, as a result, such investment is not contributing to GDP growth. On the contrary, public debt appears to be crowding-out such growth. If public investment is directed towards improving human capital, by investing in education, health and infrastructure, GDP growth of the endogenous type may be generated. Furthermore, increases in public debt for the purpose of increasing public investment in infrastructure is shown to have a positive impact on the private sector, stimulating further private borrowing and investment.

Granger causality test results in Jordan indicated that public investment is found to have positive crowding-in effects on private investment after one year, because increased public investment in infrastructure makes the investment climate more favourable to private investors. However, that phenomenon is reversed in the subsequent year, and public investment appears to have an indirect negative crowding-out effect on private investment, through its positive effect on public debt, which puts upward pressure on interest rates. Jordan should therefore try to stimulate further public investment in infrastructure and human capital: such investment in health and education may be expected to generate GDP growth of the endogenous type, while public investment in infrastructure appears to play a central role in stimulating private sector initiative.

Granger causality test results in Lebanon indicated that public debt does not seem to Granger-cause GDP, and that such debt does not help to predict GDP. As a result, there is no crowding-in or -out effect on GDP by public debt, which may be explained by the fact that public debt in Lebanon began to accumulate in the mid 1990s, and that effect is not being captured by our empirical tests. On the other hand, private investment was shown to significantly and positively Granger-cause GDP with a two-year lag. Private investment therefore, which has always played a significant role in growth in Lebanon, has three distinct effects: it reduces public debt and increases private debt and GDP.

The most interesting result is the fact that public debt has a significant positive effect on private debt, appearing to have a crowding-in effect on growth through its positive impact on private debt. While public debt has a negative, crowding-out effect on private investment after one year, that effect becomes positive in the second year. That demonstrates that important short-term endogenous growth is the outcome of public investment in infrastructure in Lebanon.

Granger causality test results have indicated crowding-in effects from the private sector to the public sector in the Syrian Arab Republic. Private investment is crowding-in public debt, and private debt is crowding-in public investment, which may be attributed to the fact that private investment stimulates the economy, resulting in an increase in demand for public investment. Private investment indirectly affects public debt through its positive effect on public investment, while private debt positively affects public investment because of its positive effect on private investment. Those indirect effects point to the strongly complementary nature of private and public investment.

The Syrian Arab Republic should therefore not only further enhance the role of the private sector and further develop private sector initiative, but also increase the effectiveness of public investment. However, in the past, that economy has tended to rely on the public sector to stimulate growth; greater opportunity should therefore be given to the private sector if optimal GDP growth rate is to be achieved.

There are indications that both Egypt and Jordan have made some gains from their privatization schemes of the early 1990s in terms of improving budget deficit to GDP ratio and achieving a reduction in the relative size of their respective public sectors. However, further accelerating GDP growth rates will require greater emphasis to be placed on measures to improve efficiency and productivity.

That scenario does not apply to the other MDEs, namely, Lebanon and the Syrian Arab Republic. In the former, the high level of public investment is not surprising and has been mainly due to heavy investment in the devastated infrastructure. Most GDP growth in the early and late 1990s was of the endogenous type. In the past decade, the country was obliged to pursue an expansionary fiscal policy. However, in the near future, the significant increase in the size of its public expenditure deficit may start to have serious consequences for the whole economy as serious crowding-out effects begin to appear. Albeit the GDP growth rate did increase somewhat in the 1990s, those gains appear to be dissipating quickly: recent GDP growth rates have been close to zero. Furthermore, the expansionary fiscal policy put significant pressure on the real rate of interest, which subsequently translated into a huge servicing of the public debt and chronic budget deficits.

The same is true in the Syrian Arab Republic, where the size of public expenditure has always significantly crowded-out private consumption and investment. Large public expenditure, including on State-owned enterprises, is associated there with disguised unemployment and low labour productivity, which have serious implications for economic growth. It is therefore clear that structural change is required in order to afford the private sector a greater role and more room for investment.

With regard to LDEs in the ESCWA region, our empirical results in respect of Bahrain indicate complementary effects between private and public investment after one year, with greater private investment bringing increased public investment, followed by crowding-out effects after two years. Second year effects may be attributed to the fact that private investment necessitates more private debt, which in turn crowds-out public debt, and hence public investment. Bahrain appears to be unique in having a public sector that is smaller than is required for optimal growth. It has been devoting considerable efforts to the privatization of some public entities and the diversification of its economy.

In respect of Kuwait, the Granger causality test results indicated the existence of a bi-directional causality effect between private investment and GDP. After one year, private investment has negative crowding-out effects on GDP, and positive crowding-in effects after two years. In the long term, therefore, private investment appears to be contributing positively to the GDP growth rate. The results also showed that there is another interesting and significant bi-directional causality effect between private investment and public investment, which appears after one year to be negative, depicting crowding-out effects, that become positive after two years, depicting crowding-in effects. That demonstrates the complementary nature of private and public investment in Kuwait.

Granger causality tests in respect of Qatar indicate strong bi-directional causality effects between public investment and GDP. Public debt in that country has been steadily increasing since the early 1990s, appearing to crowd-out private investment and consumption and, consequently, the GDP growth rate. The significant increase in public debt has not been accompanied by increases in public investment. Those

increases are therefore not contributing to an increased GDP growth rate. On the contrary, public debt appears to be crowding-out such growth. If public investment is directed towards improvements in infrastructure and human capital, GDP growth of the endogenous type may be expected.

The Granger causality test results for Qatar also indicate the existence of bi-directional causality effects between private debt and GDP. Private debt appears to have positive crowding-in effects on GDP, whereas GDP has negative crowding-out effects on private debt. Private debt was also shown to have a crowding-out effect on public investment, which may be attributed to competition for funds between the private and public sectors. Whenever private debt increases, loanable funds become scarce, making it more difficult for the public sector to borrow. The scarcity of funds makes it harder for the public sector to invest. The reciprocal causality is more complicated, because public investment has crowding-in effects on private debt after one year, and crowding-out effects after two years. The detected positive causality in the immediate future is a result of the positive effect public investment has on the productive capacity of the economy, which in turn encourages private investment, creating a need for private funds. However, the positive relationship becomes negative after two years. As already mentioned, that may be attributed to the competition for funds between the public and private sectors.

The Granger causality test results indicate that private debt crowds-out public debt in Saudi Arabia, which may be because an increase in private debt creates a shortage in the market of loanable funds and causes financing problems for the Government. The tests also indicate that after one year, public debt has a negative effect on private investment that is reversed after two years.

In respect of the United Arab Emirates, the Granger causality test results indicate that public debt is leading to private investment. After one year, public debt crowds-in private investment; after two years it crowds-out such investment. Those two contrasting effects of public debt on private investment indicate the following: with respect to the first, public debt appears to have an indirect positive effect on private investment by stimulating public investment; while with respect to the second, the negative indirect effect is a result of the positive effect of public debt on interest rates.

In Kuwait, Saudi Arabia and the United Arab Emirates, public investment is higher than in other ESCWA member countries. All three economies are dominated by the oil sector, and should diversify away from oil and stimulate the role of the private sector. Increased reliance on private rather than public investment may enhance growth performance in those economies if greater efficiency and productivity are generated. Reliance on private initiative could also ameliorate some economic inefficiencies emanating from over-employment in the public sector and enhance growth and productivity.

Annex

ANNEX TABLE 1. UNIT ROOT TESTS: EGYPT

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-1.83	-2.79	-2.25	-2.95	-2.12	-3.55	-4.26
PP FD (3)	-6.46**	-5.88**	-4.54**	-9.47**	-5.58**	-3.55	-4.26
Constant							
PP (1)	-1.25	-2.67	-2.11	-1.23	-2.24	-2.95	-3.64
PP FD (1)	-6.34**	-5.98**	-4.56**	-9.06**	-5.60**	-2.95	-3.64
Constant and time trend							
ADF (1)	-1.60	-2.80	-2.68	-2.00	-2.06	-3.55	-4.26
ADF FD (1)	-4.64**	-4.18*	-3.68*	-7.36**	-3.41	-3.55	-4.26
Constant							
ADF (1)	-1.29	-2.64	-2.41	-1.47	-2.19	-2.95	-3.64
ADF FD (1)	-4.44**	-4.24**	-3.67**	-7.02**	-3.39**	-2.95	-3.64

Source: ESCWA estimates.

Notes: (a) PP = Phillips-Perron test; FD = first difference; and ADF = Augmented Dickey-Fuller test; (b) the numbers in parentheses are the proper lag lengths based on the Akaike Information Criterion (AIC); (c) a single asterisk (*) indicates rejection of the null hypothesis of non-stationarity at the 5 per cent level, while a double asterisk (**) indicates a stronger rejection at the 1 per cent level; (d) for most variables the time trend variable is statistically insignificant; (e) numbers in italics are Mackinnon's critical values at the 5 and 1 per cent significance levels.

ANNEX TABLE 2. COINTEGRATION TEST: EGYPT

Hypothesis		Trace statistics	Critical values	
Null	Alternative		5%	1%
$r = 0$	$r \geq 1$	130.92**	87.31	96.58
$r \leq 1$	$r \geq 2$	76.90**	62.99	70.05
$r \leq 2$	$r \geq 3$	38.70	42.44	48.45
$r \leq 3$	$r \geq 4$	17.69	25.32	30.45
$r \leq 4$	$r = 5$	6.62	12.25	16.26

Source: ESCWA estimates.

Notes: (a) The Johansen cointegration likelihood ratio test is based on the trace of the Stochastic matrix; (b) the test allows for a linear deterministic trend in the data, and an intercept; (c) r represents the number of cointegrating vectors; maximum lag one year in VAR; (d) ** and * indicate significance at the 1 and 5 per cent levels of significance respectively; (e) the asymptotic Critical values are from Osterwald-Lenum (1992).

ANNEX TABLE 3. VECM: EGYPT

	Lags	GDP	Public debt	Public investment	Private debt	Private investment
GDP	1	-0.26 <i>-1.16</i>	0.03 <i>0.19</i>	-0.02 <i>-0.55</i>	0.54** <i>3.56</i>	-0.03 <i>-0.43</i>
	2	-0.19 <i>-0.63</i>	0.29 <i>1.55</i>	-0.03 <i>-0.83</i>	0.59** <i>2.94</i>	0.25** <i>3.10</i>
Public debt	1	-0.32 <i>-0.76</i>	0.55* <i>2.10</i>	0.00 <i>0.09</i>	0.88** <i>3.19</i>	-0.16 <i>-1.41</i>
	2	0.09 <i>0.24</i>	0.57* <i>2.51</i>	-0.04 <i>-0.98</i>	0.38 <i>1.60</i>	-0.25* <i>-2.51</i>
Public investment	1	-0.77 <i>-0.60</i>	-0.19 <i>-0.24</i>	-0.65** <i>-4.20</i>	-0.46 <i>-0.55</i>	-0.09 <i>-0.27</i>
	2	-2.09 <i>-1.53</i>	1.62 <i>1.91</i>	-0.57** <i>-3.41</i>	0.33 <i>0.37</i>	0.64 <i>1.76</i>
Private debt	1	0.53 <i>1.52</i>	-0.11 <i>-0.52</i>	0.05 <i>1.08</i>	0.14 <i>0.62</i>	-0.26** <i>-2.82</i>
	2	0.29 <i>0.87</i>	-0.08 <i>-0.37</i>	0.02 <i>0.50</i>	0.37 <i>1.67</i>	0.06 <i>0.67</i>
Private investment	1	-0.71 <i>-1.40</i>	1.15** <i>3.67</i>	-0.06 <i>-1.01</i>	0.52 <i>1.57</i>	-0.27 <i>-1.98</i>
	2	0.20 <i>0.39</i>	-0.36 <i>-1.15</i>	-0.06 <i>-0.91</i>	-0.07 <i>-0.20</i>	0.00 <i>-0.03</i>
Constant		0.10** <i>2.69</i>	-0.02 <i>-0.91</i>	0.00 <i>-0.90</i>	-0.09** <i>-3.59</i>	-0.01 <i>-1.47</i>
Cointegration relation		0.00 <i>0.62</i>	0.01* <i>2.43</i>	0.00* <i>2.00</i>	0.01** <i>3.84</i>	0.00** <i>-3.99</i>

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * and ** denote significance at the 5 and 1 per cent levels respectively.

ANNEX TABLE 4. UNIT ROOT TESTS: JORDAN

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-1.78	-2.32	-2.13	-3.30	-3.02	-3.55	-4.26
PP FD (3)	-3.49*	-5.14**	-7.39**	-7.94**	-4.17*	-3.55	-4.26
Constant							
PP (1)	-2.63	-1.98	-1.04	-1.76	-2.50	-2.95	-3.64
PP FD (1)	-3.06*	-5.24**	-7.20**	-8.10**	-4.27**	-2.95	-3.64
Constant and time trend							
ADF (1)	-2.55	-2.13	-2.00	-2.06	-4.12*	-3.55	-4.26
ADF FD (1)	-3.04	-3.53	-5.25**	-4.02*	--	-3.55	-4.26
Constant							
ADF (1)	-2.67	-1.71	-1.33	-1.32	-3.14*	-2.95	-3.64
ADF FD (1)	-2.67	-3.59*	-5.08**	-4.11**	--	-2.95	-3.64

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 5. COINTEGRATION TEST: JORDAN

Hypothesis		Trace statistics	Critical values	
Null	Alternative		5%	1%
$r = 0$	$r \geq 1$	109.58**	87.31	96.58
$r \leq 1$	$r \geq 2$	71.91**	62.99	70.05
$r \leq 2$	$r \geq 3$	38.28	42.44	48.45
$r \leq 3$	$r \geq 4$	16.45	25.32	30.45
$r \leq 4$	$r = 5$	4.50	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 6. VECM: JORDAN

	Lags	GDP	Public debt	Public investment	Private debt	Private investment
GDP	1	0.14 <i>0.57</i>	-0.09 <i>-1.17</i>	-0.13** <i>-8.48</i>	-0.01 <i>-0.11</i>	0.32** <i>2.59</i>
	2	0.40 <i>1.03</i>	0.06 <i>0.50</i>	0.03 <i>1.42</i>	0.09 <i>0.48</i>	-0.43* <i>-2.20</i>
Public debt	1	-0.20 <i>-0.75</i>	-0.03 <i>-0.34</i>	-0.06** <i>-3.63</i>	-0.12 <i>-1.01</i>	0.53** <i>3.99</i>
	2	-0.40 <i>-0.39</i>	0.24 <i>0.73</i>	0.03 <i>0.56</i>	-0.44 <i>-0.96</i>	-1.11* <i>-2.18</i>
Public investment	1	-1.27 <i>-1.07</i>	0.33 <i>0.89</i>	0.14 <i>1.93</i>	0.49 <i>0.92</i>	0.08 <i>0.13</i>
	2	-2.31 <i>-0.81</i>	0.47 <i>0.52</i>	0.41* <i>2.37</i>	-0.61 <i>-0.48</i>	-1.04 <i>-0.73</i>
Private debt	1	-0.80 <i>-0.41</i>	0.44 <i>0.70</i>	0.07 <i>0.62</i>	-1.43 <i>-1.61</i>	-0.42 <i>-0.43</i>
	2	2.13* <i>1.97</i>	-0.38 <i>-1.10</i>	-0.55** <i>-8.48</i>	-0.53 <i>-1.08</i>	1.12* <i>2.07</i>
Private investment	1	0.24 <i>0.24</i>	-0.30 <i>-0.92</i>	-0.31** <i>-5.07</i>	-0.44 <i>-0.95</i>	1.03* <i>2.02</i>
	2	-0.80 <i>-1.44</i>	0.21 <i>1.21</i>	0.16** <i>4.87</i>	0.40 <i>1.61</i>	-0.34 <i>-1.23</i>
Constant		-0.33 <i>-0.74</i>	0.18 <i>1.25</i>	0.15** <i>5.54</i>	0.32 <i>1.58</i>	-0.39 <i>-1.76</i>
Cointegration relation		0.01 <i>0.37</i>	0.01 <i>0.96</i>	0.01** <i>7.01</i>	0.03* <i>2.40</i>	-0.03* <i>-2.25</i>

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * and ** denote significance at the 5 and 1 per cent levels respectively.

ANNEX TABLE 7. UNIT ROOT TESTS: LEBANON

	GDP	Public debt	Public investment	Private investment	Private debt	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-1.95	-1.90	-2.15	-2.05	-2.37	-3.55	-4.26
PP FD (3)	-5.94**	-6.43**	-5.80**	-5.34**	-6.26**	-3.55	-4.26
Constant							
PP (1)	-0.84	0.09	-1.87	-1.88	-2.31	-2.95	-3.64
PP FD (1)	-6.03**	-6.34**	-5.84**	-5.41**	-6.32**	-2.95	-3.64
Constant and time trend							
ADF (1)	-1.82	-1.69	-2.24		-2.29	-3.55	-4.26
ADF FD (1)	-4.53**	-4.40**	-4.18**	-4.37**	-4.43**	-3.55	-4.26
Constant							
ADF (1)	-0.78	-0.06	-1.81	-1.78	-2.13	-2.95	-3.64
ADF FD (1)	-4.58**	-4.32**	-4.20**	-4.41**	-4.47**	-2.95**	-3.64

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 8. COINTEGRATION TEST: LEBANON

Hypothesis			Trace statistics	Critical values	
Null	Alternative			5%	1%
$r = 0$	$r \geq 1$		65.41*	62.99	70.05
$r \leq 1$	$r \geq 2$		30.46	42.44	48.45
$r \leq 2$	$r \geq 3$		17.16	25.32	30.45
$r \leq 3$	$r = 4$		6.59	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 9. VECM: LEBANON

	Lags	GDP	Public debt	Private debt	Private investment
GDP	1	0.10 <i>0.31</i>	-0.11 <i>-0.52</i>	0.39 <i>1.28</i>	-0.06 <i>-1.31</i>
	2	-0.20 <i>-0.59</i>	0.56* <i>2.35</i>	0.21 <i>0.63</i>	-0.09 <i>-1.65</i>
Public debt	1	-0.38 <i>-1.23</i>	-0.10 <i>-0.47</i>	0.44 <i>1.46</i>	-0.05 <i>-1.04</i>
	2	-0.23 <i>-0.75</i>	-0.25 <i>-1.19</i>	0.28 <i>0.96</i>	0.02 <i>0.47</i>
Private debt	1	0.59* <i>2.04</i>	-0.36 <i>-1.82</i>	0.03 <i>0.11</i>	-0.07 <i>-1.57</i>
	2	0.06 <i>0.19</i>	0.46* <i>2.21</i>	0.84 <i>0.62</i>	-0.13* <i>-2.70</i>
Private investment	1	-0.35 <i>-0.25</i>	-0.40 <i>-0.42</i>	0.85 <i>0.63</i>	-0.36 <i>-1.65</i>
	2	1.17 <i>0.89</i>	0.39 <i>0.43</i>	0.04 <i>0.03</i>	-0.43* <i>-2.10</i>
Constant		0.10 <i>1.25</i>	0.04 <i>0.84</i>	-0.08 <i>-1.03</i>	0.02 <i>1.91</i>
Cointegration relation		-0.01 <i>-0.28</i>	0.05 <i>1.22</i>	-0.09 <i>-1.70</i>	0.00 <i>0.11</i>

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * denotes significance at the 5 per cent level.

ANNEX TABLE 10. UNIT ROOT TESTS: SYRIAN ARAB REPUBLIC

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-2.43	1.54	-2.32	-2.37	-2.61	-3.55	-4.26
PP FD (3)	-4.06*	-4.65**	-4.95**	-5.85**	-4.12*	-3.55	-4.26
Constant							
PP (1)	-3.00	4.92	-0.17	-1.57	-2.61	-2.95	-3.64
PP FD (1)	--	-3.37*	-4.92**	-5.79**	-4.20**	-2.95	-3.64
Constant and time trend							
ADF (1)	-2.54	0.80	-2.40	-2.61	-3.65*	-3.55	-4.26
ADF FD (1)	-3.08	-3.37**	-3.44	-4.32**	--	-3.55	-4.26
Constant							
ADF (1)	-2.67	2.62	-0.26	-1.51	-3.46*	-2.95	-3.64
ADF FD (1)	-2.91	-2.11	-3.41*	-4.21**	--	-2.95	-3.64

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 11. COINTEGRATION TEST: SYRIAN ARAB REPUBLIC

Hypothesis			Trace statistics	Critical values	
Null	Alternative			5%	1%
$r = 0$	$r \geq 1$		99.03**	87.31	96.58
$r \leq 1$	$r \geq 2$		54.69	62.99	70.05
$r \leq 2$	$r \geq 3$		27.98	42.44	48.45
$r \leq 3$	$r \geq 4$		15.88	25.32	30.45
$r \leq 4$	$r = 5$		6.61	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 12. VECM: SYRIAN ARAB REPUBLIC

	Lags	GDP	Public debt	Public investment	Private debt	Private investment
GDP	1	-0.21* -2.23	0.03 1.58	0.02** 2.82	0.04 1.16	0.00 -0.09
	2	0.25 0.88	0.00 0.07	0.06** 3.12	-0.03 -0.23	-0.03 -0.32
Public debt	1	-0.38 -1.18	0.03 0.40	0.03 1.40	0.13 1.11	0.09 0.86
	2	-0.24 -0.19	0.43 1.60	-0.16 -1.82	-0.06 -0.12	0.53 1.25
Public investment	1	1.67 1.39	0.16 0.63	0.01 0.16	0.01 0.01	-0.42 -1.07
	2	-3.48 -0.89	2.00* 2.45	0.31 1.18	1.62 1.10	0.24 0.19
Private debt	1	-8.22 -2.09	0.69 0.84	0.30 1.14	1.00 0.67	1.46 1.13
	2	0.47 0.47	-0.43* -2.10	0.04 0.58	0.06 0.15	-0.25 -0.76
Private investment	1	-0.77 -0.74	0.10 0.45	-0.10 -1.39	0.29 0.74	0.38 1.12
	2	-0.27 -0.31	0.15 0.81	0.13* 2.26	0.02 0.05	0.30 1.07
Constant		-0.69 -0.78	-0.23 -1.25	0.08 1.39	-0.17 -0.50	-0.27 -0.92
Cointegration relation		0.05 1.22	0.01 1.45	0.00 -1.14	0.00 0.27	0.00 -0.36

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * and ** denote significance at the 5 and 1 per cent levels respectively.

ANNEX TABLE 13. UNIT ROOT TESTS: BAHRAIN

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-1.96	1.73	-1.14	-2.45	-2.47	-3.87	-4.99
PP FD (3)	-4.18*	-2.81	-5.88**	-3.38	-4.57*	-3.87	-4.99
Constant							
PP (1)	-0.18	5.05	-1.44	-1.50	-1.78	-3.15	-4.14
PP FD (1)	-4.18*	-1.39	-3.88	-3.49*	-4.67**	-3.15	-4.14
Constant and time trend							
ADF (1)	-2.57	1.19	-0.13	-2.65	-2.55	-3.87	-4.99
ADF FD (1)	-3.91*	-0.92	-1.87	-3.44*	-3.89*	-3.87	-4.99
Constant							
ADF (1)	0.11	2.74	-2.89	-1.60	-1.83	-3.15	-4.14
ADF FD (1)	-3.84*	0.39	-0.81	-3.61*	-4.00*	-3.15	-4.14

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 14. COINTEGRATION TEST: BAHRAIN

Hypothesis			Critical values	
Null	Alternative	Trace statistics	5%	1%
$r = 0$	$r \geq 1$	36.23	42.44	48.45
$r \leq 1$	$r \geq 2$	14.97	25.32	30.45
$r \leq 2$	$r \geq 3$	3.26	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 15. VAR: BAHRAIN

	Lags	GDP	Public investment	Private investment
GDP	1	0.17	-0.01	-0.06
		<i>0.56</i>	<i>-0.20</i>	<i>-0.24</i>
	2	-0.28	0.00	0.47
		<i>-0.97</i>	<i>0.04</i>	<i>1.87</i>
Public investment	1	0.54	0.25	2.70
		<i>0.25</i>	<i>1.04</i>	<i>1.37</i>
	2	-2.07	-0.12	0.59
		<i>-0.94</i>	<i>-0.48</i>	<i>0.30</i>
Private investment	1	-0.08	0.02	-0.24
		<i>-0.25</i>	<i>0.56</i>	<i>-0.91</i>
	2	0.11	-0.06	-0.21
		<i>0.37</i>	<i>-1.94</i>	<i>-0.77</i>
Constant		0.04	0.00	-0.02
		<i>1.90</i>	<i>-0.60</i>	<i>-1.19</i>

Source: ESCWA estimates.

Notes: Numbers in italics are t-statistics.

ANNEX TABLE 16. UNIT ROOT TESTS: KUWAIT

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-3.11	-2.87	-1.72	-1.95	-4.04*	-3.55	-4.26
PP FD (3)	-6.02**	-7.54**	-3.19	-4.58**	--	-3.55	-4.26
Constant							
PP (1)	-3.56*	-2.43	-1.45	-1.93	-4.02*	-2.95	-3.64
PP FD (1)	--	-7.61**	-3.25*	-4.61**	--	-2.95	-3.64
Constant and time trend							
ADF (1)	-3.03	-2.36	-2.25	-2.43	-2.71	-3.55	-4.26
ADF FD (1)	-4.82**	-5.47**	-3.07	-4.91**	-5.68**	-3.55	-4.26
Constant							
ADF (1)	-2.98*	-2.10	-1.97	-2.35	-2.76	-2.95	-3.64
ADF FD (1)	--	-5.52**	-3.13*	-4.90**	-5.83**	-2.95	-3.64

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 17. COINTEGRATION TEST: KUWAIT

Hypothesis		Trace statistics	Critical values	
Null	Alternative		5%	1%
$r = 0$	$r \geq 1$	140.23**	87.31	96.58
$r \leq 1$	$r \geq 2$	80.66**	62.99	70.05
$r \leq 2$	$r \geq 3$	53.27**	42.44	48.45
$r \leq 3$	$r \geq 4$	28.95*	25.32	30.45
$r \leq 4$	$r = 5$	9.51	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 18. VECM: KUWAIT

	Lags	GDP	Public debt	Public investment	Private debt	Private investment
GDP	1	0.02 <i>0.26</i>	-0.19** <i>-2.61</i>	-0.02** <i>-2.71</i>	0.04 <i>1.55</i>	0.00 <i>-0.10</i>
	2	0.19 <i>0.50</i>	-0.42 <i>-1.07</i>	-0.03 <i>-0.58</i>	0.17 <i>1.12</i>	0.00 <i>0.08</i>
Public debt	1	0.32 <i>0.93</i>	-0.59 <i>-1.66</i>	-0.05 <i>-1.41</i>	0.19 <i>1.41</i>	0.03 <i>0.78</i>
	2	0.60 <i>0.99</i>	-0.74 <i>-1.16</i>	0.04 <i>0.61</i>	0.01 <i>0.05</i>	0.12 <i>1.97</i>
Public investment	1	-0.39 <i>-0.80</i>	-0.14 <i>-0.27</i>	0.05 <i>0.97</i>	0.04 <i>0.21</i>	0.02 <i>0.39</i>
	2	-3.87 <i>-0.55</i>	3.16 <i>0.43</i>	-0.27 <i>-0.33</i>	0.48 <i>0.17</i>	-0.34 <i>-0.47</i>
Private debt	1	7.45* <i>2.38</i>	-5.93 <i>-1.83</i>	-0.84* <i>-2.36</i>	-0.28 <i>-0.22</i>	0.14 <i>0.45</i>
	2	1.07 <i>1.57</i>	-2.15** <i>-3.06</i>	-0.14 <i>-1.78</i>	0.63* <i>2.36</i>	0.07 <i>1.02</i>
Private investment	1	-0.43 <i>-0.48</i>	-0.75 <i>-0.80</i>	-0.11 <i>-1.09</i>	0.24 <i>0.66</i>	0.03 <i>0.29</i>
	2	1.30 <i>0.45</i>	4.09 <i>1.36</i>	0.39 <i>1.18</i>	-0.70 <i>-0.61</i>	-0.10 <i>-0.34</i>
Constant		-3.92 <i>-1.87</i>	3.35 <i>1.54</i>	0.54* <i>2.28</i>	0.03 <i>0.04</i>	0.08 <i>0.37</i>
Cointegration relation		0.00 <i>-0.01</i>	0.17** <i>2.56</i>	0.01* <i>2.00</i>	-0.02 <i>-0.86</i>	0.00 <i>-0.76</i>

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * and ** denote significance at the 5 and 1 per cent levels respectively.

ANNEX TABLE 19. UNIT ROOT TESTS: QATAR

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-2.76	-3.57	-2.07	-2.87	-2.16	-3.93	-5.12
PP FD (3)	-4.02*	-6.92**	-5.32**	-5.45**	-4.21*	-3.93	-5.12
Constant							
PP (1)	-3.39*	-3.02	-1.62	-1.32	-1.77	-3.18	-4.22
PP FD (1)	--	-6.81**	-5.42**	-4.80**	-4.33**	-3.18	-4.22
Constant and time trend							
ADF (1)	-2.57	-2.22	-2.24	-2.50	-2.24	-3.93	-5.12
ADF FD (1)	-3.15	-3.56	-5.75**	-3.00	-3.89	-3.93	-5.12
Constant							
ADF (1)	-2.55	-1.79	-1.88	-0.74	-1.86	-3.18	-4.22
ADF FD (1)	-2.83	-3.54*	-5.81**	-2.53	-3.85**	-3.18	-4.22

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 20. COINTEGRATION TEST: QATAR

Hypothesis		Trace statistics	Critical values	
Null	Alternative		5%	1%
$r = 0$	$r \geq 1$	67.71*	62.99	70.05
$r \leq 1$	$r \geq 2$	34.59	42.44	48.45
$r \leq 2$	$r \geq 3$	16.18	25.32	30.45
$r \leq 3$	$r = 4$	4.85	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 21. VECM: QATAR

	Lags	GDP	Public investment	Private debt	Private investment
GDP	1	0.01 <i>0.55</i>	0.00* <i>-2.32</i>	-0.01 <i>-1.39</i>	0.01** <i>2.80</i>
	2	0.17 <i>0.43</i>	-0.08 <i>-1.89</i>	-0.18 <i>-0.66</i>	0.05 <i>0.55</i>
Public investment	1	-0.04 <i>-0.10</i>	-0.06 <i>-1.39</i>	-0.16 <i>-0.60</i>	-0.11 <i>-1.19</i>
	2	-0.54 <i>-0.16</i>	-0.46 <i>-1.33</i>	-0.40 <i>-0.17</i>	0.35 <i>0.45</i>
Private debt	1	-0.66 <i>-0.22</i>	-0.33 <i>-1.10</i>	-2.01 <i>-0.99</i>	-0.10 <i>-0.14</i>
	2	-0.07 <i>-0.18</i>	0.04 <i>1.09</i>	0.06 <i>0.23</i>	-0.28** <i>-3.08</i>
Private investment	1	-0.35 <i>-0.77</i>	0.10* <i>2.09</i>	-0.22 <i>-0.72</i>	-0.22* <i>-2.15</i>
	2	-1.24 <i>-1.64</i>	0.23** <i>2.99</i>	0.00 <i>-0.01</i>	0.16 <i>0.91</i>
Constant	1	1.20 <i>1.56</i>	-0.15 <i>-1.90</i>	-0.77 <i>-1.49</i>	-0.03 <i>-0.15</i>
Cointegration relation	2	0.04 <i>1.20</i>	0.00 <i>0.46</i>	0.02 <i>0.93</i>	0.00 <i>0.57</i>

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * and ** denote significance at the 5 and 1 per cent levels respectively.

ANNEX TABLE 22. UNIT ROOT TESTS: OMAN

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-2.47	-2.00	-2.74	-4.48**	-2.67	-3.55	-4.26
PP FD (3)	-5.01**	-5.54**	-4.97**	--	-4.59**	-3.55	-4.26
Constant							
PP (1)	-4.13**	-2.13	-1.89	-2.53	-2.69	-2.95	-3.64
PP FD (1)	--	-5.62**	-5.08**	-4.56**	-4.63**	-2.95	-3.64
Constant and time trend							
ADF (1)	-2.99	-1.81	-2.99	-4.43**	-3.89*	-3.55	-4.26
ADF FD (1)	-4.10*	-3.74*	-4.31**	--	--	-3.55	-4.26
Constant							
ADF (1)	-3.53*	-1.88	-1.47	-1.99	-3.79*	-2.95	-3.64
ADF FD (1)	--	-3.46*	-4.35**	-3.88**	--	-2.95	-3.64

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 23. COINTEGRATION TEST: OMAN

Null	Hypothesis		Trace statistics	Critical values	
	Alternative			5%	1%
$r = 0$	$r \geq 1$		168.83**	87.31	96.58
$r \leq 1$	$r \geq 2$		68.21*	62.99	70.05
$r \leq 2$	$r \geq 3$		42.14	42.44	48.45
$r \leq 3$	$r \geq 4$		19.40	25.32	30.45
$r \leq 4$	$r = 5$		4.10	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 24. VECM: OMAN

	Lags	GDP	Public debt	Public investment	Private debt	Private investment
GDP	1	0.09 <i>0.99</i>	0.02** <i>3.09</i>	0.00 <i>-0.24</i>	-0.02 <i>-0.86</i>	-0.10** <i>-3.21</i>
	2	0.41 <i>1.94</i>	0.01 <i>0.80</i>	0.00 <i>0.22</i>	-0.01 <i>-0.14</i>	-0.26** <i>-3.65</i>
Public debt	1	0.05 <i>0.28</i>	0.03* <i>2.24</i>	-0.01 <i>-0.74</i>	0.01 <i>0.18</i>	0.00 <i>-0.03</i>
	2	-10.36** <i>-3.09</i>	-0.08 <i>-0.30</i>	0.47 <i>1.27</i>	1.43 <i>1.89</i>	5.10** <i>4.46</i>
Public investment	1	-4.51* <i>-2.08</i>	-0.20 <i>-1.15</i>	-0.04 <i>-0.18</i>	0.70 <i>1.44</i>	0.79 <i>1.07</i>
	2	0.71 <i>0.30</i>	0.22 <i>1.16</i>	-0.10 <i>-0.37</i>	-0.85 <i>-1.58</i>	0.24 <i>0.29</i>
Private debt	1	9.63** <i>3.05</i>	0.07 <i>0.28</i>	-0.49 <i>-1.42</i>	-1.63* <i>-2.29</i>	-3.46** <i>-3.21</i>
	2	2.35 <i>1.90</i>	-0.03 <i>-0.29</i>	-0.07 <i>-0.52</i>	-0.12 <i>-0.45</i>	-1.04* <i>-2.44</i>
Private investment	1	-0.08 <i>-0.08</i>	0.08 <i>1.09</i>	0.06 <i>0.54</i>	-0.14 <i>-0.63</i>	0.79* <i>2.35</i>
	2	-0.56 <i>-1.24</i>	-0.06 <i>-1.66</i>	0.00 <i>0.08</i>	0.10 <i>0.99</i>	0.33* <i>2.11</i>
Constant		-0.36 <i>-0.70</i>	-0.04 <i>-0.95</i>	-0.03 <i>-0.51</i>	0.19 <i>1.62</i>	-0.07 <i>-0.40</i>
Cointegration relation		0.03 <i>0.67</i>	-0.01* <i>-2.06</i>	0.00 <i>-0.58</i>	0.00 <i>0.23</i>	0.03 <i>1.65</i>

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * and ** denote significance at the 5 and 1 per cent levels respectively.

ANNEX TABLE 25. UNIT ROOT TESTS: SAUDI ARABIA

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-3.17	-1.39	-1.91	-2.24	-3.46	-3.55	-4.26
PP FD (3)	-4.22*	-6.99**	-4.05*	-7.57**	-6.52**	-3.55	-4.26
Constant							
PP (1)	-4.54**	1.55	1.28	-1.94	-3.24*	-2.95	-3.64
PP FD (1)	--	-5.83**	-3.71**	-7.37**	--	-2.95	-3.64
Constant and time trend							
ADF (1)	-3.54	-1.28	-2.18	-1.97	-3.74*	-3.55	-4.26
ADF FD (1)	-2.87	-3.89*	-3.88*	-5.79**	--	-3.55	-4.26
Constant							
ADF (1)	-4.05**	1.72	0.88	-2.07	-3.24*	-2.95	-3.64
ADF FD (1)	--	-2.97*	-3.54*	-5.64**	--	-2.95	-3.64

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 26. COINTEGRATION TEST: SAUDI ARABIA

Null	Hypothesis	Alternative	Trace statistics	Critical values	
				5%	1%
$r = 0$		$r \geq 1$	112.88**	87.31	96.58
$r \leq 1$		$r \geq 2$	69.14*	62.99	70.05
$r \leq 2$		$r \geq 3$	35.39	42.44	48.45
$r \leq 3$		$r \geq 4$	17.58	25.32	30.45
$r \leq 4$		$r = 5$	4.67	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 27. VECM: SAUDI ARABIA

	Lags	GDP	Public debt	Public investment	Private debt	Private investment
GDP	1	-0.27** <i>-3.81</i>	0.01 <i>1.88</i>	0.02 <i>1.73</i>	0.01 <i>0.86</i>	-0.02 <i>-0.98</i>
	2	0.08 <i>0.26</i>	0.01 <i>0.38</i>	0.01 <i>0.28</i>	-0.02 <i>-0.36</i>	0.08 <i>0.89</i>
Public debt	1	0.04 <i>0.19</i>	-0.02 <i>-1.66</i>	0.03 <i>0.85</i>	0.01 <i>0.29</i>	-0.07 <i>-0.95</i>
	2	-2.00 <i>-0.55</i>	-0.25 <i>-1.32</i>	-0.20 <i>-0.40</i>	0.64 <i>1.02</i>	0.04 <i>0.03</i>
Public investment	1	-3.99 <i>-0.93</i>	0.68** <i>3.10</i>	-0.20 <i>-0.33</i>	-0.61 <i>-0.82</i>	-1.05 <i>-0.79</i>
	2	-1.49 <i>-0.61</i>	0.11 <i>0.87</i>	-0.02 <i>-0.07</i>	0.09 <i>0.21</i>	-0.28 <i>-0.36</i>
Private debt	1	-2.13 <i>-1.28</i>	-0.02 <i>-0.18</i>	0.00 <i>-0.01</i>	0.23 <i>0.81</i>	-0.17 <i>-0.33</i>
	2	2.03 <i>1.07</i>	-0.16 <i>-1.60</i>	-0.45 <i>-1.72</i>	-0.22 <i>-0.68</i>	0.19 <i>0.32</i>
Private investment	1	3.51 <i>1.63</i>	-0.42** <i>-3.80</i>	0.04 <i>0.14</i>	-0.17 <i>-0.46</i>	0.29 <i>0.43</i>
	2	2.69** <i>2.78</i>	-0.11* <i>-2.27</i>	-0.14 <i>-1.07</i>	-0.15 <i>-0.87</i>	0.21 <i>0.69</i>
Constant		1.51 <i>1.62</i>	-0.06 <i>-1.31</i>	-0.14 <i>-1.08</i>	-0.09 <i>-0.56</i>	-0.16 <i>-0.54</i>
Cointegration relation		0.10 <i>1.35</i>	0.01* <i>2.48</i>	0.00 <i>0.33</i>	0.01 <i>1.07</i>	0.00 <i>0.09</i>

Source: ESCWA estimates.

Notes: (a) numbers in italics are t-statistics; (b) * and ** denote significance at the 5 and 1 per cent levels respectively.

ANNEX TABLE 28. UNIT ROOT TESTS: UNITED ARAB EMIRATES

	GDP	Public debt	Private debt	Public investment	Private investment	Critical values	
						5%	1%
Constant and time trend							
PP (3)	-5.70**	-2.25	-2.63	-1.74	-3.09	-3.55	-4.26
PP FD (3)	--	-4.97**	-4.55**	-6.26**	-4.44**	-3.55	-4.26
Constant							
PP (1)	-4.17**	-1.29	-0.24	-1.98	-3.03*	-2.95	-3.64
PP FD (1)	--	-5.09**	-4.64**	-5.74**	--	-2.95	-3.64
Constant and time trend							
ADF (1)	-2.37	-2.32	-3.61*	-2.19	-4.02*	-3.55	-4.26
ADF FD (1)	-3.49	-3.47	--	-5.96**	--	-3.55	-4.26
Constant							
ADF (1)	-1.49	-1.56	-0.83	-2.55	-3.63*	-2.95	-3.64
ADF FD (1)	-3.60*	-3.59*	-4.15**	-5.41**	--	-2.95	-3.64

Source: ESCWA estimates.

Note: See notes to annex table 1.

ANNEX TABLE 29. COINTEGRATION TEST: UNITED ARAB EMIRATES

Hypothesis			Trace statistics	Critical values	
Null	Alternative			5%	1%
$r = 0$	$r \geq 1$		80.35	87.31	96.58
$r \leq 1$	$r \geq 2$		48.06	62.99	70.05
$r \leq 2$	$r \geq 3$		26.34	42.44	48.45
$r \leq 3$	$r \geq 4$		12.40	25.32	30.45
$r \leq 4$	$r = 5$		4.40	12.25	16.26

Source: ESCWA estimates.

Note: See notes to annex table 2.

ANNEX TABLE 30. VAR: UNITED ARAB EMIRATES

	Lags	GDP	Public debt	Private debt	Public investment	Private investment
GDP	1	0.32 <i>0.52</i>	-0.04 <i>-0.42</i>	0.03 <i>0.96</i>	0.13 <i>0.48</i>	-0.19 <i>-1.16</i>
	2	0.20 <i>0.33</i>	0.03 <i>0.31</i>	0.01 <i>0.27</i>	-0.11 <i>-0.41</i>	0.23 <i>1.48</i>
Public debt	1	-1.62 <i>-0.76</i>	-0.08 <i>-0.23</i>	0.02 <i>0.18</i>	1.00 <i>1.04</i>	0.49 <i>0.89</i>
	2	0.96 <i>0.50</i>	-0.12 <i>-0.40</i>	-0.04 <i>-0.35</i>	-0.34 <i>-0.39</i>	-0.69 <i>-1.40</i>
Private debt	1	-3.23 <i>-0.53</i>	-0.43 <i>-0.45</i>	-0.21 <i>-0.65</i>	-0.37 <i>-0.13</i>	1.42 <i>0.90</i>
	2	2.21 <i>0.42</i>	-0.65 <i>-0.78</i>	-0.06 <i>-0.22</i>	-1.89 <i>-0.80</i>	0.23 <i>0.17</i>
Public investment	1	0.86 <i>0.66</i>	0.04 <i>0.20</i>	0.05 <i>0.73</i>	0.20 <i>0.35</i>	-0.36 <i>-1.07</i>
	2	0.93 <i>0.70</i>	0.03 <i>0.13</i>	-0.05 <i>-0.68</i>	-0.49 <i>-0.82</i>	0.26 <i>0.75</i>
Private investment	1	-0.23 <i>-0.24</i>	0.07 <i>0.48</i>	-0.01 <i>-0.26</i>	0.29 <i>0.66</i>	-0.06 <i>-0.24</i>
	2	0.16 <i>0.21</i>	0.00 <i>0.04</i>	0.02 <i>0.51</i>	0.05 <i>0.14</i>	0.23 <i>1.16</i>
Constant	1	0.00 <i>-0.04</i>	0.00 <i>0.45</i>	0.00 <i>-0.96</i>	0.02 <i>0.90</i>	0.00 <i>-0.33</i>

Source: ESCWA estimates.

Note: numbers in italics are t-statistics.

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