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A post-Keynesian Assessment Of Alternative Saudi Arabian Austerity strategies

Robert E. Looney

The main purpose of this paper is to examine the consequences of declining oil revenues for the Saudi Arabian economy. In particular, the paper is interested in examining several alternative expenditure strategies open to the government that would be least disruptive to the non-oil manufacturing sector and in what sense?

The interaction of government expenditures and the private sector was examined using a modified form of the Granger Causality test. These tests were performed on annual data over the period 1960 through 1992 (the last year for which consistent time series data are available).

Our main finding was that contrary to what one might expect, public investment and infrastructure has played a minor role in stimulating private sector capital formation. If anything it appears that increased private sector investment has stimulated a follow-on expansion in government expenditures of this type. It follows that expenditure reductions in this area are not likely to cause a significant reduction in the expansion of private investment.

A POST-KEYNESIAN ASSESSMENT OF ALTERNATIVE SAUDI ARABIAN AUSTERITY STRATEGIES

Robert E. Looney
Naval Postgraduate School

INTRODUCTION

Given the probability that Saudi Arabia will not experience in the near future a surge in oil revenues similar to those obtained in the early and late 1970s, the major problem facing the government will be how best to utilize its dwindling oil revenues to generate positive overall rates of economic growth, while at the same time meeting to the fullest extent possible the basic needs of the majority of the population. Clearly any future growth strategy must involve devising means whereby the private sector will assume a more important role in expanding not only output, but perhaps more importantly in sustaining a level of effective domestic demand (Looney, 1984) to stave off any further recessionary tendencies stemming from reduced government expenditures. This is especially critical in the non-hydrocarbon manufacturing sector, which is almost totally dependent on the local market for sales.

In this context, the main purpose of the analysis below is to examine the consequences of declining oil revenues for the Saudi Arabian economy. In particular, the paper is interested in examining several alternative expenditure strategies open to the government. In which general areas of government expenditure consumption (current), investment (infrastructure) or defense (military)–would budgetary cuts be the least disruptive on private investment and in what sense?

RECENT CONTROVERSIES

Economic management in Saudi Arabia government has come under increasing criticism in recent years (Englelbert,1993; IMF, 1993). In general this criticism has focused on the country's chronic and massive deficits in both its budget and current account balance. In particular the IMF (1993) has argued that Saudi Arabia's budget deficit and current account deficit as a percentage of GDP will increase during the coming years with figures for 1993 as their lowest. The IMF has been asking the Saudi government to review the effect of investment in the public sector, reconsider its policy on government subsidies, and impose taxes on non-oil sectors. The Saudi government, however, appears to give priority to political and social considerations over reduction of the deficit.

CONTRASTING VIEWS OF THE ECONOMY

The IMF's point of view is that it is necessary for the Saudi government to examine the efficiency of public investment, to review various subsidies and related pricing policies, and to examine the possibility of taxation on non-oil sectors. Second, if the financial deficit is not reduced, funds in the private sector could flow into the government sector as a loan, resulting in a shortage of funds needed for private companies under a market economy.

To counter this the Saudi Government has argued that: (1) a whole spectrum of policies will be reviewed in the context of the sixth development plan (1995-99), (2) the government promises to continue pursuing tighter expenditure policy, and (3) at this time political and social considerations have precluded a reduction in subsidies or an increase in fees and charges. As to the second problem of "crowding out", the Saudi government has argued that under present conditions of rich liquidity on hand through commercial banks, financing the budgetary deficits with loans from the private sector will not cause "crowding out" (although the Saudis concede that in the medium term this may occur).

The IMF has noted two points concerning the international balance of payments. First, the IMF forecasts that a deficit of the current account as a percentage of GDP will increase from the bottom figure of 9.3% in 1993 up to 13.3% in 1997. The reason given by the IMF is that although income from oil exports will increase from the lowest figure of US $42.3 billion in 1993 to $46.7 billion in 1997, its slow rate of increase will not be enough to catch up with the increase in payments for imports of goods and services. Second, the IMF recommends that, Saudi Arabia consider the

establishment of financial income sources other than oil in the near future.

The Saudi Arabian government does not seem convinced by the IMF's projection of its current account balances and contends that: (1) such persistent weaknesses in the external current account could not be maintained, and that (2) one important ingredient for recovery will be an external environment that diminishes or at least does not increase, the impediments facing the country in marketing oil products. The gist of Saudi Arabia's second point is not too clear but it is likely to mean that if foreign countries consuming oil ease or take off regulations limiting their importation, then the future prospects of total exportation from Saudi Arabia should be much improved. Regarding the second point raised by the IMF relating to Saudi Arabia's policy the Saudi Government contents that it will (1) maintain a tight fiscal stance, (2) take additional policy measures to reduce the current account deficit to manageable levels and (3) examine possibilities of increasing income from sources other than oil.

SHORT-RUN CONSTRAINTS

Many of the issues noted above have been developing over the past several years and are likely to persist throughout the 1990s. In addition the country faces a number of immediate short run problems that must be successfully dealt with if the country is to resume steady economic expansion.

The Oil Market. The Kingdom's 1994 budget was based on the assumption that the average price of Saudi oil exports would be about $14-15 a barrel in 1994. Although prices have recently increased the average for the first half of 1994 was about $2 a barrel lower than this. If the low prices average out over the year, oil export earnings could fall below $35,000 million, the lowest level since 1989.

The Exchange Rate Policy. In recent years the decline in oil prices has caused the Saudi currency to come under heavy pressure from speculators banking on a riyal devaluation. The government has stated that it will maintain the value of the riyal. However, the hard riyal policy has drained domestic liquidity and contributed to an increase in domestic interest rates.

Government Development Bonds. In 1988 the government initiated a bond program to finance the budget deficit. These development bonds carry interest rates fixed at a margin over the rate for U.S. government bonds. When dollar interest rates were falling, the bonds were a sound

investment. The rise in dollar rates since the middle of 1993 has made investment in Saudi Bonds increasingly unattractive.

Debt Service. Servicing loans is a novel experience for the Saudi Government. In May 1991 Saudi Arabia signed its first internationally syndicated sovereign borrowing. The first of five quarterly principal payments was due in May 1994. The Finance Ministry also has to service a $2,500 million five year loan signed in May 1991 with local banks.

Rebuilding Financing Reserves. It is possible that the kingdom is conserving cash in an effort to rebuild its liquid savings. International reserves fell below $10, 000 million for the first time in more than a decade during the spring of 1992 and they have never recovered. The effort to conserve cash may reflect a desire to restore reserves to prudent levels, particularly in view of the uncertain future trends in oil prices.

Defense Equipment Contracts. Since June 1990 Saudi Arabia is reported to have agreed to buy 30,000 million worth of defense equipment from the US alone. Deliveries are increasing and cash payments due to American manufacturers are rising. It is estimated that the schedule for cash payments due under foreign military sales (FMS) called for a total of $4,200 million to be paid in 1994 and $5,000 million in 1995. It has been apparent for at least a year that the kingdom could not support this payment program.

Balancing the Budget. A further influence is the management of the 20 percent across-the board cut in public spending called for in the 1994 budget. This aims to eliminate the deficits that have been a feature of state fiscal policy since 1982. Spending department have been told they must adhere to the spending target. However suppliers have been given little guidance about the priorities for 1994. The expenditure review has compounded the uncertainty in the business community. It may have contributed to the general slowdown in government disbursements.

MAIN CHALLENGES

In dealing with these issues the Saudi authorities will have to confront several major challenges. The first is structural. Economists forecast that the rate of growth of Saudi hydrocarbon earnings in the next five years will be lower than the expansion in the obligations of the Saudi state. The conclusion is that the budget deficit could continue indefinitely unless appropriate action is taken.

The second challenge is more psychological. It involves increased uncertainty among potential creditors is being compounded by the absence of a clear indication about the methods the kingdom will use to raise the finance needed to bridge the gap between today's deficits and the better days that should come at the end of the century. Will there be more loan syndications? Is the government debt market to be developed to include floating rate securities? Will export credits be sought? When will the stock market be opened up to foreign investors, if at all?

POST-KEYNESIAN ASSUMPTIONS

In the analysis that follows, we have implicitly assumed a series of Post Keynesian type relationships hold. These entail the various impacts on the economy, and particularly private investment stemming from the different classes of government expenditure investment, consumption, and defense. The Post Keynesian approach (Eichner, 1975,1978, 1979; Gapinski, 1979; Mankiw, 1993) is much too eclectic to adequately summarize here. However, one of its attractive features for examining government policy in Saudi Arabia is that the approach offers a framework for examining the relationship between the components of public sector demand, income distribution and private investment.

In place of the relative price variable which is the focal point of a neoclassical analysis, Post Keynesian (Romer, 1993) theory makes investment the key determinant of most economic aggregates. This follows from an underlying belief that in a dynamic, expanding economy, the income effects produced by investment and other sources of growth far outweigh the substitution effects resulting from price movements. That is changes in demand, both aggregate and sectoral, are due more to changes in income than to changes in relative prices.

Perhaps more importantly, Saudi Arabia possesses a number of structural characteristics that would seem to preclude an automatic equilibration of most markets at or near full employment (Nagi, 1982):

1. Government expenditures play a pervasive role in the economy, accounting in recent years for well over half of aggregate demand.
2. Financial markets are still underdeveloped.
3. The relatively low population base puts some limit on the size of the market and competition.

These factors combine to produce macroeconomic instability (IMF 1993a) which, in turn, reduces growth through several channels. First, by distorting price signals so that these no longer reflect underlying scarcities, it results in the misallocation of resources and reduced productivity. Second, macroeconomic instability increases uncertainty and reduces the rate of investment, as potential investors wait for uncertainty to dissipate before committing resources. Capital flight, which is likely to increase with macroeconomic instability, further reduces investment in the domestic economy. High and variable inflation, an important source of macroeconomic instability, further depresses investment, often by lowering real returns to saving. Large fiscal deficits may lead to the crowding out of private investment by raising real interest rates. High deficits, which result in rapid accumulation of public debt, may also signal higher taxes and lower public investment in the future.

The implications of this situation in terms of private sector investment are that government expenditures may crowd (Looney and Frederiksen 1987) out private investment either in a real sense (competition for factors of production) or in a financial sense (competition for financing).

BUDGETARY STRATEGIES

At first sight, the most logical austerity program would be one of concentrating on a selective reduction in defense expenditure allowing resources to be freed up to finance (more productive) government programs. Since the early 1980s defense alone has averaged around 30-40 percent of the national budget with the latest figure of 41 percent in 1993 (USACDA 1995).

It is not at all clear how much of the allocations to defense are in excess of what is needed on purely strategic grounds. Although Saudi Arabia has spent massively on developing an extensive military infrastructure and in purchasing the most sophisticated hardware available, the rationales for this expenditure have been articulated in only the most general terms.

These are to enable the kingdom to protect it's extensive borders from regional or superpower incursions and to ensure internal security (Economist Intelligence Unit, 1986:6). In terms of constraints, the country's purchasing program has been limited only by the lack of absorptive capacity, trained manpower and the willingness of the U.S. to supply certain weapons systems.

The first dilemma therefore facing the Saudi authorities is whether the country can justify the high costs of military expenditures when a distinct possibility exists that cut backs in defense could free up sufficient funds to offset most of the budgetary cuts in the non defense area brought about by the oil price declines.

Along these lines, classical theory would predict on the basis of resource allocation that increases in defense will decrease investment and/or civilian consumption and thus reduce industrial output. Increased military burdens would, in this situation, have to be justified on the basis of other social welfare gains such as an increase in collective security. Keynesian theory, on the other hand, suggests that in the presence of inadequate effective demand the operation of the income multiplier would result in an increase in industrial output, resulting from additional defense expenditures. Of course one could always argue that expenditure on either consumption or investment would have a greater domestic expenditure multiplier on private sector incomes and rates of production than that produced by military expenditures Thus, there are purely economic rationales for increased military spending. Whether or not military expenditures have a positive economic impact relative to other sources of demand is ultimately an empirical question (Deger and Smith 1985).

The second budgetary dilemma currently facing the Saudi authorities concerns the wisdom of further expanding the kingdom's infrastructure. During the last decade, Saudi Arabia has had perhaps the largest ever program of investment in transport and related infrastructure. Since the expansion in oil revenues in 1973/74 the country invested in a wide variety of programs to expand not only its road network, but sea and air ports as well. In large part, the rationale for this program was based on the presumption that the cost reducing impact of this investment would make private investment much more profitable, and thus stimulate a major expansion in private sector output.

The possibility that public sector investment in infrastructure can stimulate not only increased levels of private sector investment, but overall increases in industrial output as well, has long intrigued economists. This possibility is clearly suggested by infrastructure's key role in Hirschman's (1958) unbalanced development strategy.

Tersely put, Hirschman advocated that in countries where the private sector is somewhat squeamish about risk taking, the government could

stimulate private sector capital formation, and follow on increases in industrial output through massive investments in such areas as transportation, and energy thereby reducing the costs of commercial production, While not explicitly acknowledged, Hirschman's notions of imbalance through massive investments in infrastructure underlie Saudi Arabia's development strategy (Looney and Frederiksen, 1985).

In terms of financing, the Saudi authorities have spent more on infrastructure in the last fifteen years than any country in history over a similar time period. In terms of the focus of the present study, the relevant question is whether the Saudi Arabian government's strategy of infrastructure led investment been successful in the Hirschman sense i.e., has it resulted in distinctly higher levels of private investment over and above the levels likely to exist in the absence of these programs? If not, what impacts have been associated with infrastructural investment and have these effects been superior to those that would have resulted from either consumption or military expenditures?

The analysis below is largely quantitative since a key element in assessing these issues revolves around the issue of causality. That is have the government's expenditures resulted in a follow on set of effects on private investment or, instead, has private investment created pressures for the government to expand its expenditures? In turn, answer to these questions will in large part determine the appropriate strategies for fiscal policy.

THE ISSUE OF CAUSATION

As noted, previous studies (Looney, 1989, 1989a, 1990, 1991, and 1992) have suggested that government expenditures in Saudi Arabia have been a mixed blessing. On the one hand, these expenditures have the potential to increase private sector profitability either through increases in aggregate demand (the Keynesian effect) and/or cost reductions (the infrastructural effect). On the other hand, public expenditures appear to compete for funds and physical resources with the private sector, thus reducing ceteris paribus the total volume of private capital formation.

Little can be said on these issues until the issue of causation is adequately resolved:

1. Often in studies of this type the direction of causation has implicitly been assumed to go from government deficits to expanded domestic

borrowing to interest rate increases and ultimately reduced private investment. One could just as easily argue that increased levels of private investment have placed pressure on the government to expand facilities, especially in energy. The government, wishing to aid private investment while simultaneously lacking adequate funding for major infrastructural programs, may first grant the private sector various forms of relief such as tax holidays followed by modest increases in public investment. The outcome of this process would be expanded deficits, but not necessarily the crowding out of private investment in the classical sense. The causation issue must be addressed before any definitive conclusion can be made concerning crowding out.

2. As a related issue, the timing of these impacts needs to be identified. Many effects associated with government expenditures are likely to have a delayed impact on private investment decisions. Again because the precise timing of these effects has not been identified, the patterns of causation are unclear.

GRANGER TEST

The original and most widely used causality test was developed by Granger (1969). According to this test (again using the example of public expenditures and private investment), government expenditures (GE) affect growth of public sector investment (PI) if private investment can be predicted more accurately by past values of public expenditures than by past values of private investment. To be certain that causality runs from GE to PI, past values of GE must also be more accurate than past values of PI in predicting increases in public expenditures.

More formally, Granger (1969) defines causality such that X Granger causes (G-C) Y if Y can be predicted more accurately in the sense of mean square error, with the use of past values of X than without using past X. Based upon the definition of Granger causality, a simple bivariate autoregressive (AR) model for public expenditures (GE) and PI can be specified as follows:

$$(1)\quad PI(t) = c + \sum_{i=1}^{p} a(i)PI(t-i) + \sum_{j=1}^{q} b(j)GE(t-j) + u(t)$$

$$(2)\quad GE(t) = c + \sum_{i=1}^{r} d(i)\, GE(t-1) + \sum_{j=1}^{s} e(j) PI(t) + v(t)$$

where GE is the growth in public sector expenditures and PI = the growth in private investment; p, q, r and s are lag lengths for each variable in the equation; and u and v are serially uncorrelated white noise residuals. By assuming that error terms (u, v) are «nice» ordinary least squares (OLS) becomes the appropriate estimation method[1] .

Within the framework of unrestricted and restricted models, a joint F-test is appropriate for causal detection. Where:

$$(3)\ \mathrm{F} = \frac{\text{(RSS(r)-RSS(u)/(df(r)-df(u)}}{\text{RSS(u)/df(u)}}$$

RSS(r) and RSS(u) are the residual sum of squares of restricted and unrestricted models, respectively; and df(r) and df(u) are, respectively, the degrees of freedom in restricted and unrestricted models.

The Granger test detects causal directions in the following manner: first, unidirectional causality from GE to PI if the F-test rejects the null hypothesis that past values of GE in equation (1) are insignificantly different from zero and if the F-test cannot reject the null hypothesis that past values of PI in equation (2) are insignificantly different from zero. That is, GE causes PI but PE does not cause GE. Unidirectional causality runs from PI to GE if the reverse is true. Second, bi-directional causality runs between GE and PI if both F-test statistics reject the null hypotheses in equations (1) and (2). Finally, no causality exists between GE and PI if we can not reject both null hypotheses at the conventional significance level.

The results of Granger causality tests depend critically on the choice of lag length. If the chosen lag length is less than the true lag length, the omission of relevant lags can cause bias. If the chosen lag is greater than the true lag length, the inclusion of irrelevant lags causes estimates to be inefficient. While it is possible to choose lag lengths based on preliminary partial autocorrelation methods, there is no a priori reason to assume lag lengths equal for all types of deficits.

THE HASAIO PROCEDURE

To overcome the difficulties noted above, Hsaio (1981) developed a

systematic method for assigning lags. This method combines Granger Causality and Akaike's final prediction error (FPE), the (asymptotic) mean square prediction error, to determine the optimum lag for each variable. In a paper examining the problems encountered in choosing lag lengths, Thornton and Batten (1985) found Hsiao's method to be superior to both arbitrary lag length selection and several other systematic procedures for determining lag length.

The first step in Hsiao's procedure is to perform a series of autoregressive regressions on the dependent variable. In the first regression, the dependent variable has a lag of one. This increases by one in each succeeding regression. Here, we estimate M regressions of the form:

$$(4) \quad G(t) = a + \sum_{i=1}^{m} b(t-1)G(t-1) + e(i)$$

where the values of m range from 1 to M. For each regression, we compute the FPE in the following manner

$$(5)\ \mathrm{FPE(m)} = \frac{\mathrm{T + m + 1}}{\mathrm{T - m - 1}}\ \mathrm{ESS(m)/T}$$

Where: T is the sample size, and FPE(m) and ESS(m) are the final prediction error and the sum of squared errors, respectively. The optimal lag length, m*, is the lag length which produces the lowest FPE. Having determined m* additional regressions expand the equation with the lags on the other variable added sequentially in the same manner used to determine m*. Thus we estimate four regressions of the form:

$$(6) \quad G(t) = a + \sum_{i=1}^{m*} b(t-1)G(t-1) + \sum_{i=1}^{n} c(t-1)D(t-1) + e(i)$$

with n ranging from one to four. Computing the final prediction error for each regression as:

$$FPE(m^*, n) = \frac{T + m^* + n + 1}{T - m^* - n - 1}\ Ess(m^*, n)/T$$

we choose the optimal lag length for D, n* as the lag length which produces the lowest FPE. Using the final prediction error to determine lag length is equivalent to using a series of F tests with variable levels of significance[2] .

The first term measures the estimation error and the second term measures the modeling error. The FPE criterion has a certain optimality property that "balances the risk due to bias when a lower order is selected and the risk due to increases in the variance when a higher order is selected (Hsaio, 1979)." As noted by Judge (1982) et. al., an intuitive reason for using the FPE criterion is that longer lags increase the first term but decrease the RSS of the second term, and thus the two opposing forces are optimality balanced when their product reaches its minimum.

Depending on the value of the final prediction errors, four cases are possible: (a) Government Expenditures cause Private Investment when the prediction error for private investment decreases when government expenditures are included in the investment equation. In addition, when private investment is added to the government expenditure equation, the final prediction error should increase; (b) Private Investment causes Government Expenditures when the prediction error for government expenditures falls when private investment is added to the regression equation for public expenditures, and is increased when public expenditures are added to the regression equation for private investment; (c) Feedback occurs when the final prediction error decreases when government expenditures are added to the private investment equation, and the final prediction error decreases when private investment is added to the government expenditure equation; and (d) No Relationship exists when the final prediction error increases both when government expenditures are added to the private investment equation and when private investment is added to the government expenditure equation.

OPERATIONAL PROCEDURES

The government expenditure figures used to carry out the causation tests was for the period 1960-1992 and was derived from data provided by the Saudi Arabian Monetary Agency (various issues): All variables were deflated by the non-oil GDP deflator. For best statistical results (Hsaio, 1981; Joerding, 1986 and Doan, 1992) the variables were transformed into their logarithmic values[3] .

Relationships were considered valid if they were statistically significant

at the ninety-five percent level of confidence. That is, if ninety-five percent of the time we could conclude that they had not occurred by pure chance, we considered them statistically significant.

As noted above, there is no theoretical reason to believe that private investment and government expenditures by category have a set lag relationship–that is they impact on one another over a fixed time period. To find the optimal adjustment period of impact, lag structures of up to six years were estimated. The lag structure with the highest level of statistical significance was the one chosen best depict the relationship under consideration (the optimal lag reported in Table 1)[4] .

In terms of data the greatest difficulty involved the lack of data as to the value and composition of the kingdom's stock of infrastructure. In particular official Saudi data on government investment contains both infrastructural and non - infrastructural type expenditures. Conceivably the cost reducing effect of the infrastructure component of government investment could be offset by the potential crowding out of private sector activity stemming from the non - infrastructural component.

To avoid these potential problems it was first necessary to separate out and estimate the independent effects of the different categories of public investment. Since the raw data itself does not allow these distinctions to be made, a proxy measure for the infrastructural and non - infrastructural components of government investment had to be developed. Following Blejer and Khan (1985) this involved making a distinction between types of public investment on the basis of whether or not that investment was expected or not.

Expected investment was assumed to be depicted by past patterns trend in investment[5] . Again, it is assumed that expected public investment reflects investment in infrastructure. Similarly, transitory government investment was assumed to be depicted by that component of public investment that was unexpected. Operationally, unexpected public investment was defined as the difference between the actual (realized) level of government investment and that was expected. Clearly, the basic assumption underlying these proxies is that infrastructure investment is an on going process that moves slowly over time and cannot be changed very rapidly.

In a similar manner, proxies were developed for permanent and transitory government consumption, with permanent consumption reflective of long term trends in government salaries and subsidies and transitory government consumption reflecting short term adjustments to changing revenues.

Expected military expenditures are reflective of long term weapons acquisition and infrastructure development, while unexpected military expenditures were assumed to reflect short run responses to changes in the kingdom's perceived security situation.

RESULTS

Causality tests were performed on Saudi data for the period from 1960 through 1992 (the last year for which consistent time series data is available). The analysis produced a number of interesting patterns that are summarized in Table 1. Specifically:

1. Contrary to what one might expect, public investment and infrastructure has played a minor role in stimulating private sector capital formation. If anything it appears that increased private sector investment has been stimulated a follow-on expansion in government expenditures of this type.
2. In contrast defense expenditures have provided a fairly strong stimulus to the private sector. However, short run increases in defense have not resulted in an expansion in private sector capital formation.
3. The reverse pattern occurs with non-military expenditures. As with public investment, this category of expenditures generally increases following an expansion in private sector investment.
4. The most complex pattern involves public consumption. Actual public consumption interacts in a feed back mechanism with private investment with increases in public consumption providing a week stimulus to private investment. In turn increased private investment elicits a follow-on expansion in public consumption. Longer run expansion in public consumption, however appears largely affected by private investment with short run government consumption providing some stimulus to the private sector.

Table 1
Saudi Arabia: Interaction of Public Expenditures and Private Investment, 1960-1992

	A	B	C	D
Public Investment				
Optimal Lag (years)	1	1	2	2
Final Prediction Error	(0.28e-1)	(0.29e-1)	(0.38e-1)	(0.32e-1)
F Statistic				
Causality pattern private investment–> public infrastructure (+m)				
Public Infrastructure				
Optimal Lag (years)	1	3	2	3
Final Prediction Error	(0.28e-1)	(0.29e-1)	(0.25e-1)	(0.20e-1)
Causality pattern private investment—> public infrastructure (+m)				
Public non-infrastructural investment				
Optimal Lag (years)	1	1	2	2
Final Prediction Error	(0.28e-1)	(0.28e-1)	(0.36e-1)	(0.33e-2)
Causality pattern: private investment—> non-infrastructural public investment (+m)				
Actual Military Expenditures				
Optimal Lag (years)	1	1	1	1
Final Prediction Error	(0.28e-1)	(0.25e-1)	(0.37e-1)	(0.39e-1)
Causuality pattern: Military Expenditures—> Private Investment (+m)				
Expected Military Expenditures				
Optimal Lag (years)	1	1	1	2
Final Prediction Error	(0.28e-1)	(0.23e-1)	(0.26e-1)	(0.27e-1)
Causality pattern: Military Expenditures—> Private Investment (+m)				

Table 1 (conted.)
Saudi Arabia: Interaction of
Public Expenditures and Private Investment, 1960-1992

	A	B	C	D
Unexpected Military Expenditures				
Optimal Lag (years)	1	3	1	1
Final Prediction Error	(0.28e-1)	(0.29e-1)	(0.39e-1)	(0.42e-1)
Causality pattern: No relationship				
Actuall Non-Military Expenditures				
Optimal Lag (years)	1	1	1	2
Final Prediction Error	(0.28e-1)	(0.28e-1)	(0.86e-1)	(0.74e-1)
Causallity pattern: Private Investment—> Non-Military (+m)				
Expected Non-Military Expenditures				
Optimal Lag (years)	1	1	1	1
Final Prediction Error	(0.28e-1)	(0.30e-1)	(0.60e-1)	(0.40e-1)
Causality pattern: Private Investment—> Non-Military (+m)				
Un-Expected Non-Military Expenditures				
Optimal Lag (years)	1	1	2	2
Final Prediction Error	(0.28e-1)	(0.28e-1)	(0.99e-1)	(0.92e-1)
Causuality pattern: Private investment—> Non-Military (+m)				
Actual Public Consumption				
Optimal Lag (years)	1	4	1	1
Final Prediction Error	(0.28e-1)	(0.26e-1)	(0.22e-1)	(0.21e-1)
Causality pattern: Feedback (+w, +w)				

Table 1 (conted.)
Saudi Arabia: Interaction of
Public Expenditures and Private Investment, 1960-1992

	A	B	C	D
Expected Public Consumption				
Optimal Lag (years)	1	2	1	1
Final Prediction Error	(0.28e-1)	(0.29e-1)	(0.19e-1)	(0.18e-1)
Causality pattern: Private Investment—>Public Consumption (+w)				
Un-Expected Public Consumption				
Optimal Lag (years)	1	2	3	1
Final Prediction Error	(0.28e-1)	(0.27e-1)	(0.23e-1)	(0.25e-1)
Causality pattern: Public Consumption—>Private Investment (+w)				

Notes: Summary of results obtained from Granger Causality Tests. A Hsaio Procedure was incorporated General Public Investment to determine the optimal lag. All variables estimated in their logarithmic form. Anticipated infrastructure is the valued predicted by regressing public investment on its value in the previous year. Actual infrastructure approximated as the smoothed exponential trend of public investment. Regression Patterns: A = private investment on private investment; B = public expenditures on private investment; C = government expenditures on government expenditures; and D = private investment on government expenditures. The Dominant pattern is that with the lowest final prediction error. The signs (+,-) represent the direction of impact. In the case of feedback the two signs represent the lowest final prediction error of relationships B and D. Each of the variables was regressed with 1, 2, 3, 4, 5, 6 year lags. Strength assessment (s = strong; m = moderate; w = weak) based on the size of the standardized regression coefficient.

Conclusions

The main thrust of the analysis undertaken above has been to assess the possibility of redirected government expenditures as a way of overcoming the deflationary effects associated with falling oil revenues and the need for sustained austerity in public sector expenditures. Particular interest has been in the ability of the government to sustain private investment through altering the composition (but not necessarily level) of public sector expenditures.

With regard to the government's infrastructure program, one can only conclude that the Saudi Arabian development strategy, based largely on the assumptions of a Hirschman type unbalanced growth strategy greatly overestimated the willingness of entrepreneurs to shift resources to directly productive investment as costs of production fell. Put differently the Saudi Arabian private sector does not appear interested in investing in fixed plant and equipment solely as a result of the Hirschman type cost reducing linkages stemming form the public sector's infrastructure led development strategy. The causality analysis suggests that the inability of public investment to stimulate private investment is not the result of a crowding out process. If this is the case, government expenditure reductions in this area are not per se likely to cause a significant down turn in private investment.

The lack of any appreciable crowding out effects is also indicated by the fact that the spread effects stemming from the government's military programs induce a fairly strong response from the private sector. Based on current commitments these expenditures are likely to remain high for the medium term. If past patterns hold, private sector investment should remain buoyant even in light of cut backs in public investment and consumption.

Notes

1 - If the disturbances of the model were serially correlated, the OLS estimates would be inefficient, although still unbiased, and would distort the causal relations. The existence of serial correlation was checked by using a maximum likelihood correlation for the first-order autocorrelation of the residuals [AR(1)]. The comparison of both OLS and AR(1) results indicated that no significant changes appeared in causal directions. Therefore, we can conclude "roughly' that serial correlation was not serious in this model.

2 - Since the F statistic is redundant in this instance they are not reported here. They are, however, available form the authors upon request.

3 - The time series must be stationary to yield valid Granger Tests (Doornik and Hendry 1992). In this regard the finding of a unit root in a time series indicates non-stationarity. In a well known paper, Dickey and Fuller (1981) suggested a method for computing a test for a unit root in a time series and presented critical values for their proposed tests with and without the trend variable included. Dickey-Fuller (DF) tests (Dickey and Fuller 1979 1981) were performed using PC Give Version 7.0 (Doornik and Hendry 1992). in a simple case where xt = a +bxt-1 + et where b = 1 which generates a random walk (with drift if a not equal to 0). Here the autoregressive coefficient is unitary and stationarity is violated. A process with no unit or explosive roote is said to be I(0); the Durbin-Watson (DW) statistic for the level of a variable offers one simple characterisaction of this integrated property. For example. if xt is a random walk, DW will be very small. If xt is white noise, DW will be around 2. Very low DW values thus indicate that a transformed model may be desirable perhaps including a mixture of differenced and disequilibrium values. An examination of the series used in the causation analysis indicated that a non-stationarity set of relatinships exists.

4 - As a practical matter, the results were insensitive to the manner in which a variable was defined–actual, expected, and unexpected usually provided a consistent picture. Because of this only the actual impacts are summarized in the tables below. However because of its importance government investment in the form of infrastructure (here proxied as expected, or on-going government expenditure are also included in the set of main findings. The findings for the other variable definitions are available from the author upon request.

5 - Expected expenditures were calculated as: Exp(t) = a + b[Exp(t-1)], with the parameters (a) and (b) estimated over the period 1960-92.

References

Blejer, M and Mohsin S.Khan.

1985 "Public investment and Crowding Out in the Caribbean Basin Countries" in Michael Cannily and John McDermott. The Economics of the Caribbean Basin, New York: Praeger Publishers,. 219-236.

Dager, Saadet Deger and Ron Smith.

1985 "Military Expenditure and Development: The Economic Linkages, "IDS Bulletin 16, 49-54.

Dickey, D.A. and W.A. Fuller.

1979 "Distribution of the Estimators for Autoregressive Time Series With a Unit Root: Journal of the American Statistical Association 74, 427-31.

Dickey, D.A. and W.A. Fuller

1981 "Likelihood Ratio Statistics for Autoregressive Time Series With a Unit Root" Econometrica 49, 1057-72.

Doan, Thomas A.

1992 Regression Analysis for Time Series User's Manual Version 4, Evanston, Illinois: Estima, 1992).

Doornik, Jurgen A. David F. Hendry.

1992 PC Give, Version 7: An Interactive Econometric Modeling System, Oxford: Institute of Economics and Statistics.

Economist Intelligence Unit.

1986 Country Profile: Saudi Arabia, 1986/87, London: The Economist Intelligence Unit.

Eichner, Alfred, and J.A. Kregel.

1975 "An Essay of Post-Keynesian Theory: A New Paradigm in Economics," Journal of Economic Literature 14, 1293-1314.

Eichner, Alfred.

1978 A Guide to Post-Keynesian Economics, New York: M.E. Sharpe.

——

1979 " A Post Keynesian Short-Period Model, "Journal of Post Keynesian Economics 1, 38-63.

Engelbert, Stephen Jeff Gerth and Tim Weiner.

1993 " Saudi Arabia Stability Hit by Heavy Spending over Last Decade" New York Times, August 22, 1.

Gopinski, James H. and Charles Rockwood. eds

1979 Essays in Post-Keynesian Inflation, Cambridge Mass: Ballinger.

Granger, C.W.J.

1969 "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods, ' Econometrica 37, 424-438.

Hirschman.Albert O.

1958 The Strategy of Economic Development New Haven Conn.: Yale University Press.

Hsiao. C

1979 "Causality Tests in Econometrics, "Journal of Economic Dynamics and Control 7, 326-35.

——

1981 "Autoregressive Modeling and Money-Income Causality Detection, "Journal of Monetary Economics 6, 85-106.

Joerding, W.

1986 "Economic Growth and Defense Spending: Granger Causality "Journal of Development Economics 21, 35-40.

Judge, G.G,. W. Hill, H. Griffiths, H. Lutkephol, and T.C. Lee.

1982 Introduction to the Theory and Practice of Econometrics New York: John Wiley and Sons.

Looney, Robert E.

1984 " The Impact of Exports on the Saudi Arabian Economy" in Robert S. Stokey ed., The Arabian Peninsula Stanford, California: Hoover Institution Press.

——

1989 "Oil Revenues and Viable Development: Impact of the Dutch Disease on Saudi Arabian Diversification Efforts" Arab American Affairs 27, 29-36.

——

1989a "Saudi Arabia's Development Strategy: Comparative Advantage versus Sustainable Growth" Orient 30, 75-96

Looney, Robert E.

1990 Economic Development in Saudi Arabia: Consequences of the Oil Price Decline, Greenwitch: Conn JAI Press.

——

1991 "Budgetary Priorities in Saudi Arabia: The Impact of Relative Austerity Measures on Human Capital Formation" OPEC Review, 15, 122-152;

——

1991a "A Post-Keynesian Analysis of Third World Military Exenditures" Rivista internazionale di Scienze Economiche e Commercialli 38, 779-98.

——

1992 "Real or Illusory Growth in an Oil-Based Economy: Government Expenditures and Private Sector Investment in Saudi Arabia" World Development, 20, 1367-1376.

——

1994 "The Economic Consequences of Defense Expenditures the Middle East" METU Studies in Development 21, 89-113.

Looney, Robert E. and P.C. Frederiksen.

1985 " The Evolution and Evaluation of Saudi Arabian Economic Planning Journal of South Asian and Middle Eastern Studies 9, 3-19.

——

1987 "Fiscal Policy in Mexico: The Fitzgerald Thesis Re-examined" World Development 15, 399-404.

Mankiw, N. Gregory.

1993 "Symposium: Keynesian Economics Today" Economic Perspectives 7, 3-82.

Nagi, M.H.

1982 " Development with Unlimited Suplies of Capital: The case of OPEC," The Developing Economics 20, 3-20.

Romer, David.

1993 "The New Keynesian Synthesis" The Journal of Economic Perspectives 7, 5-23.

Thornton, D.L. and D.S. Batten.

1985 "Lag-Length Selection and Tests of Grander Causality Between Money and Income," Journal of Money , Credit and Banking 17, 164-78.

United States Arms Control and Disarmament Agency.

1995 World Military Expenditures and Arms Transfers: 1993-1994 Washington: USACDA, February 1995

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