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# OIL REVENUES AND VIABLE DEVELOPMENT: IMPACT OF THE "DUTCH DISEASE" ON SAUDI ARABIAN DIVERSIFICATION EFFORTS

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Recent theoretical research on the overall economic effects of oil revenues on economic growth indicates that their net impact may well be much less than originally anticipated. Specifically, government domestic expenditure of oil revenues inevitably leads to real exchange-rate appreciation. Exchange-rate appreciation or the so-called "Dutch disease" should ultimately result in a contraction in the non-oil export sector with inflation and expansion taking place in the non-traded-goods sector.

As Al-Sabah notes<sup>1</sup> the Dutch disease is not unique to oil-exporting countries, but has occurred in a variety of environments:

1. The national gas discoveries in the Netherlands in the 1960s led to an appreciation in the real exchange rate, brought about not so much by an appreciation in the nominal exchange rate as by nominal wage increases ahead of those of West Germany, with the net result that her export industries

were squeezed and a decline in Dutch manufacturing set in.

2. The boom in technologically advanced parts of Japan's manufacturing sector in the 1960s had adverse effects on the less dynamic tradable sectors, including agriculture.

3. The boom in the export of Swiss bonds and money in the 1970s led to a real appreciation in the Swiss franc and had an adverse effect on traditional Swiss exports and export-competing industries.

Given the varying structures of developed and developing countries, one would anticipate the manufacturing sector to contract in advanced countries, while the agricultural sector would be most severely affected in developing countries.<sup>2</sup> This stems in part from the fact that most developing oil-exporting countries, particularly the smaller countries in the Persian Gulf area, had negligible industrial output before the

<sup>1</sup>Mohammad Al-Sabah, "The 'Dutch Disease' in an Oil Exporting Country: Kuwait," *OPEC Review* (Summer 1988), p. 129.

<sup>2</sup>Nancy C. Benjamin, Shantayanan Devarajan, and Robert J. Weiner, "Oil Revenues and the 'Dutch Disease' in a Developing Country: Cameroon," *OPEC Review* (Summer 1986), p. 143.

1973-74 oil boom, and were not exporters of industrial products.

In fact, in their pursuit of an active industrial policy most of the Gulf governments have attempted to use oil revenues to develop a wide variety of industries. Enormous subsidies such as cheap energy, subsidized imported inputs and low real interest rates on loans, tax holidays and non-nominal rents on industrial sites have all been financed out of oil revenues. Given the lack of an initial industrial base, appreciating currency by reducing the cost of imports of capital and intermediate goods could provide a net subsidy rather than a cost to indigenous manufacturers. This may be particularly relevant to Saudi Arabia, where one of the main inputs to industrial production — workers — are largely foreign and therefore essentially imports. The same applies to other "tradable" sectors. *A priori*, therefore, it is impossible to draw any conclusions as to whether the Dutch disease has been a major obstacle to the development of manufacturing in newly industrializing oil-exporting countries.

The purpose of this paper<sup>3</sup> is to examine the effects of exchange appreciation on a major oil exporter: Saudi Arabia. In particular, we are interested in determining whether the exchange-rate appreciation associated with the post-1973-74 boom in oil revenues has tended to stifle overall manufacturing output. As a basis of comparison, the effects of exchange appreciation on the other major sectors are also estimated.

Based on the findings of this analysis, several conclusions are drawn concerning the viability of Saudi Arabian industries in

an environment of falling oil revenues and an overvalued exchange rate.

## PATTERNS OF INDUSTRIAL DEVELOPMENT

Since the mid-1970s, much of the Saudi Arabian government's attention has centered on industrial development, primarily in the downstream activities of the petroleum sector. Joint ventures with foreign partners were formed to import technology capable of utilizing oil and gas as feedstock for refining and petrochemical operations. Major petrochemical plants are operational, and most primary production facilities were completed by the end of 1985. With these facilities, Saudi Arabia is capable of producing between 4 and 5 percent of the world's primary petrochemical output.

For purposes of classification, Saudi officials distinguish among six types of industries:

1. Group I includes chemicals, fertilizers, drugs and medicine, crude-oil refining, rubber products and plastic products;

2. Group II comprises iron and steel, aluminum, structural metal products, and fabricated metal products;

3. Group III industries include structural clay products, cement and cement products, and non-metallic mineral products;

4. Group IV is composed of textiles, clothing, footwear, paper products, chinaware, and glass products;

5. Group V includes furniture, machinery, equipment, consumer appliances, air conditioners, and motor vehicles;

6. Group VI encompasses food products, bakeries, ice storage and warehousing, and carbonated products.

Saudi officials characterize heavy industry as primary and secondary industries; these designations refer both to industrial function and to the size of plants. The classification most useful for the present study is size of investment. Primary indus-

<sup>3</sup>The quantitative results surveyed here are based on the analysis presented in Robert E. Looney, "Oil Revenues and the Dutch Disease in Saudi Arabia: Differential Impacts on Sectoral Growth," *Working Paper 'R*

, Department of National Security Affairs, Naval Postgraduate School (1988).

try refers to investments greater than \$100 million; secondary industries range from \$20 million to \$100 million, and light manufacturing corresponds to investments of less than \$20 million.<sup>4</sup>

The new emphasis of Saudi industrialization clearly indicates that a movement toward highly capital-intensive operations is underway. In all categories, for firms under construction (presumably completed by the end of 1985) capital per worker is greater than for enterprises already in operation (at the end of 1983). For primary industries in Group I, capital per worker is \$1,051,000 for operating firms and \$2,302,900 for firms under construction. For purposes of comparison, during 1976 in the United States, capital per worker in 1972 dollars was \$151,000 in the petroleum sector, \$65,000 in primary metals and \$55,000 in the chemical industry.

In terms of employment, the 180 percent increase in industrial investment on new projects will increase the industrial labor force by approximately 35 percent. The change in emphasis from light manufacturing to heavy industry is primarily responsible for this relatively small increase in the industrial labor force. Employment in light manufacturing accounts for about three fourths of total employment for firms in operation but only two thirds of total employment for the firms under construction.

In spite of the massive investment in industry, the industrial labor force will remain a small proportion of the total labor force. The Saudi labor force in the period between 1985 and 1990 will be between 1.8 million and 2.0 million persons. The total industrial employment of approximately

125,000 will be about 7 percent of total Saudi employment.

On the other hand, it is estimated that by 1990 there will still be over 500,000 foreign workers in Saudi Arabia. More important, although there are no official statistics, it is clear that most workers in industry are non-Saudis.

### GENERALIZATIONS CONCERNING SAUDI INDUSTRIALIZATION

These trends, together with several recent assessments<sup>5</sup> of Saudi industrialization, suggest the following:<sup>6</sup>

1. Investments have been largely in projects seeking to utilize locally available raw materials. Basic industries have been created in isolation without the vital intermediate trans-sectoral industries which in time might allow the growth of a self-perpetuating industrial base.

2. Industrial development began as a function of factors unrelated to the socio-economic reality of the Kingdom. It depended mainly on the need to use the flared associated gas and accumulating capital. As a result, the pace of the process of industrialization was dictated by external conditions and not by the needs and capabilities of the domestic society. This led to heavy dependence on foreign manpower, expertise, management and technology.

3. Sudden easy access to wealth created a consumer-oriented society in which the relationship between productivity and reward largely disappeared. Many investment decisions were based on overly optimistic economic assumptions. The deci-

<sup>5</sup>In particular, M. H. Nagi, "Development with Unlimited Supplies of Capital: The Case of OPEC," *The Developing Economies* (March 1982); and M. Nagi, "Dimensions of Dependency in Oil Rich Countries," *The Arab Journal of the Social Sciences* (October, 1986).

<sup>6</sup>Nagi, "Dimensions of Dependency," pp. 181-182.

<sup>4</sup>Cf. Donald A. Wells, "The Effects of Saudi Industrialization on Employment," *Journal of Energy and Development*, pp. 273-284.

**TABLE**  
**Dutch-Disease Indicators**

| Country      | Oil Shock (%) Real Exchange Rate<br>(1975 = 100) |         |      |      |      | Sectoral Growth Rates (1970-81)<br>(% per annum) |        |           |
|--------------|--------------------------------------------------|---------|------|------|------|--------------------------------------------------|--------|-----------|
|              | 1970-75                                          | 1975-80 | 1970 | 1978 | 1981 | Agric.                                           | Manuf. | Non-Trade |
| Saudi Arabia | 544                                              | 168     | 292  | 104  | 69   | 5.3                                              | 6.7    | 15.8      |
| Kuwait       | 183                                              | 71      | 167  | 119  | 86   | 6.1                                              | 9.5    | 9.7       |
| Nigeria      | 73                                               | 46      | 117  | 121  | 89   | -0.3                                             | 11.7   | 9.1       |
| Mexico       | 146                                              | 20      | 83   | 124  | 89   | 3.7                                              | 7.1    | 6.8       |
| Indonesia    | 1                                                | 60      | 118  | 117  | 106  | 4.0                                              | 13.4   | 10.1      |
| Venezuela    | 48                                               | 34      | 97   | 103  | 76   | 2.7                                              | 4.7    | 5.5       |

Source: Based on Table 11.3 of Michael Roemer, "Dutch Disease in Developing Countries: Swallowing Bitter Medicine," in Mats Lundahl ed., *The Primary Sector in Economic Development: Proceedings of the Seventh Arne Ryde Symposium, Frostavallen, August 29-30, 1983* (London: Croom Helm, 1985), p. 243.

**Notes:**

Oil Shock = increment in nominal value of petroleum exports divided by GDP at beginning of each period.

Real Exchange Rate = Index of local currency-to-dollar rate divided by the implicit GDP deflator and multiplied by an index of import prices. A decrease in the index represents a real appreciation.

Non-Tradables = Construction, utilities, transport and communication, public administration and defense, and other services.

sions were often speculative rather than based on long-term economic viability. In other words, technology was selected on the basis of extrapolated-factor endowments which assumed continued high oil revenues, and not based on an assessment of the country's long-run sustainable-factor proportions. The post-1982 oil-revenue decline significantly changed the relative-factor proportions from those in existence after 1973-74.

### DUTCH DISEASE FACTORS AND SECTORAL OUTPUT

It is clear that Saudi Arabian manufacturing has been developed on the basis of both foreign workers and capital equipment. At the same time the government has offered little in the way of tariff protections. On the other hand, the government, through subsidized loans and its expanded level of expenditures, has reduced the costs of manufacturing while at the same time generating a net increase in overall demand for industrial products. Finally, there is no question that appreciation of the exchange

rate has played a role in affecting the differential expansion of sectoral output. During the period 1970-1981, the exchange rate appreciated from 292 (1975 = 100) to 69 while both the agricultural and manufacturing sectors' outputs expanded at about one half the rate of non-tradables (see Table).

To determine the effects of government expenditures along with those associated with the Dutch Disease, an equation was created of the form: Output = f[government expenditures, credit, real exchange rate, change in the real exchange rate].

Both long-run movements in the real exchange rate and year-to-year changes were included in the analysis since it was not at all clear from the literature which has the greater effect on the profitability of domestic firms. Higher values for the real exchange rate and its change indicate devaluation.

In general, the results of this analysis indicate the following in the case of tradables:

1. Government expenditures and credit have played a major role in stimulating production.

2. The problems associated with an appreciating exchange rate, the Dutch disease, have tended to reduce output. This applies to both long- and short-run movements in the case of agriculture, mining and refining, and shorter-run movements in the case of non-oil manufacturing.

In short, oil revenues have tended to work somewhat at cross purposes for the general class of tradables. On the expenditure side, oil revenues have been converted into both effective demand and available credit that would obviously not have been present otherwise.

On the other hand, the competitive effects associated with exchange appreciation have apparently tended to offset any cost-reducing effects stemming from lower-cost imports of capital, intermediate goods and labor. Here, however, non-oil manufacturing presents an interesting exception, in that the longer-run effects associated with the Dutch disease have tended to net out, leaving only shorter-run negative impacts stemming from appreciation in the real exchange rate.

In the case of non-tradables a much different pattern has developed:

1. With the exception of construction, direct government expenditures have played a minor role in stimulating production. With the exception of wholesale and retail trade, the same applies to credit.

2. On the other hand (again with the possible exception of wholesale and retail trade) in the short run, all of these sectors have received considerable stimulus through their higher domestic prices and reduced import costs associated with an appreciating exchange rate.

## POLICY IMPLICATIONS

Two competing theories provide differing insights as to the appropriate policy implications suggested by the above patterns:<sup>7</sup> the neo-classical model, and a Keynesian model.

Neo-classical analysis assumes that to the extent that the government uses all or part of its foreign-exchange surplus for internal development, structural adjustments must occur to accommodate the increase in real income. The major effects can be broken down into spending and resource-movement effects. Given that the government spends its oil revenue on internal development and assuming that both tradable and non-tradable goods have positive income elasticities of demand, i.e., normal goods, then given full employment the excess demand for non-tradable goods must increase their price relative to tradables.

This theory implies a real appreciation which induces a resource movement out of tradable sectors into non-tradables. At the same time, real appreciation shifts demand away from non-tradable towards tradable goods. The profitability and production of the tradable sector will be squeezed in the process.

In this situation any attempt by policy-makers to restore the competitiveness of the tradable sector by means of a nominal devaluation would be nullified by an equal percentage increase in domestic inflation. More precisely, at given nominal wages and prices of non-tradable goods, a devaluation in the exchange rate will decrease real wages in terms of tradable goods, thus stimulating production in the tradable-goods sector.

The impact effect of a nominal devaluation is, therefore, excess demand for labor

<sup>7</sup>Cf. Al-Sabah, pp. 130-134 for a detailed outline of these approaches. The discussion that follows is based largely on Al-Sabah's excellent summary.

emerging primarily from the tradable-goods sector, which leads to an increase in money wages and a reallocation of labor out of non-tradable goods into the tradable-goods sector. The nominal increase in money wages will continue squeezing profitability in the process, and thus production of non-tradable goods, until the excess demand for labor is eliminated.

Devaluation leads to substitution and income effects on the demand side. The impact of devaluation will reduce private real income. The reduction in real private income will decrease consumption of both goods, and the substitution effect will decrease further the consumption of tradables (but will increase the demand for non-tradables). The two forces work in the same direction in the tradable sector, leading to an excess supply of tradable goods and a balance-of-trade surplus, while the substitution effect outweighs the income effect in the non-tradable sector, leading to excess demand in this sector.

In the Keynesian framework, prices are not assumed to be as flexible as in the neo-classical approach, i.e., the ramifications of an oil boom do not necessarily result in changes in relative prices or in real wage rates. In other words, the general equilibrium adjustments to a booming sector take the form of quantity rather than relative price adjustments. An expansion in the oil sector will create a balance-of-payments surplus and an increase in real income. Aggregate demand increases in both tradable and non-tradable markets. Excess demand for tradable goods can be easily satisfied by an increase in imports and domestic tradable production. Similarly, excess demand in the non-tradables market can be eliminated by an increase in the production of non-tradables through the effective utilization of unemployed or imported resources.

In short, the squeeze of profitability in the tradables sector is not an inevitable result of an expansion of the oil sector because the external surplus can be eliminated, not necessarily exclusively through an appreciation of the exchange rate, but through both an increase in imports and the exchange rate. Furthermore, the importation of labor and capital at constant nominal exchange rates can aid in the expansion of both tradable and non-tradable goods.

In terms of the results presented in Tables 2 and 3, together with movements in sectoral employment, it would seem that the neo-classical model best describes the pattern of sectoral output in Saudi Arabia. This is particularly evidenced by the strong positive stimulus to non-tradables in both the long and short run, and similar negative impacts on tradables.

The one exception appears to be manufacturing, where a long-run disincentive does not appear to be present. This pattern is easily explained by the fact that the manufacturing sector in Saudi Arabia is extremely non-homogenous, with a modern export sector superimposed on a local more traditional non-traded set of activities, largely producing for ARAMCO and the construction sector (non-tradables). There is likely to be imperfect substitution between many of the local manufactured goods and imported products. Given the fact that the manufacturing sector comprises both tradables and non-tradables, any long-term trends in the exchange rate are likely to be neutral for the sector as a whole.

Some Keynesian elements have been present, particularly those facilitating increased output in both sectors through the massive importation of both productive inputs and additional tradable goods (during the Third Plan, 1980-85, employment increased by 8.0 percent overall, with increases of 7.7 percent in producing sectors,

and 9.8 percent in service sectors, while other manufacturing increased at a rate of 17.3 percent).<sup>8</sup> If these Keynesian effects were strong, we might expect the short-run effects of an appreciating real exchange rate to be minimal. The strong significance

of this term in all the regression equations indicates that this has not been the case.

Given likely developments in the oil sector, and the resulting inability to import massive amounts of labor and capital, the government, burdened with an overvalued real exchange rate, will find it increasingly difficult to attain its highest priority, diversification through expansion of the traded-goods sector.

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<sup>8</sup>Kingdom of Saudi Arabia, Ministry of Planning, *Fourth Development Plan, 1985-1990*, p. 32.