The Evolution of Arab Industrial Diversification: Differential Impacts of Post 1973/74 Governmental Expenditures

Robert E. Looney
Naval Postgraduate School California, U.S.A.

Introduction

The aim of this paper is to provide an empirical estimate of the extent and relative degree to which two effects commonly associated with third world government expenditures have suppressed industrial development in the Arab states. Both effects, the so called "Dutch Disease" and the "Guns vs. Butter" or military expenditure effect, are well documented in the development literature (Neary and Van Wijenbergen, 1985; Parvin and Dezhbakhsh, 1988; Looney, 88/89; and Looney 1988). Until recently, however, only a few country studies (al-Sabah, 1988; Looney, 1987, Auty, 1988; Looney, 1991) have focused on these issues in the context of the Arab World. In large part, comparative studies of the impact of these effects in the region have been impossible given the lack of comparative data. With the publication of the Arab Monetary Fund's (1987) National Income Accounts for the Arab World studies of this type can now be undertaken.

Impact of Government Expenditures: Dutch Disease Effects

The Dutch Disease model is based upon a three-factor, two commodity full employment of production and trade (Corden and Neary, 1982; Corden 1984). Specifically the economy is assumed to produce two commodities; one traded internationally (either exported or imported; or both), the other traded only domestically, since either transport costs or import restriction prevent the commodity from being internationally traded. The two sectors producing traded and non-traded goods are assumed to have capital in a fixed amount that is given and non-shiftable in the short run. The labor force is fixed in the aggregate, but mobile between the two sectors.

In short the model assumes two specific factors, one mobile factor and commodities, one internationally traded and the other not. Based on these assumptions, significantly increased oil financed public sector expenditures produce a change in relative sectoral prices. The resultant price/wage movements determine factor incomes and sectoral output (Gauzier, 1986).

Based on the above assumptions, petroleum financed expenditures impact in a predictable manner: imports expand and there is a decline in the relative price of traded goods. This is a direct result of the fact that the initial excess demand increases the price of non-traded goods (which are realistically assumed to be in limited supply in the short run). In short, higher disposable incomes, the relative price advantage of traded goods after the boom, plus lower production of traded goods at home, (due to their lower relative price and resulting fall in profitability), increases the demand for imports causing the trade balance to deteriorate. However, the country's ability to maintain a fixed exchange rate supported by dollar- dominated oil revenues, together with rising prices for non- tradeables results in an appreciation of the real exchange rate.

Given the fixed capital stock and perfectly competitive markets, the demand for labor in each sector depends on the wage/price relationship in that sector. The demand for labor depends negatively on the sectoral real product wage (ratio of the wage to sector output price). This means that a rise in the relative price of one sector by more than the wage would increase employment and thereby output in that sector. Increased output would involve higher cost per unit, since it would come about through an increase in the sector's use of labor per unit of capital, implying a falling sectoral marginal physical product of labor, because the capital stock is fixed.

The mobility of labor and the immobility of capital means that a change in the relative price of traded to non-traded goods would have an uneven impact on factor incomes. Labor mobility allows labor to shift toward the traded sector, and thereby maintain or raise its real income, while capital immobility means that the returns to capital fall sharply in the sector with a lower relative price, and returns to capital in the sector with a higher relative price rise sharply.

It is clear that the traditional Dutch Disease-oriented approach to the analysis of oil booms stresses the factors associated with the appreciation of the real exchange rate, driven by a rise in the relative price of non-traded goods. The relative shift causes a reallocation of labor towards the non-traded sector; a rise in the output of non-traded goods and a fall in the output of traded goods. Returns to capital in non- traded activities increases, while returns in traded activities fall. However there is an ambiguous impact on the real wage rate since the wage in terms of non-traded goods falls, but rises in terms of traded goods. Clearly, the net welfare impact on workers depends on the composition of the wage basket in terms of traded and non traded goods.

To sum up: the first effect related to government expenditures, the so called "Dutch Disease," stems from the overvaluation of the domestic exchange rate following an oil revenue boom. Here, it is assumed that the increase in domestic inflation stemming from stepped up governmental expenditures is concentrated in those sectors of the economy that do not face foreign competition. Due to the presence of foreign substitutes for most manufactured goods produced in the region, economic theory would predict a lower relative rate of price increase in the Arab Gulf states' industrial sectors. The resulting fall in the relative profitability of manufacturing (cheaper imports and price/cost squeeze) causes a shift in resources to non-traded activities.

For each country, the resulting suppression of the industrial sector should depend in large part on the composition of industry i.e., the relative amounts of traded and non-traded goods produced, and the extent to which domestic producers of traded goods are protected by tariffs and/or quotas from foreign competitors. **Ceteris paribus** we would expect the Gulf states to suffer the effects of the Dutch Disease relative to those of other Arab countries due to the following: (a) while most Arab countries benefited directly or indirectly from the post 1973/74 oil price increases, the oil boom was largely concentrated in the Arab Gulf countries, (b) compared to other Arab world countries the Arab Gulf states are largely open to world market forces and foreign competition.

On the surface, there is considerable evidence that most of the patterns predicted by the model outlined above have characterized development in two of the leading Gulf states, Saudi Arabia and Kuwait. For example, in a recent study, Al- Sabah (1988) found that:

1. The real share of the tradable sector in non-oil GDP increased from 9.97 percent in 1966 to more than 14.5 percent in 1974, but then declined to only 12.4 percent in 1978. In contrast, the private non-tradable sector behaved in an opposite manner–its share continued to decline in the 1960s and early 1970s (it reached 44.7 percent of non-oil GDP in 1974), but after 1974 it recovered strongly to contribute more than half of the non-oil real GDP in 1978. The public non-tradable sector, on the other hand, fluctuated with a downward trend.

2. Not only did the real growth rate of the private non- tradable sector surpass those of the tradable and public non-tradable sectors, but it also emerged in the 1978-80 period as the fastest employer. Employment in the private non-tradable sector increased from 24.46 percent of the total labor force in 1975 to more than 32 percent in 1980.

3. Even though tradable and public non-tradable sectors managed to increase their absolute numbers of labor employment (due to the large influx to foreign labor), they were not able to increase their relative shares in total employment.

4. Government expenditure on wages and salaries, which represents more than 80 percent of current expenditure, increased by about 130 percent during the period 1972-78, although the increase in the size of Government employment was no more than 48 percent in the same period, reflecting the fact that nominal wages in the Government sector increased by more than 80 percent during the six year period.

5. Government expenditures increased by more than 250 percent during the 1973/74- 1977/78 period. Given the scarcity of indigenous labor, the huge increase in Government expenditure resulted in a large increase in the cost of labor, and also in intense real estate speculation which made real estate transactions more profitable than building new housing. As a result, a severe housing shortage developed, which was reflected by the more than 80 percent increase in the rental index of housing during 1975-78.

6. In terms of relative rates of inflation, the price index for the tradable goods sector relative to the GDP deflator was continually decreasing throughout the 1974-78 period. In other words, price inflation in the tradable sector was decreasing relative to general domestic price inflation, whereas price inflation in private non- tradeables outpaced domestic inflation. Price responses of the public non-tradable sector, on the other hand, were less regular possibly because of their largely administered prices and the dominance of the Government sector.

7. The appreciation of the real exchange rate (defined by Al-Sabah as the GDP deflator for tradable goods relative to the GDP deflator for private non-tradable goods sectors) was a clear signal for private resources to be reallocated towards non-tradable activities (like real estate speculation), while profitability in the tradable sector tended to be squeezed between rising domestic costs and import competition.

8. During this period, the importance of trade to the Kuwaiti economy increased considerably. The trade balance was only about 11.5 percent of the GDP in 1970, but after the oil price increase of 1973-74, it increased tremendously to a value of more than half the 1974 GDP.

9. The movements of the nominal exchange rate, however, in the period 1974-78 appear to have had a very weak linkage with particular

components of the balance of payments. The Kuwaiti dinar's exchange rate was not very sensitive to changes in the current or capital account, perhaps because it was heavily influenced by the authorities' desire to curtail imported inflation.

10. There is a remarkable association between the real exchange rate, share of tradable goods in non-oil GDP, and non-oil trade deficits relative to GDP. Up to 1974, the real exchange rate was depreciating, with inflation in the tradable sector far exceeding inflation in non-tradeables. The rise in the relative price of tradable goods had presumably reduced the growth rate and demand for tradeables relative to non-tradeables. This factor may go a long way in explaining the 28 percent reduction in the ratio of the non-oil trade deficit in GDP during the 1971- 74 period. On the other hand, real depreciation among other things had apparently stimulated growth in the tradable sector and led to more than a ten percent increase in the share of tradeables in non oil real GDP.

11. The picture for 1974-78 is very consistent with the "Dutch Disease" model in that, in the case of the real appreciation of the exchanges rate, one would expect the growth in domestic demand for tradeables to increase relative to non-tradeables, leading to an increase in the trade deficit and hence a squeeze in profitability of the tradable sector relative to non-tradeables. In fact, real appreciation was associated with a substantial increase in the non-oil trade deficit and a noticeable reduction in the share of the tradable sector in non-oil real GDP. Interestingly enough the private non-tradable sector, which was a major loser during the period of real depreciation, made a remarkable recovery after the price shock of 1973-74.

In sum, Al-Sabah presents a convincing case for the existence of the Dutch Disease in Kuwait, at least through the 1970s. These results were also confirmed for the expanded time period, 1970-85, by Looney (1991) in a recent study which found that:

1. Primary activities - agriculture, fishing, and mining exhibit mixed results from real exchange rate appreciation, with agriculture and mining experiencing weak Dutch Disease effects (the rather low level of statistical significance of the Dutch Disease term) with fishing obtaining a positive stimulus from this effect.

2. Manufacturing activities exhibit a fairly consistent pattern of Dutch Disease effects. As anticipated, this sector, which is comprised largely of products that are tradable, experienced generally negative impacts

from both an appreciating exchange rate and an increase in relative prices.

3. As expected, services consisting largely of non- tradeables generally experienced positive Dutch Disease effects.

Finally, in his study of Saudi Arabian industrialization, Looney (1987) found in the case of tradeables that:

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.

From this, Looney concluded that in the case of Saudi Arabia oil revenues have tended to work at somewhat cross proposes for the general class of tradeables. On the expenditure side, oil revenues have been converted into both effective demand and available credit that would obviously not 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-tradeables 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 these sectors have received considerable stimulus through their higher domestic prices and reduced import costs associated with an appreciating exchange rate.

Looney found that in spite of the apparent Dutch Disease symptoms in Saudi Arabia, long run disincentives did not prevent expansion in the manufacturing sector as a whole. In part, this finding may result from 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-tradeables). There is likely to be imperfect substitution between many local manufactured goods and imported products. Given the fact that the manufacturing sector is comprised of both tradeables and non-tradeables, any long term trends in the exchange rate are likely to be neutral for the sector as a whole.

On the other hand, Looney concluded that, 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.

Impact of Government Expenditures: Military Expenditure Effects

In terms of their impact, defense (Lebovic and Ishaq, p.110) expenditures in particular and/or government expenditures in general may retard industrial development because of their potential to cause: (a) a decrease in private consumption because fewer resources (including foreign exchange) are available to the civilian sector; (b) a decrease in civilian imports and even balance of payments difficulties due to increased military imports; (c) an increase in inflation due to increased government budget deficits; (d) a distortion of the pricing system because generally military procurements are not made in open, competitive markets; and (e) shortages of managerial skills and skilled workers in a labor-constrained civilian sector leading to reduced productivity and growth.

In his examination of the Saudi Arabian economy, Looney (1987, 225-226) found that:

1. In general, military expenditures have had a net positive impact on the country's overall gross capital formation. That is, after controlling for government expenditures and oil revenues, increases in military expenditures have had a net stimulating effect on investment in the Kingdom. The same also applies to non-oil investment. Here, however, the size of the coefficient (0.30) of defense expenditures is low compared with that of government investment (0.79).
2. Military expenditures do not appear to stimulate either total private-sector expenditures or consumption. Again government investment appears particularly productive in contributing to increased levels of private sector consumption.
3. Military expenditures do not appear to increase levels of imports nearly as much as do the overall levels of government expenditures or oil revenues.

4. Interestingly enough, military expenditures appear to induce private-sector investment whereas government investment seems to crowd out or preempt resources that might otherwise flow toward this sector.

5. In the net, military expenditures appear to contribute more to overall demand than does government consumption. The stimulating effect of military expenditures on other types of government expenditures (particularly in light of the apparently negative effect of government consumption on investment) has tended to reinforce this effect.

In short, military expenditures in the Saudi Arabian context appear to have (in addition to their security value) a number of significant impacts on the private sector, not all of which are negative. In particular, several of the major areas of private sector activity appear to derive more of a stimulus from government expenditures than from other government allocations. The same also appears to apply to the overall level of gross capital formation and non-oil investment.

The next section attempts to build on these earlier individual country case studies. In doing so, the above analysis is extended to include direct comparisons of the manner in which the Dutch Disease and military expenditure effects have affected the pattern of relative industrial diversification in the Arab World.

Empirical Estimates

The methodology used to test for possible impacts of post- 1973/74 governmental expenditure effects on industrialization consisted largely of factor analysis of the sectoral composition of Gross Domestic Product for the sample of Arab countries. Two sets of estimates were made, with the first including Dutch Disease variables and the second military expenditures as a share of the central government budget (United States Arms Control and Disarmament Agency, 1989). Next, factor scores on each of the major dimensions (factors) in the data set were computed. Since these factor scores represent the ranking of individual countries on each of the five estimated factors, the structural evolution of Arab world countries can be directly compared. Specific steps involved:

1. A five factor analysis, performed on variables(1) depicting oil, imports, two largely non-traded sectors - distribution and construction, and a traded sector - manufacturing. The principal components of each of these structural variables was created out of at least two measures, usually the variable as a percent of non-oil Gross Domestic Product and of domestic absorption. The advantage of using principal components

of this type is that it avoids to a certain degree arbitrary definitions of each of the major structural elements. Non-oil Gross Domestic Product was used as a numerator since its value is more indicative of structural change than that produced by total GDP measures i.e., using total GDP as a numerator might produce results indicating increased industrial diversification when in actually it was reflecting simply the fact of falling oil revenues. The same is true, albeit to a lesser degree, using domestic absorption as a numerator.

2. Oil producing countries were differentiated from non-oil economies largely on the basis of their relative scores on a factor depicting the importance of oil in their overall economic activity. Countries receiving a positive factor score on the oil factor were classified as oil-producers, while those with a corresponding negative score were classified as non-oil producers. The one exception is Bahrain which was classified as an oil producer, despite the fact that it received a negative score for several years.

3. To get a picture of the evolution of the impacts of Arab Gulf industrialization associated with the-1973/74 oil price shocks, three years were selected for each of the Dutch Disease and military expenditure exercises. In each case, the terminal year of 1985 was selected. Perhaps because they are relatively subtle, the effects of the Dutch disease appear to have taken several years after the 1973/74 oil price increases to manifest themselves - 1979 was the first year selected. On the other hand, military expenditures appear to have had a more immediate impact following the 73/74 oil price increases - 1977 was the first year selected for analysis of their impact.

4. The impact of both the Dutch Disease and military expenditure effects were estimated by taking the differences in country scores on the manufacturing factor computed with Dutch Disease and military expenditure variables included, and those produced with these variables omitted. In other words, to what extent did Dutch Disease and military expenditures cause the pattern of individual country industrial diversification to deviate (relative to other Arab World countries) from what it would have been without the presence of these factors?

5. In the results presented below (Tables 1-6), the factor score for manufacturing represents the relative ranking of countries on this dimension with the Dutch Disease effects included (Tables 1-3) and then with military expenditures incorporated (Tables 4-6). The figures in

parenthesis represent the factor scores on the manufacturing dimension with Dutch Disease effects and military expenditures omitted.

The factor analysis produced a number of interesting results. First, for the Dutch Disease effects (Tables 1-3):

I. **The Dutch Disease Effects**

1. At the beginning[2] of the period 1979, (Table 1), the Dutch disease and related inflationary effects do not appear to have had a widespread effect on the region's industrial diversification efforts i.e., these variables had standardized regression coefficients on the industrial factor of 0.28 and -0.15 respectively.
2. The Dutch effects actually appear somewhat neutral at this point in time in that no stimulus was provided to non-traded activities such as construction or the distributive trades. Inflation per se, however, did provide a positive stimulus to the distribution sector (or at least was highly associated with the expansion of these activities).
3. Developments in the oil sector did not provide a positive stimulus to industrial diversification. Instead this sector was largely responsible for movements in the construction activity. The same was also true for movements in per capita real income and the level of per capita real income i.e., instead of providing a stimulus to the industrial sector, these variables were largely a reflection of price and production policies in hydrocarbons.
4. The factor scores in industrial development derived by dropping the DUTCH and INFLATION terms from the factor analysis indicated that, aside from Qatar, all the oil producing countries would have had fairly significant improvements in their industrial performance in the absence of these effects. The gains would have been greatest in Kuwait, followed by Libya, Oman, Bahrain and the UAE (increased factor scores by 0.81, 0.78, 0.65, 0.55 and 0.52 respectively). As expected, the Dutch disease and inflationary effects had only minor impacts on the industrial diversification efforts of the non-oil economies of the Arab world.

Table 1

Arab States, structural Impact of Inflation and the Dutch Disease, 1979

standard Regression Coefficients-Oblique Factor Pattern

Variable	Factorl oil/cons	Factor2 industry	Factor3 imports	Factor4 distribution	Factor5 Dutch
oil/GDP	0.96*	0.05	-0.09	0.04	- 0.14
oil/abs	0.93*	0.19	-0.09	0.06	-0.16
const/abs	0.87*	- 0.14	0.00	- 0.14	0.19
const/GDP	0.85*	- 0.31	0.05	- 0.20	0.18
per cap in	0.84*	0.13	0.10	0.22	- 0.17
GDP growth	0.69*	0.12	0.11	0.15	0.08
manuf/abs	- 0.04	0.97*	- 0.12	0.09	0.22
manuf/GDP	0.06	0.91*	- 0.07	0.02	0.26
serv/abs	0.00	0.73*	0.41	- 0.15	- 0.13
imports/GDP	0.04	- 0.23	0.94*	0.06	0.18
imports/abs	-0.08	0.10	0.90*	0.20	0.14
servic/GDP	0.13	0.40	0.62*	-0.28	- 0.17
INFLATION	-0.07	- 0.15	0.12	0.87*	- 0.50
dist/abs	0.00	0.28	- 0.11	0.85*	0.22
dist/GDP	0.23	- 0.18	0.17	0.70*	0.29
DUTCH	- 0.07	0.28	0.16	- 0.01	0.91*
Eigen Values	5.91	2.97	2.19	1.51	1.18

Country Factor Scores

Oil Producers						
UAE	2.09	-0.94	(-0.42)	0.26	0.45	1.57
Bahrain	0.16	1.32	(1.87)	1.94	2.00	0.34
Saudi Arab	1.35	-0.42	(-0.18)	0.65	-1.17	0.04
Oman	0.33	-1.13	(-1.78)	0.62	0.68	0.45
Qatar	1.36	0.22	(-0.29)	0.52	1.57	-1.85
Kuwait	0.99	2.67	(1.86)	0.84	-0.38	-0.43
Libya	0.73	-0.52	(-1.30)	0.78	-1.02	-0.42
Iraq	0.67	-0.81	(-0.27)	-0.86	0.43	1.24
Algeria	0.02	0.34	(0.74)	-0.73	-0.51	-0.13
Non-oil producers						
Jordan	- 0.74	-0.38	(-0.05)	0.90	0.48	0.70
PDRY	-0.88	-0.45	(-0.36)	0.40	- 0.22	0.35
YAR	- 0.85	-1.13	(-0.92)	-0.28	-0.41	- 0.49
Egypt	- 0.82	0.28	(0.55)	0.93	0.15	0.98
Tunisia	-0.66	0.50	(0.54)	-0.55	-0.68	0.68
Sudan	- 1.09	-0.18	(-0.04)	-1.97	- 1.67	0.32
Somalia	- 1.16	-0.80	(-0.65)	-1.46	- 0.99	- 1.89
Morocco	- 0.68	1.44	(1.34)	-0.85	- 0.91	0.22
Mauritania	- 0.82	0.01	(-0.63)	0.70	- 1.13	- 1.69

Note: ( ) figures = factor scores without DUTCH and Inflation; abs = absorption

Table 2

Arab States, Structural Impact of Inflation and the Dutch Disease, 1981

Variable	Factor1 oil/cons	Factor2 distribution	Factor3 industry	Factor4 services	Factor5 imports
Standard Regression Coefficients-Oblique Factor Pattern					
const/GDP	1.00*	- 0.15	0.12	- 0.17	0.05
const/abs	0.95*	0.07	0.22	- 0.16	- 0.06
oil/GDP	0.77*	0.19	- 0.18	0.32	- 0.06
oil/abs	0.71*	0.30	- 0.15	0.36	- 0.10
dist/abs	- 0.20	0.98*	0.09	- 0.19	0.05
dist/GDP	0.23	0.79*	- 0.02	- 0.28	0.32
GDP growth	0.27	0.78*	0.06	0.07	- 0.01
capita GDP	0.44	0.64*	- 0.02	0.23	-0.02
manuf/GDP	0.05	0.20	0.83*	0.09	- 0.09
DUTCH	0.29	-0.12	0.79*	- 0.15	0.18
manuf/abs	- 0.19	0.39	0.71*	0.12	- 0.13
INFLATION	- 0.03	0.10	- 0.76*	- 0.36	- 0.04
SERV/GDP	0.19	- 0.35	- 0.05	0.93*	0.26
serv/abs	-0.21	0.06	-0.22	0.89*	0.01
import/GDP	0.05	- 0.01	- 0.05	0.11	0.96*
import/abs	- 0.23	0.35	0.06	0.15	0.84*
Eigen Values	6.19	3.13	1.86	1.53	1.38
Country Factor Scores					
Oil producers					
UAE	1.41	1.75	0.70 (0.56)	-0.04	-0.07
Bahrain	-0.60	2.37	1.45 (2.39)	0.64	1.83
Saudi Arab	1.93	- 0.28	-0.34 (0.07)	0.42	-0.06
Oman	0.74	0.21	-1.23 (-1.91)	0.02	0.91
Qatar	1.05	1.64	-0.38 (0.17)	2.08	-0.96
Kuwait	0.36	0.54	0.18 (-0.34)	1.53	0.52
Libya	1.34	- 1.23	-0.63 (-1.17)	0.03	0.70
Algeria	0.41	- 0.44	0.54 (0.32)	-0.93	-0.78
Non-oil producers					
Jordan	-0.50	- 0.28	0.72 (0.33)	-0.81	1.40
PDRY	-0.52	- 0.98	-0.05 (-1.18)	-0.64	0.86
YAR	-0.61	- 0.72	-0.87 (-0.79)	-0.99	-0.02
Egypt	-0.89	- 0.02	0.84 (0.66)	-0.54	-0.75
Tunisia	-0.73	-0.41	1.01 (0.67)	0.08	-0.44
Sudan	-0.88	0.02	-0.50 (-0.54)	-1.27	-1.16
Somalia	-1.29	-0.06	-2.15 (-0.67)	-0.92	-1.97
Morocco	-0.86	- 0.40	1.75 (1.61)	0.87	-1.07
Mauritania	-1.12	-1.12	-0.94 (-0.64)	1.49	0.40

Note ( ) figures = factor scores without DUTCH and Inflation; abs = absorption.

Table 3

Arab States, Structural Impact of Inflation and the Dutch Disease, 1985

Standard Regression Coefficients-Oblique Factor Pattern

Variable	Factorl oil/serv	Factor2 industry	Factor3 distribution	Factor4 imports	Factor5 construct
ser/GDP	0.98*	0.16	- 0.23	0.09	-0.12
ser/abs	0.92*	0.27	- 0.11	- 0.20	- 0.15
oil/abs	0.89*	- 0.20	0.16	-0.09	0.13
oil/GDP	0.86*	- 0.25	0.13	0.04	0.08
per cap in	0.60*	0.00	0.45	0.07	0.17
man/GDP	-0.03	0.91*	0.10	0.01	0.03
man/abs	- 0.01	0.87*	0.20	- 0.27	- 0.04
DUTCH	- 0.05	0.80*	0.01	0.14	- 0.03
INFLATION	- 0.18	- 0.53*	0.20	- 0.49	- 0.29
dist/abs	- 0.06	0.16	0.91*	0.22	- 0.12
dist/GDP	0.01	0.00	0.89*	0.20	- 0.08
GDP growth	0.09	0.10	0.63*	0.25	0.26
imp/GDP	0.01	- 0.08	- 0.01	1.00*	- 0.10
imp/abs	- 0.08	0.03	0.18	0.95*	- 0.11
con/GDP	- 0.03	- 0.04	- 0.09	-0.01	- 1.02
con/abs	0.01	0.05	0.01	- 0.22	0.97*
Eigen Values	6.02	2.60	2.29	1.78	1.28

Country Factor Scores

Oil Producers

UAE	1.02	0.85	(1.21)	2.13	0.23	1.62
Bahrain	0.32	0.85	(1.24)	2.04	1.17	0.43
Saudi Arab	0.66	-0.03	(0.08)	- 0.29	0.76	1.68
Oman	0.77	-1.10	(-1.70)	0.70	0.48	0.36
Qatar	2.43	0.43	(1.10)	0.42	- 0.72	0.33
Kuwait	1.33	-0.12	(-0.63)	- 0.33	1.22	- 0.70
Libya	0.86	-0.45	(-0.96)	- 1.23	- 0.67	1.16
other						
Iraq	-0.22	0.18	(-0.04)	0.14	- 0.21	0.18
Jordan	-0.67	0.40	(0.17)	0.00	1.31	- 0.53
PDRY	-0.68	-0.07	(-0.35)	- 1.17	1.12	- 0.17
YAR	-0.82	-0.93	(-0.86)	- 0.91	- 0.37	- 0.59
Egypt	-0.53	0.80	(0.72)	0.03	- 0.79	- 0.96
Algeria	-0.44	0.32	(0.39)	- 0.30	- 1.00	1.71
Tunisia	-0.45	0.79	(0.64)	- 0.51	- 0.30	- 0.69
Sudan	-1.34	-0.34	(-0.36)	1.33	- 1.59	- 1.09
Somalia	-1.20	-2.22	(-1.07)	- 0.40	- 1.49	- 1.50
Morocco	-0.14	2.08	(1.82)	- 0.87	- 0.66	- 0.73
Mauritania	-0.91	-1.45	(-1.38)	- 0.79	1.49	- 0.50

Note: ( ) figures = factor scores without DUTCH and INFLATION; abs = absorption

By 1981 (Table 2) the situation had changed to the extent that:

1. Dutch disease and inflationary effects now loaded highest on the industrial factor (with standardized regression coefficients of 0.79 and -0.76 respectively).
2. While the over-valued real exchange rate, DUTCH, tended to retard industrial development, it provided only a moderate stimulus to non-traded sectors such as services (-0.15) and distribution (-0.12).
3. As the immediate effects of the oil price increases began to wear off, both the increase in real per capita GDP and the level of real percapita GDP began to be associated more with activity in the distribution sectors, rather than developments in oil.

Finally, as of 1985 (Table 3):

1. The Dutch Disease and inflation variables were still loading strongly on the industrial development dimension. Income growth was most closely associated with distributional activates, while per capital real income was again most closely associated with developments in hydrocarbons.
2. In terms of its relative impact, the Dutch Disease was again concentrated largely in the oil producers with Qatar's industrial efforts most negatively affected (followed by Bahrain, the UAE and Saudi Arabia).

The results (Tables 4-6) from the analysis of increased post 1973/74 defense expenditures also produced some interesting patterns[(3)]. Initially, in 1977 (Table 4):

II. The Military Expenditure Effects

1. Military expenditures loaded (with the expected negative sign) most heavily on industrial development.
2. As with the Dutch Disease, the effects of defense expenditures were strongly felt in the Gulf states with Saudi Arabia, the UAE and Bahrain suffering the largest declines in industrial development (evidenced by declines in industrial factor scores of 0.33, 0.30 and 0.28 respectively). Egypt, however, had the largest decline in industrial output, with its industrial score decreasing by 0.36 when defense was added to the factor analysis.

By 1980, defense (Table 5):

1. Loaded quite heavily (with a standardized regression coefficient of 0.95) on industrial output.
2. Again, the effects of military expenditure were felt quite heavily in the Gulf with the UAE, Bahrain, Saudi Arabia and Oman suffering sizable potential declines in their industrial development (declines in industrial factor scores of 0.77, 0.47, 0.31 and 0.30 respectively). Two other countries, Jordan and Morocco, also experienced sizable declines in industrial potential due to excessive military expenditures.

Finally in 1985 (Table 6):

1. While still negatively correlated with industrial diversification, military expenditures were most affected by developments in the oil sector. Inflation, however, still retarded industrial development.
2. In terms of individual countries, the negative impacts on industrial development were pretty well spread across all of the Gulf states, albeit at lower levels than in the previous two years examined. Saudi Arabia and Oman had the highest reduction in industrial factor scores (0.18) followed by Kuwait (0.13), the UAE and Bahrain (0.08), and Qatar (0.07). Of the major non-oil countries, Jordan and Egypt again suffered greatest suppression of industrial development stemming from effects associated with their defense expenditures.

Conclusions

In sum, the Dutch Disease effects appeared to build up in the late 1970s/ early 1980s. Although their impact was concentrated in the Gulf States, this impact was waning by 1985. While this effect retarded the region's development somewhat, the non- traded sectors of the economy do not appear to have received any tangible benefits from the Dutch Disease/ inflation effects associated with the post 1973/74 oil price boom.

The impact of defense expenditures on Arab industrial development industrial appears to have followed a pattern similar to that associated.

Table 4
Arab States, Structural Impact of Inflation and Defense Expenditures, 1977

Standard Regression Coefficients-Oblique Factor Pattern

Variable	Factor1 oil/cons	Factor2 industry	Factor3 imports	Factor4 distribution	Factor5 inflation
oil/GDP	1.01*	0.01	- 0.02	0.03	- 0.14
oil/abs	1.00*	0.11	0.02	0.04	- 0.14
const/GDP	0.84*	- 0.12	0.00	- 0.07	0.31
const/abs	0.81*	0.02	0.01	- 0.01	0.42
manuf/GDP	0.07	0.97*	0.18	0.12	0.04
manuf/abs	-0.06	0.95*	0.04	0.07	0.06
DEFENSE	-0.06	- 0.64*	0.22	- 0.07	- 0.58
imports/GDP	0.07	- 0.02	0.96*	- 0.03	- 0.05
imports/abs	-0.06	0.22	0.93*	0.07	0.11
dist/abs	-0.10	0.16	- 0.04	0.95*	0.12
dist/GDP	0.15	- 0.21	0.14	0.85*	- 0.08
INFLATION	0.02	- 0.13	0.65*	0.03	0.59*
EigenValues	4.86	2.83	1.60	1.08	0.73

Country Factor Scores

oil producers

UAE	1.50	-1.13	(-0.83)	0.30	1.42	0.99
Bahrain	- 0.22	1.13	(1.41)	2.26	1.96	1.78
Saudi Arab	1.94	-0.10	(0.23)	0.35	- 1.13	0.86
Oman	0.87	-1.80	(-1.93)	0.58	1.12	- 1.35
Qatar	0.95	-0.69	(-0.71)	0.30	0.55	1.57
Kuwait	0.99	1.55	(1.11)	0.94	0.38	- 1.95
Libya	1.15	-0.79	(-0.91)	-0.11	0.86	- 0.04
Algeria	0.04	0.77	(0.68)	-0.52	-0.35	0.40

Non-Oil Producers

Jordan	-0.77	-0.13	(0.04)	1.11	0.10	- 0.87
PDRY	- 0.74	0.31	(0.15)	0.54	- 0.33	- 0.37
YAR	- 0.73	-1.14	(-1.12)	-0.46	- 0.50	- 0.09
Egypt	- 0.87	0.82	(1.18)	-0.61	- 0.14	- 1.20
Tunisia	- 0.75	0.68	(0.38)	-1.09	- 0.18	0.42
Sudan	- 1.03	0.13	(-0.07)	-1.62	1.20	0.30
Somalia	- 1.00	-0.16	(-0.37)	-1.49	- 1.46	0.13
Morocco	- 0.64	1.56	(1.65)	-0.86	- 0.33	- 0.26
Mauritania	- 0.69	-1.00	(-0.88)	0.37	- 1.47	- 0.30

Note: ( ) figures = factor scores without DEFENSE.

Table 5
Arab States, Structural Impact of Inflation and Defense Expenditures, 1980

Standard Regression Coefficients-Oblique Factor Pattern

Variable	Factor1 oil/cons	Factor2 industry	Factor3 imports	Factor4 distrubution	Factor5 inflation
con/abs	0.95*	0.13	0.06	- 0.14	- 0.08
oil/abs	0.92*	0.06	- 0.12	0.29	0.09
oil/GDP	0.91*	- 0.06	0.06	0.20	0.06
const/GDP	0.90*	- 0.06	0.16	- 0.28	- 0.06
manuf/abs	- 0.09	0.78*	0.16	0.16	- 0.22
manuf/GDP	0.07	0.76*	0.25	0.01	- 0.30
DEFENSE	-0.08	- 0.95*	0.30	0.09	- 0.18
imports/GDP	0.10	- 0.15	0.96*	- 0.01	0.06
imports/abs	-0.05	0.21	0.95*	0.15	0.15
dist/abs	- 0.10	0.24	0.03	0.93*	0.04
dist/GDP	0.13	- 0.30	0.18	0.78*	- 0.11
INFLATION)	0.00	- 0.09	0.20	- 0.02	0.99*
Eigen Values	4.57	3.38	1.67	0.85	0.71

Country Factor Scores

Oil producers

UAE	1.50	-1.04	(-0.27)	0.86	1.13	- 1.60
Bahrain	- 0.41	1.82	(2.29)	2.58	1.80	- 0.37
Saudi Arab	1.55	-0.06	(0.25)	0.58	- 1.26	0.24
Oman	0.47	-2.34	(-2.04)	0.43	1.13	0.49
Qatar	1.36	0.19	(-0.26)	- 0.41	1.21	0.82
Kuwait	0.53	0.53	(0.25)	0.44	0.64	- 0.93
Libya	1.13	-0.66	(-1.00)	0.04	- 1.06	0.93
Iraq	0.77	-0.31	(-0.33)	0.11	0.01	0.57
Algeria	0.36	0.89	(0.84)	- 0.68	- 0.72	- 0.42

Non-Oil producers

Jordan	- 0.73	-0.53	(0.34)	1.19	0.21	- 0.86
YAR	- 0.84	-0.88	(-0.86)	- 0.14	- 0.89	0.77
Egypt	- 0.94	0.77	(0.67)	- 0.37	0.55	- 0.14
Tunisia	- 0.84	0.88	(0.68)	- 0.52	- 0.38	- 1.06
Sudan	- 1.03	-0.07	(-0.57)	- 1.58	0.54	1.44
Somalia	- 1.26	-0.13	(-0.73)	- 1.42	- 1.38	1.81
Morocco	- 0.87	1.18	(1.54)	- 0.90	- 0.34	- 1.47
Mauritania	- 0.76	-0.52	(-0.66)	- 0.21	- 1.20	- 0.22

Note: ( ) figures = factor scores without DEFENSE; abs = absorption.

Table 6
Arab States, Structural Impact of Inflation and Defense Expenditures, 1985

Standard Regression Coefficients-Oblique Factor Pattern

Variable	factor1 oil/cons	Factor2 industry	Factor3 imports	Factor4 distribution	Factor5 inflation
oil/abs	0.93*	- 0.07	0.06	0.12	0.09
DEFENSE	0.90*	- 0.14	- 0.10	- 0.20	- 0.01
oil/GDP	0.87*	0.04	- 0.06	0.09	0.06
import/abs	- 0.17	1.02*	0.00	- 0.04	0.17
import/GDP	- 0.02	0.96*	- 0.19	- 0.07	0.03
INFLATION	- 0.25	- 0.53*	0.42	- 0.15	0.44
manuf/GDp	- 0.02	0.04	0.99*	- 0.03	0.04
manuf/abs	- 0.08	- 0.17	0.96*	- 0.06	0.12
const/GDP	- 0.01	0.02	- 0.13	1.02*	- 0.02
const/abs	- 0.05	- 0.11	0.05	0.99*	0.07
distrib/GDP	0.18	0.26	- 0.03	0.04	0.94*
distrib/abs	-0.03	- 0.07	0.22	0.03	0.94*
Eigen Values	4.57	3.38	1.67	0.85	0.71

Country Factor Scores

Oil producers						
UAE	1.51	0.24	1.29	(1.37)	1.28	- 0.82
Bahrain	- 0.57	1.28	0.70	(0.78)	0.51	1.54
Saudi Arab	0.38	0.53	-0.16	(0.02)	1.55	- 1.00
Oman	1.43	0.25	-1.52	(-1.34)	0.37	0.80
Qatar	1.74	-0.62	0.58	(0.75)	0.37	- 0.09
Kuwait	0.87	1.10	-0.31	(-0.18)	-0.61	- 0.50
Other						
Jordan	- 0.41	1.23	- 0.04	(0.20)	-0.60	0.03
YAR	-0.59	- 0.68	- 1.18	(-0.86)	-0.83	- 1.04
Egypt	- 0.25	- 0.86	0.63	(0.93)	-1.03	0.09
Algeria	-0.58	- 0.94	0.49	(0.67)	1.90	- 0.52
Tunisia	- 0.86	- 0.28	0.53	(0.73)	-0.60	-0.55
Sudan	- 1.34	- 1.94	- 1.00	(-0.57)	-1.02	2.18
Morocco	- 0.82	- 0.58	1.52	(1.77)	-0.54	- 0.82
Mauritania	- 0.48	1.24	- 1.55	(-1.28)	-0.76	- 0.96

Note: ( ) figures = factor scores without DEFENSE; abs = absorption with the Dutch Disease effects: its impact was negative and largely felt in the oil-producing states. On the other hand, the post-1973/74 suppressing effects associated with defense expenditures appeared first, with the Dutch Disease effects following several years later. By the mid-1980s, both effects, but in particular military expenditures, had shown definite signs of receding.

One can only speculate as to the future. It would appear, however, that the Dutch Disease may present more of a continued hindrance to industrial development in the Gulf. A major problem with the Dutch Disease is that much of the past investment in industry is likely to overlay capital intensive plant and equipment - a direct result of incentives set up by the over-valued real exchange rate. These investments may be irreversible in that once in place their technologies may not be capable of adapting to new, labor intensive methods of production dictated by lower valued real exchange rates.

Military expenditures have probably had their greatest negative effect through preempting skilled labor from industrial activities. With the development of a much larger number of qualified graduates from the region's expanded school system, this problem should be alleviated over time. Perhaps this explains in part the waning impact military expenditures have had on the region's industrial development.

NOTES

1 - The oil variables were: valued added in oil divided by: non-oil GDP, and domestic absorption. This was the case also for the manufacturing, distribution, construction and import variables. The Dutch Disease variable proper was depicted as the appreciation of the real exchange rate between 1974 and the period examined. The real exchange rate is in local currency per US dollars, so higher values for this figure indication devaluation of the currency. Inflation was represented by the change in the domestic price deflator from 1974 to the period examined. Variables depicting income: the growth in real per capita income between 1974 and the period examined; and real per capita income in the period examined were also included in the factor analysis.

2 - It should be noted that there is a change in the variable rankings in Tables 1- 6 - - that is the variables comprising say Factor1...Factor5 often vary from year to year. This pattern simply reflects the manner in which factors are calculated. As the sectoral compositions change so do the patterns of correlation between variables. The net result will be to change the relative importance of some sectors in explaining the overall variance of the data set.

3 - Because of missing observations on the military expenditure variable, fewer non-military variables had to be included in the factor analysis (in order to avoid singularity in the matrix used to derive factor scores). Since they were not important in the Dutch Disease analysis, the income and service variables were dropped from the factor analysis of military expenditures.

Bibliography

Al Sabah, Mohammad.

1988 "The Dutch Disease in an Oil-Exporting Country: Kuwait." OPEC Review XII: 129-144.

Arab Monetary Fund

1987 National Accounts of Arab Countries, 1974-1985. Abu Dhabi: Arab Monetary Fund.

Auty, Richard.

1988 "The Economic Stimulus From Resource Based Industry in Developing Countries: Saudi Arabia and Bahrain". Economic Geography 64: 209-225.

Corden, W.M.

1984 "Booming Sector and Dutch Disease Economics: Survey and Consolidation". Oxford Economic Papers 37: 359-380.

Corden, W.M. and J.P. Neary

1982 "Booming Sector and Deindustrialization in a Small Open Economy". The Economic Journal 92: 825-848.

Gauzier, A.

1986 "Prices and Output in Two Oil-Based Economies: The Dutch Disease in Iran and Nigeria". IDS Bulletin 17: 14-20

Lebovic, James H., and Ashfasq Ishaq.

1987 "Military Burden, Security Needs and Economic Growth in the Middle East". Journal of Conflict Resolution 31: 106-138.

Looney, Robert E.

1987 "The Impact of Defense Expenditures on the Saudi Arabian Private Sector". Journal of Arab Affairs 6: 198-229.