

The Determinants of Arab Countries Demand for Saudi Exports: Panel Data Evidence

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Abstract

This study empirically estimates the critical parameters of export demand function for Saudi Arabia by using annual time series-cross section data (1984-2008) and by applying fixed effects model. The empirical results confirm that there exists a significant relationship among the real value of Saudi Arabia exports to Arab countries and trade partner's real income, relative export price, and trade partner's real exchange rates. The estimation results show that all variables have a significant relation and its theoretical expected sign (positive for both real income and real exchange rate but negative for relative price), and the elasticities of real income is larger than unity (elastic). But relative price and real exchange rate are smaller than unity (inelastic).

Keywords: Export demand, Fixed Effects Model, Trade policy, Saudi Arabia

1. Introduction

The Saudi economy recorded impressive growth in 2010 as global economic recovery lifted up oil prices, and enlarged fiscal spending by the government boosted domestic demand and accelerated the growth in non-oil GDP. The actual budget recorded a surplus of SAR 87.7 billion or 5.4 percent of GDP in 2010 against a deficit of SAR 86.6 billion or 6.2 percent of GDP in the previous year. The ratio of public debt to GDP declined from 16.1 percent in 2009 to 9.9 percent in 2010. The current account of the balance of payments recorded a surplus for the twelfth year consecutively amounting to SAR 250.3 billion or 14.9 percent of GDP in 2010 (Saudi Arabian Monetary Agency (SAMA), 2011).

There is no doubt that, exports play an important role in the economic growth and development of many countries. In this respect, measuring income and price elasticities of export demand has received much attention because of the implications on trade policy and balance of payments issues. The higher the foreign income elasticity of export demand, the more significant exports will be as an engine to economic growth. In addition, the higher the export price elasticity, the more competitive is the international market for exports of a particular country, and thus a real devaluation will be more successful in promoting export earnings. As such, an aggregate export demand estimate linking exports with a measure of foreign income and relative prices is important in many conventional trade models. Export demand elasticities are also important for meaningful export forecasts, planning, and policy formulation. Because of the importance of the trade sector for Saudi Arabia's economic growth and development, the central aim of this paper is to estimate the determinants of Saudi Arabia's exports during the period 1984-2008.

As shown in table 1, real total merchandise trade has increased from 263.94 billion riyal to 1374.09 billion riyal during the period 1984-2008, with average growth rate about 7.12%. This accompanied with a rising trade/GDP ratio from 60% to 90.2% at the same period. This means that, Saudi Arabia's economy during this period directed to be more trade openness economy. Table 1 also illustrated that, Saudi Economy has achieving increasingly merchandise trade surplus with average growth rate about 17.89 during the period 1984-2008.

< Insert Table 1 Here >

Merchandise exports as shown in Table 2 represented 90.85 percent of Saudi Arabia total exports in 1984 and increased to 97.1 percent in 2008 with average annually growth rate about 8.59 percent during the period , this may dues basically to the continuing rise in oil prices. On the other hand the Saudi Arabia services exports achieved annually average growth rate during the same period about 3.24 percent which is less than half the rate of growth of

merchandise exports.

< Insert Table 2 Here>

As shown in Table 3, oil exports represented the largest share of Saudi Arabia merchandise exports with a percent about 96.37% in 1984, this may due basically to the continuing rise in oil prices, but this ratio were taken to shrink gradually to reach 89.65% in 2008 although the annually average growth rate about 8.26 percent, where the non-oil exports increased with average export rate 13.44 percent and this is a good results because it helps to diversify the structure of merchandise exports which increased gradually during the same period from 3.63 percent to 10.35 percent.

< Insert Table 3 Here>

In analyzing the Saudi Arabia's real merchandise export performance, the structure of real exports has to be analyzed. Table 4 present the structure of real merchandise exports in 1984 and 2008; the average growth rates of real merchandise exports components during the period and its shares of total real merchandise exports. Saudi economy is considered one of the most oil-economies in the world. Mining industries has accounted the largest share of merchandise exports amounted by 96.71% in 1984, but this percentage declined to 89.77% in 2008. This means that, Saudi economy is directed to be diversified economy, which depends on many sectors not only mineral sector. But in general, we can say that the process is going very slowly.

On the other hand, chemical products sector achieved the highest share of non-oil sectors whether in 1984 or 2008. The Base Metals and Articles of Base Metals sector and Electrical Machines, Equipment and Tools sector has achieved average growth rates exceeded 30 percent during the period 1984-2008.

< Insert Table 4 Here>

Figure 1 also illustrates the changes of the structure of merchandise exports during the period 1984-2008. Plastic products exports shares witnessed an obviously increase because of the high growth rate during the period.

< Insert Figure 1 Here>

Table 5 illustrates the country grouping that stated in SAMA report, all countries exports growth rate witnessed an increase with the exception of Europe not European union group, which witnessed negative growth rate during the period. Asian (Not-Arab or Islamic Countries) represented more than half of the Saudi total exports whether in 1984 or 2008. It increased with average growth rate about 15.09 percent.

Some country grouping shares increased such as North America, Gulf Cooperation Council, other Arab league countries and African (Not-Arab or Islamic Countries). On the other hand, some country grouping decreased such as Islamic (Non-Arab Countries), Oceania, South America, European Union and other Europe (Not European union Countries).

< Insert Table 5 Here>

Table 6 presents Saudi Arabia's main trading partners of real value of exports in 1984 and 2008. As it can be seen from table, Bahrain has the highest share in real exports in 1984 and 2008, that although this share decreased from 45.7 percent to 24.1 percent during this period. During the period 1984-2008, Syria achieved the highest average growth rate about 20.13 percent. Morocco and Egypt also achieved high growth rates about 19.69 percent and 17.49 percent respectively. The relative importance of some countries in total real value of exports has been decreased such as Oman, Jordan, Sudan and Syria. In the other hand, the shares of some countries at the same period obviously increased, such as Egypt, Morocco and Kuwait. In the other Arab countries, we observe large changes between 1984 and 2008, where the share increased obviously from 19.4 percent in 1984 to 37.6 percent in 2008. Figure 2 shows also the changes of real value of merchandise exports to Saudi Arabia's main trading partners. In general, all countries achieved average growth rates exceeded 6 percent and the total of Arab countries exports achieved annually average growth rates about 10.53 percent.

< Insert Table 1 Here>

< Insert Figure 2 Here>

2. Recent Empirical Studies

A large volume of literature exists on the study of export demand functions for developing and developed countries. However, from the empirical literature surveyed, no recent study was found that estimates the determinants of the exports demand function for Saudi Arabia.

Ibrahim, M. A. (2011) estimated the critical parameters of merchandise export demand function for Egypt by using annual time series-cross section data (1990-2008) and by applying fixed effects model. The empirical results confirm

that there exists a significant relationship among the real value of exports for Egypt and trade partner's real income, relative export price, and trade partner's real exchange rates. The estimation results show that all variables have a significant relation and its theoretical expected sign (positive for both real income and real exchange rate but negative for relative price), and the elasticities of real income, relative price and real exchange rate are smaller than unity.

Abdul Samad, A. (2009) investigated the economic determinants of Medium Density Fiberboard (MDF) exports with the export price, exchange rate and average world GDP for a panel of twenty eight countries over the sample period 1996-2005. The twenty eight countries considered in this study are known as exporting countries on MDF product. The results indicate that the economics determinants of MDF export are export prices and domestic exchange rate. Of which the export price are most significant impact on export demand. However, the income variable in this study shown not significantly influences the export of MDF product. Husein, J. (2008) estimated the critical parameters of the export demand function for Jordan during the period (1970-2004). The empirical results obtained show that foreign income is a significant variable in explaining the demand for exports and that foreign income elasticity is much larger than unity and Export demand for Jordanian goods is unitary price elastic.

Khedhiri and Bouazizi (2007) estimated demand elasticities for Tunisian exports to the major European trading partners by using panel data, they found a significant relationship between real exchange rate index, foreign income and Tunisian exports. Khedhiri and Bouazizi found foreign income to be elastic (2.95), while real exchange rate to be inelastic (-0.162). They conclude that devaluation of Tunisian currency will slightly improve export demand but may be very costly since it will have a depressing effect on domestic output.

Reinhart (1995) found that relative prices are a significant determinant of demand for exports in developing countries; however, the elasticity tends to be low, suggesting that large relative price swings are required to have an appreciable impact on trade patterns. Senhadji and Montenegro (1998, 1999) obtained results on relative price elasticities of exports demand similar to those of Reinhart (1995).

Guisan, M. and Cancelo, M. (2002) considered supply side determinants in addition to the traditional demand factors when estimating the determinants of exports for 25 OECD countries. Using data for the period 1960-1997, their econometric model included supply side variables such as domestic GDP, domestic private consumption and a measurement of human capital (proxied by educational levels of the population) in addition to foreign income and relative export price. Their results reveal that external demand (foreign income), domestic GDP, and average years of schooling have a positive and significant impact on exports, while both consumption and relative prices have a significant and negative impact on exports.

3. The Model and the Methods

To estimate the major trade partner's demand for Saudi Arabia's exports, we will use the traditional specification of export demand function that relates the value of a country's exports to trade partners buying power (foreign income represented in gross domestic product of trade partners), the ratio of the price of its exports to the trade partner's export price and trade partner's real exchange rate.

This study hypothesized that the explanatory variables have a linear relationship with the exports of Saudi Arabia. To reach the objective of the study, we will use the balance panel data. There are several advantages in using this type of data. First, the use of annual data avoids the problems due to seasonality. Second, by using the different origin countries as observational units, an increase in the range of variation of the variables is considered. Finally, the utilization of a pooled time-series/cross-sectional data set enables us to have more degrees of freedom than, and reduce the problem of multicollinearity, hence improving the accuracy of parameter estimates (Garin-Munoz and Martin Montero, 2007; Hsiao, 2003).

We estimate a fixed effects model to explain the demand for exports by using data from eight countries from major destination countries for Saudi Arabia's exports which represented in 2008 about 62.4 % of total Saudi Arabia's real exports (as it shown in table 6). These eight countries are: Bahrain, Kuwait, Oman, Egypt, Jordan, Morocco, Sudan and Syria. The data set pointed out the period between 1984 and 2008 ($t=1984, \dots, 2008$).

Accordingly, the estimated demand function for real exports in Saudi Arabia involves the following variables;

$$RVX_{i,t} = f(RGDP_{i,t}, TCPI_{i,t}, REX_{i,t}) \quad (1)$$

where $RVX_{i,t}$ is the real value of exports from Saudi Arabia to country i during year t in constant prices (2005=100), $RGDP_{i,t}$ is the real gross domestic product in each of the importing country i during year t in constant prices (2005=100); The relative price variable $TCPI_{i,t}$ is given by the indicative ratio of Saudi Arabia's consumer price index (2005=100) to consumer price index (2005=100) of the importing country i during year t and $REX_{i,t}$ is the real exchange rate of importing country i in the year t .

$$TCPI_{i,t} = (CPI_{Saudi,t} / CPI_{i,t}) \quad (2)$$

Where, $CPI_{Saudi,t}$ is the consumer price index of Saudi Arabia in year t , $CPI_{i,t}$ is the consumer price index of importing country i in year t .

There are several functional forms that can be used to determine the demand for exports. In this study, the model to be estimated would be:

$$\log RVX_{i,t} = \beta_0 + \beta_1 \log RGDP_{i,t} + \beta_2 \log TCPI_{i,t} + \beta_3 \log REX_{i,t} + \xi_{i,t} \quad (3)$$

We expect β_1 to be positive, an indication that as trade partner real income rises, their demand for goods and services increases, including those of Saudi Arabia; β_2 to be negative reflecting the fact that as relative price level of Saudi Arabia to trade partner rises, as Saudi Arabian exports become more expensive than trade partner's domestic goods and services, which make the foreign consumers transfer to their domestic goods. Moreover, we expect β_3 to be positive, an indication that as trade partner real exchange rate rises as Saudi Arabian goods and services become cheaper than trade partner domestic goods and services.

The loglinear form is chosen, since it is found to be the most appropriate function form for demand functions in many empirical studies (Khan and Ross (1977), Boylan et. al.(1980), Emran and Shilpi(1996). It also has the added advantage of reducing hetroskedasticity (Maddala 1992).

4. Data and Variables

This study will use the annual data from 1984 to 2008 for the eight Arab countries as stated earlier in Table 6. The real value of total exports to these countries was proxied by dividing Exports at current prices in riyal (obtained from Saudi Arabian Monetary Agency (SAMA), <http://www.sama.gov.sa>) by the Consumer price index of Saudi Arabia (2005=100) that obtained from (<http://data.worldbank.org/indicator/>). The real income at constant prices (2005=100) for each country is calculated by dividing gross domestic product (in dollars) of these countries at current prices by the Consumer price index of these Countries (2005=100), both of them obtained from World Bank Development Indicator (<http://data.worldbank.org/indicator/>). The trade partner's exchange rate is taken from international macroeconomic data set published by the Economic Research Service (ERS) in the US Department of Agriculture (USDA). Since the exchange rate is expressed as domestic exporting countries' currencies per US dollar, a decline in exchange rate indicates a real depreciation of the US dollar. We selected the domestic currencies per US dollar exchange rate because Saudi Arabia has a fixed exchange rate regime, with the riyal pegged to the US\$. The dollar/riyal exchange rate has remained fixed at 3.75 since June 1986. Finally, it is noted that, since all variables are converted to natural logarithms, the estimated coefficients can interpreted as elasticities.

5. Empirical Results

For the estimation of equation (3) we have used E-views econometric software to obtain the fixed effects panel estimates of the model by SUR Method.

Table 7 shows the results from the estimation. The results of Table 7 show that the model performs satisfactorily.

In Table 5, we see the results with the fixed effects estimator. The explanatory power is very high (Adjusted $R^2=0.815$). The explanatory variables are significant at 1% level with expected sign (Log(RGDP), Log(TCPI) and Log(REX).

From estimation results as it shown in table 4, trade partner's real income, relative price, and trade partner's real exchange rate elasticities carry their theoretical expected signs. The elasticity coefficient of trade partner's real income (Log(RGDP)) is positive, significant and larger than unity. This means that changes in trade partner's real income, ceteris paribus, will lead to nearly larger changes in real export earnings. For instance, a one percent increase in foreign real income induces a 1.91 percent increase in real export earnings, all else unchanged. The estimated relative price elasticity is negative, significant, and is smaller than unity (-0.3), which means that changes in relative price, ceteris paribus, will lead to nearly small changes in real export earnings. The elasticity coefficient of trade partner's real exchange rate is positive and is significant and smaller than unity. This implies that as trade partner's real exchange rate increase, Saudi Arabia will capture a relatively small portion of real value of exports. For instance, a one percent increase in trade partner real exchange rate induces a 0.22 percent increase in real export earnings, all else unchanged.

< Insert Table 7 Here >

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Table 1. Some key trade indicators of Saudi Arabia in constant prices (2005=100) (1984-2008)

	Value (million riyal)		Average Annual Growth rate (%)	% of GDP*	
	1984	2008	1984-2008	1984	2008
Merchandise Exports	139062.843	1004968.923	8.59	31.4	66
Merchandise Imports	124881.153	369123.770	4.62	28.2	24
Total Merchandise Trade	263943.995	1374092.693	7.12	60	90.2
Merchandise Trade Surplus	14180.65	735845.153	17.89	3.2	48.3

Source: Saudi Arabian Monetary Agency (SAMA), *Annual Report*, No. 47, <http://www.sama.gov.sa>

* calculated by the author.

* GDP at constant prices (2005=100) calculated by the author.

Table 2. Saudi total exports in constant prices (2005=100) 1984-2008

	Value (million riyal)		Average Annual Growth rate (%)	*Share %	
	1984	2008	1984-2008	1984	2008
Merchandise Exports	139062	1004969	8.59	90.85	97.1
Services Export	14000	30110	3.24	9.15	2.9
**Total Exports	153062	1035079	8.29	100	100

Source: Saudi Arabian Monetary Agency (SAMA), *Annual Report*, No. 47, <http://www.sama.gov.sa>

* calculated by the author.

** World Bank, *World Bank Development Indicator*, <http://data.worldbank.org/indicator/>.

Table 3. Saudi merchandise exports in constant prices (2005=100) 1984-2008

	Value (billion dollar)		Average Annual Growth rate (%)	%	
	1984	2008	1984-2008	1984	2008
Oil Exports	134017	900989	8.26	96.37	89.65
Non-oil Export	5045	103980	13.44	3.63	10.35
Total Merchandise Exports	139062	1004969	8.59	100	100

Source: Saudi Arabian Monetary Agency (SAMA), *Annual Report*, No. 47, <http://www.sama.gov.sa>

* calculated by the author.

Table 4. The structure of real value of merchandise exports in constant prices (2005=100) and its yearly average growth rates 1984-2008

Exports	Value (million riyal)		Yearly Average Growth Rate* (%)	% of Merchandise Export*	
	1984	2008	1984-2008	1984	2008
Mineral Products	134483.59	902220.28	8.25	96.71	89.77
Foodstuffs	174.59	7587.61	17.02	0.13	0.76
Chemical Products	1535.55	30865.12	13.32	1.1	3.07
Plastic Products	30.50	22772.24	31.74	0.02	2.27
Base Metals and Articles of Base Metals	194.57	8979.46	17.31	0.14	0.89
Electrical Machines, Equipment and Tools	8.41	5461.37	30.97	0.01	0.54
Other Exports	1	8725.54	45.95	0	0.87
Re-exports	2634.62	18357.31	8.42	1.89	1.83
Total Merchandise Exports	139062.84	1004968.92	8.59	100	100

Source: Saudi Arabian Monetary Agency (SAMA), *Annual Report*, No. 47, <http://www.sama.gov.sa>

* calculated by the author.

Table 5. Saudi Arabia's total real merchandise exports, Yearly average growth rates and shares by country grouping in constant prices (2005=100) (1984-2008)

To	Exports (Million Riyal)		Yearly Average Growth Rate (%)	Relative Importance* (%)	
	1984	2008		1984	2008
Gulf Cooperation Council	5906.60	70741.32	10.9	3.86	6.83
Other Arab League Countries	5391.25	54613.69	10.13	3.52	5.28
Islamic (Non-Arab Countries)	7359.07	46717.45	8.01	4.81	4.51
Asian (Non-Arab or Islamic Countries)	72236.01	516877.4	8.54	47.19	49.94
African (Non-Arab or Islamic Countries)	626.84	21195.72	15.8	0.41	2.05
Oceania	2379.05	2765.74	0.63	1.55	0.27
North America	9321.62	173730.2	12.96	6.09	16.78
South America	4539.34	11091.5	3.79	2.97	1.07
European Union	22419.02	105876.4	6.68	14.65	10.23
Europe not European Union	5308.16	1296.434	-5.7	3.47	0.13
Other Countries	17575.04	30173.146	2.28	11.48	2.92
Total Exports	153062	1035079	8.29	100	100

Source: Saudi Arabian Monetary Agency (SAMA), *Annual Report*, No. 47, <http://www.sama.gov.sa>

* calculated by the author.

Table 6. Saudi Arabia's total real exports to Arab trade partners and Yearly average growth rates by country in constant prices (2005=100) (1984-2008)

To	Exports (Million Riyal)		Yearly Average Growth Rate (%)	Relative Importance* (%)	
	1984	2008		1984	2008
Bahrain	5170.383	30255.54	7.64	45.76	24.14
Kuwait	352.3349	4812.468	11.51	3.12	3.84
Oman	30.50	2237.383	19.60	0.27	1.78
Egypt	300.7993	14362.17	17.48	2.66	11.46
Jordan	1410.391	14026.18	10.04	12.48	11.19
Morocco	1351.493	8120.239	7.76	11.96	6.48
Sudan	459.613	1958.672	6.23	4.07	1.56
Syria	26.29365	2451.974	20.8	0.23	1.96
Study Group	9101.809	78224.63	9.38	80.56	62.4
Other Arab Countries	2196.045	47130.39	13.63	19.44	37.6
Arab Countries (Total)**	11297.85	125355	10.55	100	100

Source: Saudi Arabian Monetary Agency (SAMA), *Annual Report*, No. 47, <http://www.sama.gov.sa>

* calculated by the author.

Table 7. Estimation results for the fixed effects model (1990-2008)

Dependent Variable: LOG(RVX_?)				
Method: Pooled EGLS (Cross-section SUR)				
Date: 02/09/12 Time: 14:34				
Sample (adjusted): 1984 2008				
Included observations: 25 after adjustments				
Cross-sections included: 8				
Total pool (balanced) observations: 200				
Linear estimation after one-step weighting matrix				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.606678	0.354574	1.711007	0.0887
LOG(RGDP_?)	1.910852	0.105800	18.06103	0.0000
LOG(TCPI_?)	-0.299894	0.045206	-6.633968	0.0000
LOG(REX_?)	0.215314	0.059748	3.603700	0.0004
Fixed Effects (Cross				
KUW--C	-0.002145			
BAH--C	3.873477			
OMA--C	-0.223649			
MAR--C	-2.666827			
JOR--C	2.050334			
EGY--C	-1.938187			
SUD--C	0.141692			
SYR--C	-1.234694			
Effects Specification				
Cross-section fixed (dummy variables)				
Weighted Statistics				
R-squared	0.814899	Mean dependent var		5.162668
Adjusted R-squared	0.805105	S.D. dependent var		12.66400
S.E. of regression	1.018298	Sum squared resid		195.9800
F-statistic	83.20617	Durbin-Watson stat		1.215440
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.602692	Mean dependent var		6.861366
Sum squared resid	155.7438	Durbin-Watson stat		0.521303

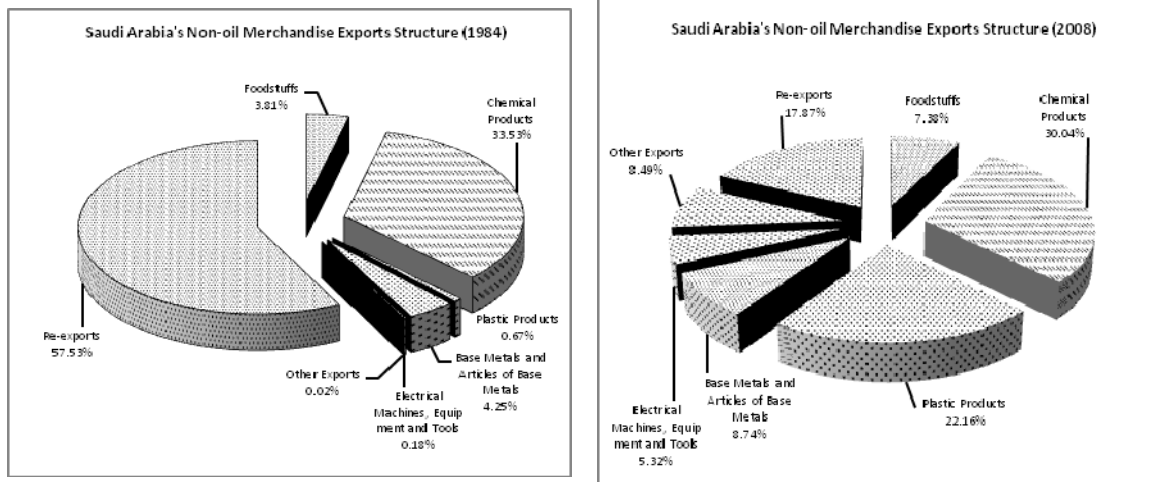


Figure 1. The structure of merchandise exports 1984-2008

Source: Drawn by the author and calculated from Table 4.

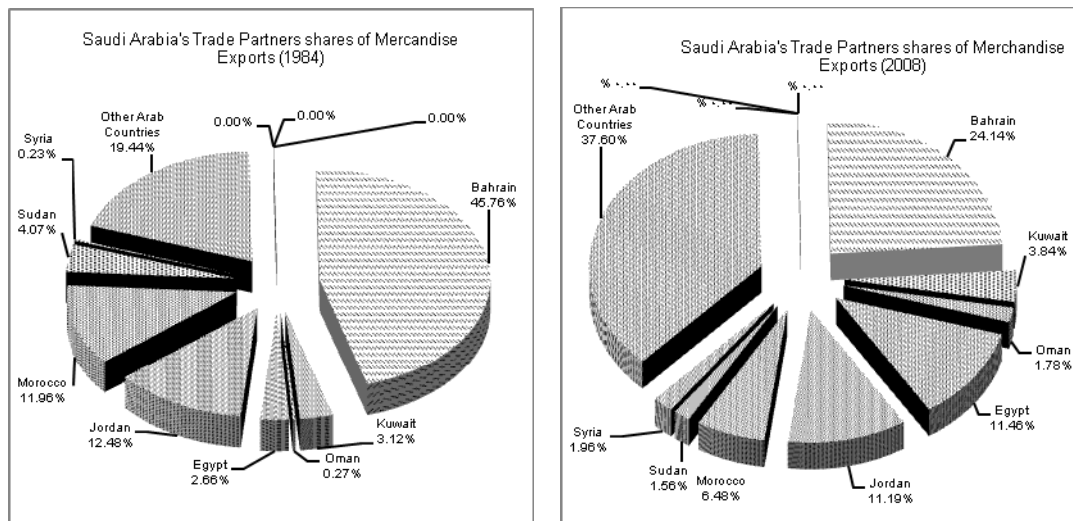


Figure 2. Saudi Arabia's Arab countries trade partners shares of real value of non-oil exports (2003-2008)

Source: Drawn by the author from Table 6.